EURAS JOURNAL OF HEALTH

Volume 1 Issue 1 December 2020

General DOI: 10.17932/EJOH.2020.022
Volume 1 Issue 1 DOI: 10.17932/EJOH.2020.022/2020.101

https://ejoh.euras-edu.org/en/2020-december-volume-1-issue-1/

EURAS JOURNAL OF HEALTH

ISSN : 2757-7996 / E-ISSN :

Language
English

Publication Period
Published issues per year: June, December

Volume 1 Issue 1 - December 2020

Correspondence Address
EURAS-Eurasian Universites Union Secretariat, Besyol Mah. İnonu Cad. No: 38 Istanbul-Turkey
Phone: 0212 444 1 428
Fax: 0 212 425 57 59
Web: https://ejoh.euras-edu.org/en/
E-mail: ejoh@euras-edu.org

Printed by
Armoni Nuans Matbaa
Adress: Yukarıdudullu, Bostancı Yolu Cad. Keyap Çarşı B- 1 Blk. N.24 Ümraniye/İST.
Phone: 0216 540 36 11 - Faks: 0216 540 42 72
E-mail: info@armoninuans.com

Editorial Board

Contents

DOI Numbers

General DOI: 10.17932/EJOH.2020.022
Volume 1 Issue 1 DOI: 10.17932/EJOH.2020.022/2020.101

AIMS

EURAS Journal of Health (EJOH) is a peer-reviewed international scientific open access periodical published in accordance with independent, unbiased, and double-blind peer-review principles. It publishes two issues per year. The publication language of the journal is English. The journal is the official publication of the Eurasian Universities Union (EURAS).

EJOH aims to contribute to the literature by publishing manuscripts of highest scientific level in all fields of health including medicine with clinical and basic fields, nursing, physiotherapy, audiology, nutrition and dietetics, dentistry, public health, epidemiology, and all relevant disciplines.

SCOPE

The journal targets all healthcare professionals in all health disciplines and publishes original experimental and clinical research articles, case reports, reviews of experts in a specific field, letters to the editors and brief reports on new methods or techniques or preliminary results of original studies. The journal conforms to the Principles of Transparency and Best Practice in Scholarly Publishing (doaj.org/bestpractice).

From The Editor

It is with great pride and enthusiasm that I invite you to read the EURAS Journal of Health (EJOH). A great amount of labor has gone into the development of EJOH and I believe you will see that effort is reflected in our issues. With double-blinded peer review, EJOH is able to open up an advantageous platform for qualified manuscripts providing the readers with keen perspectives.

I am extremely proud of and grateful to our editorial and scientific advisory board members. I consider mysef fortunate to be able to draw upon their individual and collective knowledge, experience and judgement. As you examine the organization of the boards, you will see a remarkable breadth of disciplines, skills , and backgrounds. Without the guidance, support, and feedback of the board, it would have been impossible to offer the selections you will find in this issue.

I would like to thank our authors who shared their valuable works with our journal. Together we will work towards making EJOH a truly influential publication. Original articles, case reports, brief reports, letters to the editor and special issue proposals are always welcome.

With my best regards

Prof. Dr. Zeynep Çiğdem KAYACAN

The Interdependence of Society, Environment and Health and Its Relevance for Societal Development

Ulrich LAASER[1]

Abstract

The relationship between society, environment, and health is governed by values that relate to targets as well as to the process leading there. Health scientists have to obey these universal rules and regulations on how to promote change. Given limited resources, scientists have also to calculate cost and benefit but it is the state to ensure the fundamental human right to live a healthy life under suitable conditions. Taking into account the "Preventive Paradoxon" introduced by Geoffrey Rose and the mandate for public health accredited to the European Commission in the Maastricht Treaty on European Union, progress is to be achieved bottom-up and top-down. Science can help to find the right balance through careful analysis and monitoring but this is no longer a medical domain on its own; it is linked to all societal sectors. The structure to investigate this field is the modern School of Public Health, attached to universities and reaching out to relevant institutions. Four deficits have to be overcome, the information deficit as well as the social deficit, the preventive deficit, and the regulatory deficit. Training for research and serving the health of populations is a mission well worth the effort. The One Health concept offers a unique current framework. For the development of health, it is vital to learn from each other in the belief that health and knowledge know no barriers.

Keywords; *public health, health sciences, code of ethics, value system, society, environment, health system deficits, Germany*

1 Prof. Dr. med. , DTM&H, MPH, University of Bielefeld, School of Public Health, POB 10 01 31, D 33501 Bielefeld, Email: ulrich.laaser@uni-bielefeld.de
DOI:10.17932/EJOH.2020.022/ejoh_v01i1001

Surah 107 reads:

Hast thou observed ? He who denieth the religion,
that is he who repelleth the orphan,
and urgeth not the feeding of the needy.
So, woe unto those who are praying,
who are heedless of their prayer,
those who would be seen,
but withhold the goods.

Surah 107 (1) in its first and older section, likely written down before the Hijra, explains to us the role an accepted religion, or in a wider sense an accepted value-system, has for the organization of society; and in the latter part of the Surah, from after the Hijra, Prophet Mohammed (PBUH) points to the fact that those central values may not only formally be accepted, but have to be truly believed. Thus only values which are convincing to everybody, or at least to a large majority, can fulfil this function in a society and it is interesting to note that as to the content of the core values, at least as far as Surah 107 is concerned, its demands come very close to the Sermon on the Mount of the New Testament.

Quite certainly, it is not common to begin from this angle as religious or ethical aspects usually are taken into account only marginally, or not at all, in a world which cries increasingly for precise figures and sharp analysis. But when we argue for a comprehensive view on the three dimensions of society, environment, and health, we will find that their relationship is governed by values, at least implicitly, whether we like it or not.

The Value System

Here we may differentiate between values which relate to objectives or targets in *content* areas as, for example, to enhance the quality of life or to achieve "Health for All" as the World Health Organization expresses and reiterates it in the Millennium Development Goals (2) and the Sustainable Development Goals (3). The other category of values might be called values which describe the *process* in order to achieve those objectives, i.e. not the "What?" but the "How?" is of interest here. The pure existence of process values as separate from outcome values contradicts the saying that success justifies the means. For us as human beings and members of our societies the ethical consensus on how we want to achieve certain objectives may be

even more relevant than the outcome. As scientists, however, we usually are much more interested in the effects of interventions, at least we are asked to be as society expects solutions from us for the many problems burdening the people not *l´art pour l´art*.

To elaborate on the introductory part of Surah 107 (1) observations are reported here. In our time we see observation as an instrumented process which comprises the perception of facts and their identification based on prior experience. No longer do we live, however, in a world where observation is that of an unchangeable nature and, therefore, be naive and without questioning the observed reality. On the contrary, there is nothing in our world which we do not evaluate in terms of good and bad, to be preserved or to be changed. In all civilized, as opposed to a few remaining natural in fact tribal societies, there is a dominance of change over preservation which is signified by the globally positive connotation of the term "development". This is not a so-called Western value but has become a universal one. If so, what are the criteria for the dominating processes of change? The most interesting quality of these criteria is that they cannot be derived. They are axiomatic in the sense of a declaration of belief or of will. They have to be set. The renunciation of violence, for example, is a vital requirement for the functioning of a society. Broad participation of people in the decision making process is a precondition for full exploitation of intellectuality and creativity in a society and, based on this, for its global competitiveness. The Wall in Berlin was brought down through the slogan "*Wir sind das Volk*" (We are the people!) without any violence, but with an air of extreme happiness. The government, almost two months later, did not even think of unification when the citizens changed the wall breaking slogan into "We are *one* people". However admittedly, this was the first successful but unbloodied revolution in German history (4).

Most of the process values of today can be tracked down to the three sets of principles of the French revolution: *Liberté, Egalité, Fraternité*. That is, we are determined to pursue our goals without domination and manipulation and we urge actively not equity but equal opportunities for everybody and we insist that basic needs will be taken care of in our communities predominantly as empowerment for a decent life. If we all could agree globally to these values, or at least those of us around the Mediterranean Sea, the famous "Clash of Cultures" could be transformed into a positive effort for development. Maybe then we would not have seen the violent conflicts, wherever the Christian and the Islamic world overlap: Bosnia, Cyprus, and Lebanon.

Health scientists should - like everybody - obey these universal rules and regulations on how to promote change. Their domain, however, is to analyse and reflect the direction, the means, and the resulting changes. Here utilitarian ethics (5,6) can almost declare victory as world-wide *cost benefit* thinking has gained ground. Is that economic dimension of thinking ethical at all? Not if there were unlimited resources! However, that clearly is not the case. In a situation where our means are restricted, every spending for less beneficial purposes, is to the disadvantage of at least some people, whose status could have been improved. The largest benefit, to the greatest possible number is the yardstick and, therefore, the most efficient use of money is mandatory. Squandering resources is unethical! According to the analysis of the Cochrane Centres, up to one third of medical procedures are ineffective or even inefficacious, i.e. not evidence based. On the other hand, even with efficient schemes in the area of clinical care, what is their relative efficiency as compared to other contributions to fulfilment in human life? And what is considered to be fulfilment? It is obvious that these preferences are culturally determined depending on historical, geographical, and traditional factors. Thus, the results of decision making processes are different according to culturally determined priorities set in a league table of measures, ranking quality adjusted years of life saved. The ranking depends on the specific valuation of benefits and involved costs**,** i.e. on the people´s "Willingness to pay" how much for what in a specific society. This setting of priorities according to criteria of efficiency is of immediate relevance to the kind of decisions to be taken by a government. However, governments do not always like the transparency of choices, which are made explicit by a calculation of benefits and costs. To its fullest, this approach is linked to an open society. Nevertheless, all administrations in our time have to observe, along these principles, the three dimensions taken up here: Society, environment, health, and the way they interact.

Society

What constitutes a *society*? In most simple terms it is a coherently organized population on a defined territory and**,** if it is politically autonomous**,** we call it a state. However, the latter quality is not essential as**,** for example**,** Germany was not a state between 1803 and 1871, but there was a feeling of national commonalities expressed in the term of the "*Kulturnation*" which referred to common cultural characteristics like a German literature. Certainly the Palestinians constitute a society in that sense as they lack most

of the qualities of an independent state: they are not coherently organized, their territory is not defined and the Palestinian Authority has only limited powers. Nevertheless, nobody hesitates to consider the Germans in the 19th century or the Palestinians today a distinct population, a society or even a nation.

The late Geoffrey Rose, Professor of Epidemiology at the London School of Hygiene and Tropical Medicine developed the argument that the health of a population is not the result of a simple addition of individual biographies, but is determined by indivisible dynamics of its own. In his paper on "Relative Merits of Intervening on Whole Populations Versus High-Risk Individuals Only" (7) he remarks with reference to his own Whitehall data: "It then transpires that most of these deaths do not arise in the clinical part of the range, where risks are high but numbers are few; most arise at lower levels, where the risk to an individual is small but the numbers are large." This is the formula of the *"Preventive Paradoxon"* considered by many to be Geoffrey Rose's greatest idea. Later-on he coined also the term "Population strategy": Causes of incidence are identified and in consequence modified, whereas the high risk individuals are diagnosed and treated. From the Intersalt data (8), it can be shown that the correlation between mean and prevalence for not only physical, but also for behavioural variables is extremely high in 32 different national settings with a wide spectrum of levels of blood pressure, body mass, alcohol intake and sodium intake. Theoretically the shape of the distribution could change, e.g. by therapy for the high risk group which would cause the prevalence to be independent of the mean. But that is not so, in Geoffrey Rose´s words in one of his last papers, (9) on "The population mean predicts the number of deviant individuals"): "Traditional preventive strategy is concerned with identifying and helping minorities with special problems, by treating their risk factors or seeking changes in their behaviour. The underlying aim is to truncate the risk distribution, eliminating the tail but not interfering with the rest of the population. In practice such truncation proves hard or impossible to achieve..., the spread of a distribution is not readily compressed. The close link between mean and prevalence implies, that to help the minority the "normal" majority must change... The health of society is integral".

In a historical period of growing external globalization bringing together persons, ideas and experiences, at the same time**,** we can observe a process of internal disintegration within our societies, i.e. between:

- the rich(er) and the poor(er): Social disintegration,
- the young(er) and the old(er): Intergenerational disintegration,
- the (since longer established) natives and the (more recent) immigrants: Cultural disintegration.

It has been demonstrated in European societies that in spite of generally improving life expectancy**,** some lower social status groups may not only lag behind**,** but even they may worsen. What is the reason? More frequent exposures to high risks, less access to medical and other services, unhealthy behaviours? The composition of factors could be different for each of those disadvantaged groups. *But at least in theory we would not accept unequal chances for health!*

For decades e.g. in Germany**,** there was an unquestioned contract between the generations in that the younger working ages would pay the living of the old. The demographic dynamics and the exploding and costly technical options at the end of life have undermined this arrangement. Germany**,** therefore introduced an additional obligatory insurance for nursing care. It was an annoying long-lasting battle between the various lobbies who had to pay. *But at least in theory one would not accept unequal chances for health!*

Migration should be welcome in Europe as a means for growing together but to the contrary there is exclusion and ghettoization. Even in countries with much lower immigration rates than for Germany, xenophobic reactions can be observed. We should consider the provision of specially tailored health care as a means of integration: language problems, differing health beliefs and specific health problems are to be taken care of. Since the last decades Germany is confronted with elderly migrants from the first migration wave in the fifties - mainly from Turkey - left alone by their disintegrating families and unable of going home to their native countries. At the same time there is the experience of a different new immigration wave from the East of Europe. *But at least in theory, one would not accept unequal chances for health!*

If the population according to Rose reacts as a whole, the role of the state in intervention has to be reconsidered. To refer to a German Jewish physician Salomon Neumann (10) who lived towards the end of the 19th century in Berlin: He created one of the first health insurances for workers leading later-on to Bismarck´s Social Insurance Legislation of 1883. Neumann's main postulates concerned the obligation of the state to organize public

health care and to protect the health of its people. The state should ensure the basic human right to live a healthy life under suitable conditions, improve care for the poor, establish health offices at all administrative levels, organize free medical associations, provide medical statistics of the causes and effects of disease, and last, but certainly not least, let the people participate in its administration. This reference may give an idea how old and long established these concepts are. It is interesting to note that the first step to develop a European health policy has been the mandate for public health accredited to the European Commission in Article 129 of the Maastricht Treaty on European Union (11): "The Community shall contribute towards ensuring a high level of human health protection by encouraging cooperation between Member States and, if necessary, lending support to their action. Community action shall be directed towards the prevention of diseases, in particular the major health scourges, including drug dependence, by promoting research into their causes and their transmission, as well as health information and education. Health protection requirements shall form a constituent part of the Community's other policies".

Environment

However, modern governments have not to take care of present problems alone but of the survival of the future generations too. The sustainability of their policies is at stake**,** and, as much as this is a global problem, we have passed already the historical period of national governments and now witness the emergence of world politics. There is an obvious interrelationship between society and *environment* as well as between health and *environment*. Some of the central issues like family planning are much debated - although less between the Mediterranean religions of revelation (12) but rather between the religious position of the holiness of life and the secular value of the well-being of a population in economic and environmental terms.

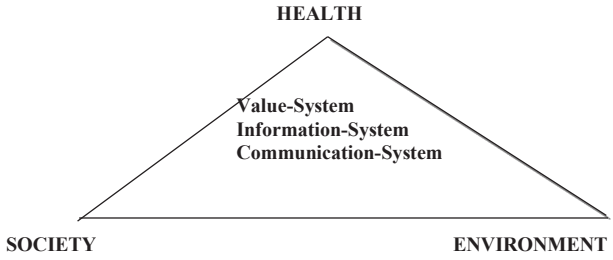


Figure 1: *Elements of the "Pyramid of Development"*

The infrastructure to handle this pyramid of development has to be amended by information as a technical means and communication as a means of social organization. As much as we need an ethical orientation in terms of values, we need also information and that is scientifically validated information on the reality, the world as it is. We need an open communication system across barriers within the society, and we need *fora* for debate, which are not too exclusive and give a chance to all sections in society to participate and express their view. I believe the last German revolution remained without bloodshed, because very early on so-called "Runde Tische" - round tables - had been established which mitigated the confrontation and still did not allow an escape from historical forces. The pyramid of development also constitutes a pyramid of Public Health Policy as the good government has to consider its three angles altogether, if only one fails, the others suffer. Science can help to find the right balance between them as public health cannot be built on either uncritical administrative execution top-down or, likewise, uncritical action-movement bottom-up without careful analysis and monitoring. In the context of public health, this is to mean socio-epidemiological research, - in its three dimensions: descriptive in terms of health statistics; analytic in terms of comparative studies; and interventive in terms of controlled trials. But it is important to realise that public health is an applied science for and among the people, it does not take place in the laboratory. Therefore, it would be a misunderstanding to withhold action until perfect proof from perfect studies is available. More relevant it is to work with the results from imperfect studies being critically aware, that they are imperfect and new results might change the course of events.

In recent years the understanding of the ONE WORLD, alive by a coherent interactive system of air, land, water, plants, animals and humans has gained affirmation and a ONE HEALTH movement is growing mainly bottom-up, a development which has recently be underlined by the Corona pandemic (13). The health of humans depend on the coherence of all natural elements (14).

Health

If we think of these three dimensions in the triangular arrangement of figure 1, health may be rightly at the top. *Health* has become something like a secular religion, a pursuit of happiness, especially after the all-inclusive definition as physical, mental and social well-being by the World Health Organization after World War II. Health promotion has an even broader connotation as it involves general competencies and general living conditions. The Americans nicely call that "Healthism". This is no longer

a medical domain on its own, it is an issue linked to all societal sectors**,** and, promptly, inter-sectoral strategies for health have been defined. But the broader the meaning of health, the less chance we have to be healthy without any impediments, i.e. to be one hundred percent healthy. There is always something left to desire! According to Karl Popper, we can falsify complete health and define what is detrimental to health, but according to him it is impossible to determine positively what health is. Therefore, health has an imprecise meaning or poetically: it always lies beyond the horizon. For that reason**,** we are tempted to spend all our financial resources, if necessary, and in every life there comes a moment where we would give everything to avoid serious illness and death. A often cited joke about cigarettes states "Smoke less, die healthy!". The contradiction *in adjecto* ´die healthy´, is it a joke or could it have a serious meaning for this discourse? The approach can be passive or active to set limits to the claim for total health. The passive one is taken by most of today's governments through cost containment policies that are freezing expenses at a level of around 10% of the GNP, where we have not any argument for that quota except custom. This policy usually leaves the distribution of resources to tradition and vested interests. Rational planning is tried only occasionally and cost-benefit-analysis even more so. The active approach, on the other hand, is much more demanding: it aims at a public consensus on what we can afford, under which circumstances, and when life should be allowed to begin and to end. Then health is not everything and certainly not worth everything, but only the individual, social and material means to lead a decent life. What is adequate under these circumstances? The consensus, certainly, will be and has to be different for different societies and for different historical periods. Science can identify the facts, define the issues, and lay out scenarios for various options, but the scientist cannot make the decisions instead of the people, although very often he sees himself in this way. Decisions of that kind have to be made by society, as a whole, and its legitimate bodies.

Health Sciences

If we agree that the pyramid of development has to be built with the indispensable help of scientific reasoning**,** then where do we find this kind of comprehensive science? Over the last years the renaissance of the Health Sciences and the debate on a New Public Health (15) as coined by the European office of the World Health Organization - meant to be different from the classic concepts of hygiene - has led to a new model of institutionalization which is characterized by modern or New Schools of

Public Health (NSPH). This institutional entity is not any longer directly related to the Ministry of Health as has been traditionally so**,** but by now is independently based as an own faculty in the setting of the university; however, contractually linked to a number of important health providers in the region with a well-defined cooperation for training and research in public health based on mutual interest.

Delineating from the aforementioned fundamentals what kind of training institutions do we need? First the NSPH should have defined - not only voluntary - links with the political and administrative system. Certainly this statement is not popular everywhere in spite of the fact that many of today's schools are state-based institutions. Nevertheless**,** it remains true that exerting influence in an open society is a two way business. NSPH need a direct and permanent connection to the decision making process in the administration if they want to channel their services to the relevant needs. So much of the indication for the work, the task-setting might come legitimately from the society mediated through the state and the semi-public institutions, charged with certain services like - e.g. in Germany - the independently practising physicians.

Second, in order to fulfil their duties properly and according to scientific standards, the modern NSPH requires a direct link to universities, most likely in terms of a usually postgraduate organization of training schemes leading to academic degrees, and in terms of applied research.. Funding policies are to support such cooperation. Legal provisions should facilitate exchange of academic staff with related faculties, additionally through international or national scholarship schemes. Often, the notorious antagonism between the Ministry of Science and the Ministry of Health creates unnecessary problems although a NSPH is related to both.

Third, public health is not *l'art pour l'art* but an applied science of preventive orientation and, the NSPHs must connect to the practice of public health and to practical intervention. They have to be institutional agents of change and not only executives. A modern School of Public Health or Health Sciences has contracted a network of institutions in the field, e.g. caring for the physically and mentally handicapped or being responsible for health reporting to the government. Partner institutions lecture at the university, and *vice versa* students of public health work on their theses in the institutional settings. Common research projects are pursued like**,** e.g. the development of a health audit for public construction works or similar activities.

Fourth because of these multiple and potentially conflicting relationships the NSPH should have an independent institutional basis, neither an institute of the Ministry of Health exclusively, nor part of another faculty. In particular, the NSPH should cooperate closely with, but needs to be separate from, the school or faculty of medicine. Again, this is not always popular and even not the prevailing model in Europe, but at least the department of public health within a medical faculty should be as autonomous as possible. However, the public health group seems to remain in a structural minority *versus* the clinical disciplines, which means being at a persistent disadvantage with regard to the distribution of scarce resources between competing priorities.

The modern School of Public Health in summary is independent with strong links to universities, practice institutions, and the political administration. 'How this triangle can be organized, and what the locally appropriate balance should be is up to those who want to invest in public health' to use the words of Andrija Stampar, Chairman of the First World Health Assembly after World War II. Responsible for such decisions should be those who tackle the work: public health must be anchored in all three corners of the triangle of society, academia, and practice.

What contributions to the health of the population can we expect from such institutes and what is most necessary? In modern societies we have to cope with four main deficits regarding population health, these are:

a) The information deficit, for example how to deal with the COVID-19 pandemic.

Because of the obvious lack of sufficient and reliable information in the health sector of many countries, international as well as national initiatives have promoted the development of indicator-based comprehensive monitoring systems (mostly although not exclusively quantitative routine data) and their interpretation by experts published as reports to the general public (health reporting). Health surveillance is a prerequisite of intelligent decision making in health policy. Valid indicators are the key to meaningful analysis. Health indicators should be relevant (regarding priorities), valid (regarding determinants of health), measurable (in quantitative or qualitative terms), sensitive to change and differences, comparable (inter-territorial), repeatable (as time series), affordable (in terms of relative cost), and useful (for intervention). Meeting these criteria obviously requires a permanent scientifically qualified institutional infrastructure.

b) The social deficit in terms of social, intergenerational, and cultural

disintegration.

Today terminology has been widely accepted which uses the term "inequality" for stating differences in health status determined by social variables like educational grade, professional category and income level, sometimes added up to one integrated index of social status. By some this is called "vertical" inequality, whereas horizontal inequality may refer to various dimensions of disparities connected with sex and age or different ways of looking at a person's position in the society, e.g. marital and family status, ethnic group, whether one is a migrant or a native resident etc. Others prefer not to make such a distinction but to think instead in terms of disadvantaged or vulnerable groups such as migrating labourers, the unemployed, socially isolated elderly, and one-parent families. The value statement on inequalities most often is termed "inequity", namely whether a socially determined state of disadvantaged health is considered to be unfair and unjust because being unnecessary and avoidable. The interdisciplinary study of the determinants and possible interventions to minimize health inequities may be summarized as "Social Public Health". Social Public Health then constitutes a core sector of the New Public Health approach which has been developed throughout the nineties. Four different concepts have been discussed already in the Black Report (16) in order to explain the differences in health status by social groups: methodological artefacts, social selection, living conditions, and health behaviour. The first explanation of social gradients is deemed of little relevance: systematic methodological errors are unlikely, given the almost universal and quite uniform existence of social gradients and health inequalities. The second and third explanation are mirrored in the slogan that "Poverty drives you sick and sickness makes you poor". Together they constitute a vicious circle effective in many regions of the ('third') world especially where the population is not sufficiently covered by health insurance. As disease is more prevalent in the lower social strata, the economically disadvantaged ones may have to pay more not only in relative but even in absolute terms. Other researchers highlight the fact that at least some part of health inequalities have been shown to arise from a higher prevalence of unhealthy behaviour in lower socio-economic groups and from differences in psychosocial work environment. Disadvantaged or vulnerable groups are subpopulations being exposed to an accumulation of unfavourable determinants of health and therefore at excess risk for disease or ill health. The terminology sometimes used for underprivileged or disadvantaged groups stresses the external causation of reduced health chances; however, voluntary risk seeking behaviours may also contribute

and should not exclude such people from supportive action. This applies even more to individuals with a limited ability to cope with strains. No systematic classification of disadvantaged groups has yet been developed, but the following for example have been suggested in various contexts: the migrating labour force, the travelling communities, the homeless, ethnic minorities, asylum seekers and refugees, elderly females living alone and in poverty, one parent families, children growing up in families on social compensation, the unemployed, and the very poor. According to Wilkinson (17) social dislocation and the disruption of social cohesion respectively may be a common mechanism of vulnerability. Furthermore many researchers hold the view that during the decade's vulnerability has gained importance vis a vis the classical vertical inequalities. On the other hand vulnerability is not necessarily static or definite but may change during a lifetime as is typically the case with regard to many states of (intermediate) poverty. The tensions originating from unacceptable differences in chances for healthy living can destroy the social web and lead to violence and war.

c) The preventive deficit in terms of lack of population strategies according to Rose and insufficient regard of environmental sustainability.

Given its great potential, the preventive sector of health services has not yet received appropriate attention. Whereas this is obvious for infectious diseases it seems to be even more relevant for chronic diseases which often start to develop early in individual lifes. Smoking, alcohol drinking and use of drugs, incorrect diet and overfeeding, too little physical exercise, insufficient hygiene and other health damaging behaviours are often responsible especially for diseases of the circulatory system and cancer. Dangerous driving, auto-aggression and unprotected sexual acts are major causes of increasing morbidity and mortality rates as well as premature death. These are mainly behaviour related risk factors, in other words they are potentially under the control of an individual. However, risk factors are based on behavioural patterns which are integrated with habitual patterns of socio-cultural lifestyles which are shaped in each case by various life situations. For this reason all preventive approaches must have behavioural and situational components. Chronic diseases, for example, are very seldom curable once they have manifested themselves but they are – at least in principle – preventable. It would be logical if some of the money allocated to treatment could be diverted to preventive activities. This could allow altering the initial conditions which contribute to the development of chronic-degenerative diseases by means of behaviour-oriented prevention: promotion of health at work, housing, recreation,

and medical services. In the future much greater consideration has to be given to the multi-dimensional interrelationship of the causes of health impairment, both in ecological research and provision of medical services. The structural problem discussed here can only be managed by means of interdisciplinary cooperation. This also applies to infra-structural and organisational problems faced by the health services.

d) The regulatory deficit in terms of an improper administrative balance between centralization and decentralization and lack of competent coordination.

Decision making in health care is organised by a regulatory framework which in most countries is characterised by a continuous shift from the old vertical model to a more horizontal one with moderating instead of a directive role of the governmental agencies. A number of decision making centres acting more or less in parallel have to be coordinated but cannot be directed. Originally organised rather in a top-down model, more and more the generation of decisions follows a bottom-up approach. This requires management which integrates several levels of a formerly hierarchical pyramid in a round table manner. A management approach of this type may be named "Horizontal Management".

As for individual therapy and even diagnosis a code of medical ethics has to be obeyed, the implementation of population-wide interventions in public health and even analytical studies have to follow ethical rules which relate predominantly to the way of how decisions in this regard are made. Five core ethical principles can be identified (Laaser et al. 2017):

Solidarity,

Equity,

Efficiency,

Respect for autonomy, and

Justice.

And in terms of operational ethics:

Serving the common public good

Stewardship, and

Keeping promises.

The public health professional having encompassed successfully education in a School or Department of Public Health as outlined may be described according to the following competency profile:

Follows a professional code of ethics

Accepts accountability towards society

Work for evidence based action

Aims at structural and stable solutions

Understands the global context of public health

Understands the multifactorial determination of public health

Be prepared for transnational management

Be qualified for transcultural, interdisciplinary and multi-professional cooperation

Knows assessment technologies

Have acquired consulting competencies

Be trained for leadership in services

Be competent for research and development in the service environment

Be knowledgeable in foreign languages, the use of internet, presentation techniques, moderation skills, conflict management, and teamwork interaction.

It will be along and never ending way to achieve this with the limited resources available. However, training for research and serving the health of populations is a mission well worth the effort.

It is obvious that no single science can deliver all solutions required, that is why public health is an interdisciplinary and multi professional science. Which disciplines constitute the canon? All disciplines which contribute to the public health of populations can be called - with regard to that specific contribution - public health sciences, whether they come from the medical, biological or natural sciences or from the social and management sciences. Fields of application are for example rehabilitation or nursing or what we call in Germany 'social psychiatry'. They increasingly develop a tendency

to form their own bundles of related sciences like rehabilitation sciences or nursing sciences. On the other hand, there are basic, instrumental disciplines related to the very triangle of public health mentioned above.

Table 1: The Basic Public Health Sciences

Scientific Foundation	Epidemiology and Biostatistics(Academia)
Preventive Orientation	Health Protection and Health Promotion(Practice)
Societal Dimension	HealthPolicyandManagement(Organisation)
Environmental Protection	One Health

These subjects are essential for policy making and efficient health planning:

- establish epidemiologically priorities in terms of which health problems are most important, and which groups are most vulnerable;
- define exposures and environmentally or occupationally determined health problems and to design and try out interventions;
- health policy and management is needed to translate empirical findings into health policy, as well as, to find proper ways to implement the latter;
- a new modern framework is provided by the One Health concept.

Public health training requires public health research. Here we should stick to Humboldt's ideal of *'Lehre und Forschung'*. Teaching and research are interlinked. Therefore**,** to be responsible for training also implies to be charged with research or more precisely training for research. However, I would give it a special term as 'applied' research, i.e. research oriented towards practical application or in another wording 'interventive research', namely how and to what effect can we improve the health of populations?

An account of hypotheses to explain the growing differences in life expectancy between East and West Germany since the 1970s, more than two years in favour of the West by the year of change 1989, should help to illustrate the extreme importance of a public health research agenda:

Hypotheses Raised to Explain Differences in Life Expectancy between Germany East and West:

1) The organization of health care (centralization, institutionalization)

2) Resources available for allocation

3) The provision of high-tech medicine

4) Degree of public information and participation (e.g. self-help-groups)

5) Quality of nutrition

6) Consumption of tobacco and alcohol

7) Environmental pollution

8) (Selective) East-West migration.

To intensify collegial contacts is a must in the field of public health - in Corona-times specifically by digital communication - as demonstrated by the complexity of these issues. When we talk about solving problems of this kind, generally the basic methods are the same, for methodologies are based on scientific knowledge and science does not differ with changing geographical location. Hence for the development in health, it is vital to learn from each other in the belief that health and knowledge knows no barriers. The Holy Prophet of the Muslims (PBUH) said that "seek knowledge even if you have to travel to China for it." The matter of concern here is very obviously learning, and not by whom or using whose knowledge. This statement may also imply that knowledge from, obviously metaphorically speaking, China might be applicable in Saudi Arabia. And it may imply that we are not only rational beings as going to China at least at the times of the prophet certainly was not the most rational thing to do. A citation from Le Petit Prince de Antoine de Saint-Exupéry (18) explains this in more detail:

"Si je vous ai raconté ces détails sur l´astéroide B 612 et si je vous ai confié son numéro, c´ést à cause des grandes personnes. Les grandes personnes aiment les chiffres. Quand vous leur parlez d´un nouvel ami, elles ne vous questionnent jamais sur l´essentiel. Elles ne vous disent jamais:"Quel est le son de sa voix ? Quels sont les jeux qu´il préfère ? Est-ce qu´il collectionne les papillons ?" Elles vous demandent: "Quel àge a-t-il ? Combien a-t-il des frères ? Combien pèse-t-il ? Combien gagne son père ?" Alors seulement elles croient le connaître. Si vous dites aux

grandes personnes: "J´ai vu une belle maison en briques roses, avec des géraniums aux fenètres et des colombes sur le toit..." elles ne parviennent pas à s´imaginer cette maison. Il faut leur dire: "J´ai vu une maison de cent mille francs." Alors elles s´écrient: "Comme c´est joli!"

References:

1. 1. Birkeland H. The interpretation of Surah 107. Studia Islamica 1958; 9: 13-29.
2. United Nations 2000. https://www.un.org/millenniumgoals/bkgd.shtml
3. United Nations 2015 (updated). file:///C:/Users/ULRICH~1/AppData/Local/Temp/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf
4. Laaser U. German Health Policies in the Years of Change. In: Stock C, Laaser U (eds.): Public Health in Eastern Europe. Z. Gesundheitswissenschaften 1994; suppl 1: 41-47
5. Laaser U, Schröder-Bäck P, Eliakimu E, Czabanowska K and Think-Tank for Sustainable Health & Well-being (GHW-2030) TOHG. A code of ethical conduct for the public health profession. South Eastern European Journal of Public Health (SEEJPH) 2017. doi: 10.4119/seejph-1863.
6. Laaser U, de Leeuw E, Stock C.(eds.): Scientific Foundations for a Public Health Policy in Europe. Juventa-Verlag, Weinheim 1995.
7. Rose G.: Relative Merits of Intervening on Whole Populations Versus High Risk Individuals Only. In: Lauer R.M., R.B. Shekelle (eds.): Childhood Prevention of Atherosclerosis and Hypertension. Raven, New York 1980.
8. The Intersalt Cooperative Research Group. Sodium, potassium, bodymass, alcohol and blood pressure: The INTERSALT Study. Hypertension 1988; 6 suppl. 4: S.584-586.
9. Rose G, Day S. The population mean predicts the number of deviant individuals. BMJ 1990; 301: 1031-1034.
10. Laaser U. (im Auftrag des Vorstands der Deutschen Gesellschaft für

Sozialmedizin und Prävention): Laudatio Prof. Geoffrey Arthur Rose, CBE. Öff. Gesundh. Wes. 1991; 53: 719-724.

11. Stein H. The Maastricht Treaty 1992: Taking stock of the past and looking at future perspectives. South Eastern European Journal of Public Health (SEEJPH) 2015. doi: 10.4119/seejph-1803.

12. McIntosh CA, Finkle JL. The Cairo Conference on Population and Development: A New Paradigm? Population and Development Review 1995; 21: 223-260. DOI: 10.2307/2137493. Available at: https://www.jstor.org/stable/2137493.

13. Ivanovic et al. (2020) "Serbian Citizens' Opinion on the COVID-19 Ivanovic M et al. Serbian Citizens' Opinion on the COVID-19 Epidemic. South Eastern European Journal of Public Health (SEEJPH), 2020. doi: 10.4119/seejph-3459.

14. One Health Commission. Available at:https://drive.google.com/drive/u/0/folders/1G1aV5i3UkuvkDz4ckUmSkxKEv1PHYjmy. Visited 7 August 2020

15. Laaser U. The institutionalization of public health training and the health sciences. Public Health Reviews 2002; 30: 71-95.

16. Department of Health and Social Security (DHSS). Inequalities in health: Report of a research working group (the Black Report). London, 1980

17. Wilkinson R. The epidemiological transition from material scarcity to social disadvantage. Daedalus 1994; 123: 61-77.

18. Saint-Exupéry, A. de. Le Petit Prince. Gallimard, Paris 1946.

The Importance of Galectin 3 for Risk Stratification and Prognosis in Hypertrophic Cardiomyopathy

Hakan UÇAR[1], Sinem ÖZYILMAZ[1], Muhammet Hulusi SATILMIŞOĞLU[2], Hamdi PUSUROĞLU[2]

Abstract

Objective: Galectin-3 levels were found to be associated with worse prognosis in various cardiac disorders. The aim of the study was to assess the relationship between serum galectin-3 levels and prognosis among HCM patients.

Material and Methods: This study included 107 consecutive patients with HCM. Galectin-3 levels were evaluated in all participants and the HCM Risk-SCD calculated in patients with HCM for each patient.

Results: The low galectin-3 and high galectin-3 groups showed significant differences in NYHA class, the HCM Risk SCD, the HCM Risk SCD (>6%), interventricular septum thickness, left ventricular mass(LVM), and LVM index, and percentage of ventricular extra systole, ventricular tachycardia, cardiopulmonary resuscitation, ICD implantation, shock, admitted hospital with heart failure symptoms into two groups(all $p<0.05$).The low galectin-3 HCM patients (n = 62) had galectin-3 levels of 4.720±2.202 ng/ml and the high galectin-3 HCM patients (n = 45) had galectin-3 levels of 7.943±1.618 ng/ml($p<0.001$). Both in the univariate and multivariate analysis, galectin-3 determined that the HCM Risk SCD is an independent predictor of high-risk($p<0.001$). In ROC curve analysis, a galectin-3 >6.324 ng/ml was identified as an effective cut-off point in the HCM Risk SCD for HCM (area under curve = 0.878, 95% CI=0.815-0.942, $p<0.001$). A galectin-3 value of more than 6.324 ng/ml yielded a with sensitivity, specificity, positive predictive value and negative predictive value of, 83%, 82%, 73%, 93%.

Conclusion: These results shape the concept of considering galectin-3 as a new target for therapeutic intervention or recognizing patients with high risk for SCD

1 Department of cardiology, Faculty of Medicine, Istanbul Aydin University, VM Florya Medical Park Hospital, Istanbul, Turkey

2 Department of cardiology, Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, Istanbul, Turkey

DOI: 10.17932/EJOH.2020.022/ejoh_v01i1002

or malign arrythmias. In this study, galectin-3 is an independent predictor of high risk for HCM Risk-SCD in HCM. Therefore, an early recognition of high-risk patients for SCD and intervention with new anti-inflammatory and antifibrotic agents might provide additional benefit over existing treatment strategies.

Keywords: *Galectin 3, sudden cardiac death, risk stratification, prognosis, hypertrophic cardiomyopathy*

Introduction

Sudden cardiac death (SCD) is well recognized and most frightening complication of hypertrophic cardiomyopathy (HCM). Most cases remain asymptomatic or rarely symptomatic (1) in their lifetime or sometimes SCD may be the first symptom. ICD therapy is an important treatment option for preventing SCD and improving prognosis. However, it can cause some unwanted complications like infective endocarditis or inappropriate ICD shocks (2). For these reasons, it is important to choose the patient who really needs ICD treatment. Several invasive and noninvasive studies have been done for risk stratification of SCD since the disease was first defined (3). One of the reasons for vigorous efforts among this subject is identification of patients who are at high risk for ventricular arrhythmias or SCD and to make the right choice when selecting patients for ICD implantation. In order to solve this problem ESC guideline recommends the use of a new risk of SCD calculation model According to this guideline implantable cardioverter defibrillator (ICD) implantation should be considered in patients with high risk (1,4).

Galectin-3 is a beta-galactoside-binding lectin that is expressed by macrophages. Nowadays, studies have shown that Galectin-3 mediate cardiac fibrosis or inflammation particularly in patients with heart failure. Moreover galectin-3 have all been well validated to predict death and heart failure (5) following a MI and provide risk stratification information for heart failure. In this study, we aimed to investigate the relationship between serum Galectin-3 levels and HCM Risk-SCD.

Material and Methods

Patient Population

This prospective observational study included 107 consecutive patients with HCM and a control group of 80 subjects who presented to the Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Center, Training and Research

Hospital between December 2012 and March 2016. The study was approved by the ethics committee. All patients and healthy subjects signed informed consent forms. Only adult patients (>17 years) were included into the study. Patients whose echocardiography (ECHO) revealed HCM or patients with positive gene mutations or patients with HCM-specific late gadolinium enhancement or the presence of apical hypertrophy assessed by cardiac magnetic resonance (MR) imaging were included in the study. Hypertrophic cardiomyopathy defined as a maximum LV wall thickness ≥ 15 mm in one or more LV myocardial segments as measured with any imaging technique with unexplained abnormal loading conditions patients with lesser degrees of wall thickening (13–14 mm); patients with a family history, and electrocardiogram (ECG) abnormalities (1).

Exclusion criteria

We excluded from our analysis the patients who do not want to participate in the study. Patients with a prior history of the ICD or permanent pacemaker implantation for secondary protection or prior cardiac arrest and sustained ventricular tachycardia; patients with prolonged hypertension, renal failure, previous coronary artery disease, moderate to severe valve diseases, atrial fibrillation, metabolic storage disease, an ejection fraction less than 50%, wall motion abnormalities. Patients with a body mass index (BMI) over 30 kg/m2 were excluded from the study. In this study the maximum LV wall thickness was 33 mm patients whose LV wall thickness was ≥35 mm was not included into the study. The final study population consisted of 107 patients.

Electrocardiography

A 12-derivation surface ECG was obtained with using a Nihon Kohden-Cardiofax S instrument (ECG-1250K, filter range 0.5 Hz to 150 Hz, AC filter 60 Hz, at a speed of 25 mm/s and an amplitude of 10 mm/mV; Nihon Kohden, Tokyo, Japan) in all patients in supine position. The rhythm, speed, and QRS morphology were assessed.

Measurement of plasma galectin-3 levels

Serum galectin-3 was measured, in duplicate, using a commercially available enzyme-linked immunosorbent assay method (Human galectin-3 ELISA kit, catalogue no. DGAL30; R&D Systems, Inc., Minneapolis, Minnesota, USA). The intraobserver variability in the measurements of galectin-3 was also assessed and all of the mean intra-assay coefficients of variance were less than 4.6%.

Echocardiography

Upon hospital admission, a transthoracic echocardiographic study was performed using a Vivid S5 system (General Electric Vivid S5; GE Vingmend Ultrasound AS, Horten, Norway) with a 1.7/3.4 MHz phased-array transducer. All echocardiographic parameters were measured off-line, and an average of three cardiac cycles was used. Biplane Simpson method was used to calculate LV ejection fraction (LVEF) (6). LV wall thickness (interventricular septum, posterior wall) left ventricular end diastolic diameter (LVEDD), and LV end systolic diameter (LVESD) were measured in the parasternal long axis. The LV outflow tract obstruction gradient (LVOTOG) was measured in the apical five chambers while the patients were performing the Valsalva maneuver. In addition, the LV end diastolic volume, end systolic volume, left atrial diameter (LAD), left atrial volume (LAV), left atrial volume index (LAVI), and LV mass in grams were calculated from M-mode echocardiograms according to the formulas described by Devereux et al. (7). The LV mass was indexed to body surface area as the LV mass index (LVMI) in g/m² of body surface area. Mitral valve regurgitation (systolic anterior motion of the mitral valve) and the relative wall thickness index (RWTI) for LV diastolic dysfunction were also evaluated.

Holter electrocardiography

The analyses were made from the 12 channel recordings obtained from the ambulatory holter monitors (DMS 300-7 Holter Reader; DSM, Stateline, NV, USA) for a period of 24 hours in all patients. Before automatic analysis, the tapes were analyzed using the Holter program (CardioScan 12.0 DM software, DSM). The recordings were evaluated for rhythm, supraventricular extrasystole (SVES), supraventricular tachycardia (SVT), paroxysmal atrial fibrillation (PAF), ventricular extrasystole (VES), non-sustained and/or sustained ventricular tachycardia (NSVT), and atrioventricular (AV) block with pauses

Measurement of the predicted five-year risk of SCD for the patients

The HCM Risk SCD risk assessment was performed to each patient with HCM risk of SCD calculator on the first visit and it was repeated if there were any change in patient's clinical status. The patients with a predicted HCM risk of SCD were divided into two groups based on percentage, as follows: ≤5.9% group, and the >6% group (1,4).

Study endpoints and follow-up

On admission, all demographic characteristics of patients were recorded. Patients

were regularly followed during visits to HCM outpatient clinic at regular 3-month intervals. Any change in clinical status was noted. ECG and ambulatory 24-hour ECG monitoring were performed every 3 months. The primary endpoint for the study was ventricular arrhythmic event. The secondary endpoint was occurrence of major arrhythmic event. Follow-up for clinical endpoints was performed by telephone interview and review of outpatient and inpatient medical records.

Statistical analysis

The study population was divided into 2 groups based on the galectin-3 levels: the first group (galectin-3 high >6.324 ng/ml, n=45) and the second group (galectin-3 low (≤6.324 ng/ml, n=62). Using ROC analysis, Galectin-3 cut off value was determined as 6.324 ng/ml for HCM-Risk SCD. Continuous variables were expressed as mean ± standard deviation; categorical variables were defined as percentages. The normally distributed continuous variables were assessed using the Kolmogorov–Smirnov test. A comparison of the parametric values of the 2 groups was performed using a two-tailed Student's t test and for parametric values using Mann Whitney U Test. The categorical variables were compared using the odds ratio, Chi-square test, or Fisher's exact test. Pearson correlation coefficient was used to compare the parametric values of the two groups, and the Spearman correlation coefficient was used for nonparametric comparisons. A backward stepwise logistic regression analysis, which included variables with $P<0.1$, was performed to identify independent predictors of HCM-Risk SCD. The accuracy of relevant variables from the regression analysis to differentiate between galectin-3 high and galectin-3 low was assessed with receiver operating characteristics (ROC) curves to determined area under the curve and optimal sensitivity and specificity. The statistical evaluation of the data was performed using the SPSS for Windows, Version 22.0 software package (SPSS Inc., Chicago, IL, USA). A P value of less than 0.05 was considered statistically significant.

Results

Baseline characteristics

A total of 107 hypertrophic cardiomyopathy patients were included in the study. Patients were divided into two groups as patients with a galectin-3>6.324 ng/ml and patients with galectin-3≤6.324 ng/ml. Baseline characteristics, which is shown in ***Table 1*** (average age respectively: 48.7±15.4, 43.2±14.1 years; 43 females, 64 males). Statistically significant differences were determined between 2 groups in NYHA (%) class, plasma Galectin-3 levels, LAV (ml), LAVI (ml/m2), IVST (mm), LVM(g), LVMI(g/m2), ventricular tachycardia (%), cardiopulmonary resuscitation (%), ICD implantation (%), appropriate shock (%), admitted with

heart failure (%) (all p<0.05). The low Galectin-3 HCM patients (n = 62) had galectin-3 levels of 4.035±1.464 ng/ml and the high Galectin-3 HCM patients (n = 45) had galectin-3 levels of 8.226±1.412 ng/ml (p <0.001) ***(Figure 1).***

Clinical outcomes

Mean follow up time is 31.1±13.2 months and low Galectin-3 group 27.1±13.4 months, the high Galectin-3 group 35.9±11.3 months. During the fallow up time 1 patient was died and 33 patients were hospitalized due to a worsening of heart failure symptoms. Thirty-six patients presented with pre-syncope and 12 patients presented with syncope. A total of 100 of the patients used beta blockers, 4 used amiodarone, 8 used disopyramide and 4 used calcium channel blockers. ICD implanted in 12 patients 8 patients presented with appropriate ICD shock, 3 patients presented with inappropriate ICD shock. Twenty-four patients had nun sustained ventricular tachycardia attack. Twelve patients received CPR ***(Table 1).***

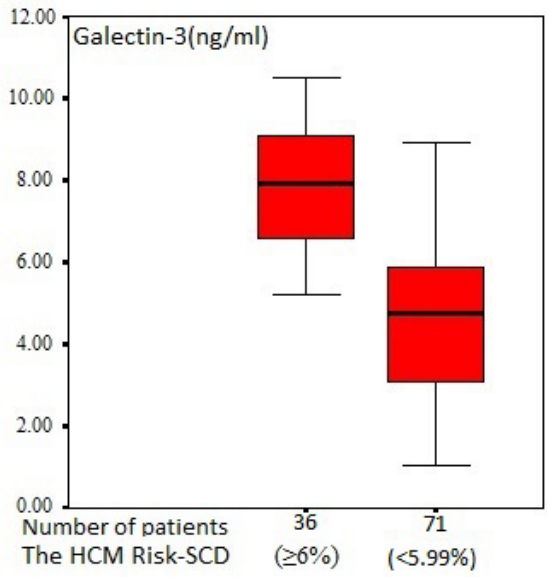


Figure 1. *Galectin 3 levels according to HCM Risk SCD ≥6% and <5.99% groups.*

Table 1. Baseline and clinical characteristics of all patients

Variabilities		All(n:107)	Low Galectin-3(≤6.324ng/ml) (n:62)	High Galectin-3(>6.324ng/ml) (n:45)	P value
Age(years)		46.6±15.1	48.7±15.4	43.2±14.1	0.065
Gender	Male(%)	64(60)	37(58)	27(42)	1.000
	Female(%)	43(40)	25(58)	18(42)	
Follow up(month)		31.1±13.2	27.1±13.4	35.9±11.3	**0.001**
BMI(kg/m²)		26.7±3.5		26.5±3.4	0.138
Diabetes mellitus(%)	(+)	5	2(40)	3(60)	0.648
	(-)	102	60(59)	42(41)	
Hypertension(%)	(+)	4	1(25)	3(75)	0.309
	(-)	103	61(59)	42(41)	
History of family(%)	(+)	43	22(51)	21(49)	0.319
	(-)	64	40(62)	24(38)	
Hyperlipidemia(%)	(+)	20	12(60)	8(40)	1.000
	(-)	87	49(56)	37(44)	
Cigarette(%)	(+)	21	10(47)	11(53)	0.333
	(-)	86	52(60)	34(40)	
Presyncope(%)	(+)	33	15(45)	18(55)	0.137
	(-)	74	47(63)	27(37)	
Syncope(%)	(+)	12	5(42)	7(58)	0.353
	(-)	95	57(60)	38(40)	
NYHA (%) class	I	42(39)	31(74)	11(26)	**0.002**
	II	43(41)	25(58)	18(42)	
	III	22(20)	5(23)	17(77)	
Beta blockers(%)	(+)	100	44(44)	56(56)	0.238
	(-)	7	6(86)	1(14)	
Amiodarone(%)	(+)	4	1(25)	3(75)	0.309
	(-)	103	61(59)	42(41)	
Dysopyramide(%)	(+)	8	3(37)	5(63)	0.280
	(-)	99	59(57)	40(43)	
Calcium channel blocker(%)	(+)	4	3(75)	1(25)	0.635
	(-)	103	59(57)	44(43)	
The HCM Risk SCD		5.7±4.1	3.6±1.8	8.7±4.8	**<0.001**
The HCM Risk SCD(>6%)	(+)	36	5(14)	31(86)	**<0.001**
	(-)	71	51(82)	14(18)	
Galectin-3(ng/ml)		5.798±2.526	4.035±1.464	8.226±1.412	**<0.001**
LAAPD(mm)		42.2±4.3	41.8±4.4	42.8±4.2	0.226
LAV(ml)		53.4±15.1	49.4±13.8	59.7±16.5	**0.001**
LAVI(ml/m²)		29.8±8.5	27.7±7.5	33.2±9.8	**0.002**
LV EF(%)		66.9±5.9	67.2±5.2	66.5±6.9	0.527

IVST(mm)		21.9±3.9	20.7±3.8	24.0±4.5	**<0.001**
LVPWT(mm)		6.4±3.1	12.9±3.3	12.8±2.9	0.854
LVM(g)		333.2±85.5	316.7±92.0	359.9±76.1	**0.012**
LVMI(g/m^2)		180.8±53.1	173.1±57.6	194.0±48.4	**0.049**
RWTI		0.62±0.22	0.62±0.23	0.62±0.24	0.977
LVOTO(mmHg)		26.1±29.8	25.1±30.1	28.3±31.5	0.599
Total cholesterol(mg/dl)		186.4±34.9	190.9±38.5	179.5±29.9	0.104
C-Reactive protein(mg/dl)		3.4±6.2	3.4±6.3	3.5±6.1	0.927
White blood cell(×10^9/L)		7.9±1.9	8.0±2.0	7.8±1.8	0.659
Blood urine nitrogen(mg/dl)		14±4.3	14.0±4.6	14.2±4.0	0.817
Creatinin(mg/dl)		0.8±0.1	0.8±0.1	0.8±0.2	0.293
Paroxysmal atrial fibrillation(%)	(+)	10	4(40)	6(60)	0.316
	(-)	97	58(60)	39(40)	
Ventricular extra sistole	(+)	73	37(51)	36(49)	**0.037**
	(-)	34	25(73)	9(27)	
Ventricular tachycardia(%)	(+)	23	8(35)	15(65)	**0.017**
	(-)	84	53(63)	30(37)	
Cardiopulmonary rescucitation(%)	(+)	12	1(8)	11(92)	**<0.001**
	(-)	95	61(64)	34(36)	
ICD implantation(%)	(+)	11	1(9)	10(91)	**0.010**
	(-)	96	61(63)	35(37)	
Shock(%)	apropriate inappropriate	8 3	1(12) 0	7(88) 3(100)	**0.002**
Admitted with heart failure(%)	(+)	31	12(39)	19(61)	**0.016**
	(-)	76	50(66)	27(34)	

Values are the mean±standard deviation or number (%). EF: ejection fraction, HCM: hypertrophic cardiomyopathy, HCM Risk-SCD: predicted 5-year risk of sudden cardiac death in HCM patients, ICD: implantable cardioverter defibrillator, IVST: interventricular septum thickness, LAAPD: left atrium anterior–posterior dimension, LAV. left atrium volume, LAVI: left atrium volume index, LVEDD: left ventricular enddiastolic dimension, LVESD: left ventricular end-systolic dimension, LVM: left ventricular mass, LVMI: left ventricular mass index, LVPWT: left ventricular posterior wall thickness, LVOTO: left ventricular outflow tract obstruction, NYHA: New York Heart Association, RWTI: relative wall thickness index, SCD: sudden cardiac death.

Correlation results of Galectin-3 and other parameters

Results for correlation between galectin-3 levels, and other parameters in patients are summarized in Table 2. A statistically significant correlation was observed between galectin-3 and NYHA class (%) (0.351, $p < 0.001$), LAV (ml) ($r = 0.434$, $p < 0.001$), LAVI (ml/m2) ($r = 0.439$, < 0.001), IVST (mm) ($r = 0.373$, $p < 0.001$), LVM (g) ($r = 0.326$, $p = 0.001$), LVMI (g/m2) ($r = 0.339$, $p = 0.001$), paroxysmal atrial fibrillation (PAF) (%) ($r = 0.211$, $p = 0.026$), ventricular extra systole ($r = 0.338$, $p < 0.001$) ventricular tachycardia (%) ($r = 0.229$, $p = 0.020$),

cardiopulmonary resuscitation (CPR) (%) (r = 0.319, p = 0.001), implantable cardioverter defibrillator (ICD) implantation (%) (r = 0.264, p = 0.007), admitted heart failure (%) (r = 0.275, p = 0.007), appropriate shock (%) (r = 0.279, p = 0.005), the HCM Risk SCD (r = 0.629, p = <0.001), the HCM Risk SCD (>6%) (r = 0.617, p < 0.001).

Table 2. Correlations coefficients of the relationship between Galectin-3 and other parameters.

Variable	Galectin-3	
	r	P
Age(years)	-0.094	0.337
Gender	0.084	0.387
BMI(kg/m²)	0.064	0.511
History of family(%)	0.179	0.066
Presyncope(%)	0.150	0.124
Syncope(%)	0.126	0.196
NYHA (%) class I	**0.351**	**<0.001**
II		
III		
LAAPD(mm)	0.179	0.066
LAV(ml)	**0.434**	**<0.001**
LAVI(ml/m²)	**0.439**	**<0.001**
LV EF(%)	-0.073	0.457
IVST(mm)	**0.373**	**<0.001**
LVPWT(mm)	0.039	0.694
LVM(g)	**0.326**	**0.001**
LVMI(g/m²)	**0.339**	**0.001**
RWTI	0.023	0.817
LVOTO(mmHg)	0.048	0.629
C-Reactive protein (mg/dl)	0.084	0.393
White blood cell (×10⁹/L)	0.040	0.686
Creatinin(mg/dl)	0.144	0.144
PAF(%)	**0.211**	**0.026**
Ventricular extra sistole	**0.338**	**0.001**
Ventricular tachycardia (%)	**0.229**	**0.020**
CPR(%)	**0.319**	**0.001**
ICD implantation(%)	**0.264**	**0.007**
Admitted heart failure	**0.275**	**0.003**
Apropriate shock	**0.279**	**0.005**
The HCM Risk SCD	**0.629**	**<0.001**
The HCM Risk SCD(>6%)	**0.617**	**<0.001**

Values are the mean±standard deviation or number (%). CPR: cardiopulmonary resuscitation, EF: ejection fraction, HCM: hypertrophic cardiomyopathy, HCM Risk- SCD: predicted 5-year risk of sudden cardiac death in HCM patients, HF: heart failure, ICD: implantable cardioverter defibrillator, IVST: interventricular septum thickness, LVPWT: left ventricular posterior wall thickness, LAAPD: left atrium anterior–posterior dimension, LAV: left atrium volume, LAVI: left atrium volume index, LVM: left ventricular mass, LVMI: left ventricular mass index, LVOTO: left ventricular outflow tract obstruction, NYHA: New York Heart Association, PAF: paroxysmal atrial fibrillation, RWTI: relative wall thickness index, SCD: sudden cardiac death.

Univariate and multivariate analysis

Logistic regression analyses for independent predictors of high-risk predicted five years risk sudden cardiac death have been shown in ***Table 3***. Both in the univariate and multivariate analysis, galectin-3 determined that the HCM Risk SCD is an independent predictor of high-risk (Galectin-3 univariate analysis: odds ratio: 0.999, confidence interval: 0.998-1.000, p value: <0.001; multivariate analysis: odds ratio: 0.999, confidence interval: 0.998-1.000, p value: <0.001). In a receiver operating characteristic (ROC) curve analysis, a Galectin-3>6.324 ng/ml was identified as an effective cut-off point in the HCM Risk SCD for HCM (area under curve = 0.878, 95% CI=0.815-0.942, p=<0.001). A galectin-3 value of more than 6.324 ng/ml yielded a with sensitivity, specificity, positive predictive value and negative predictive value of, 83%, 82%, 73%, 93% ***(Figure 2).***

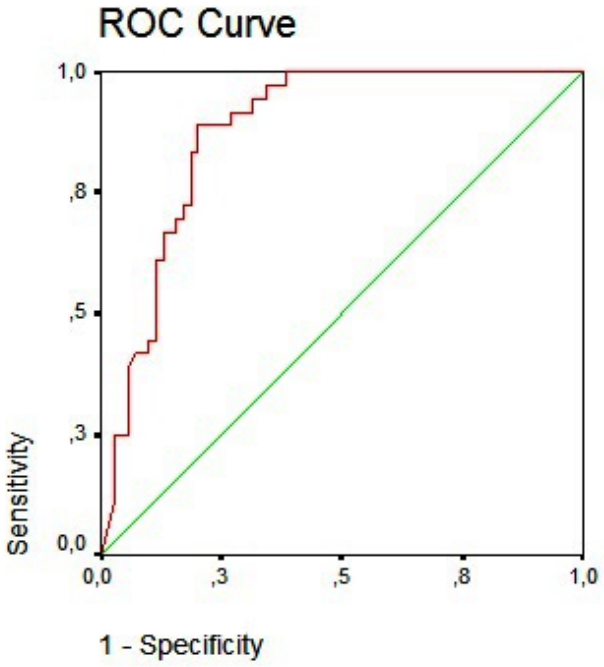


Figure 2. *In a receiver operating characteristic (ROC) curve analysis, a Galectin-3>6.324 ng/ml was identified as an effective cut-off point in the HCM Risk SCD for HCM (area under curve = 0.878, 95% CI=0.815-0.942, p=<0.001).*

Table 3. Univariate and multivariate analyses for independent high-risk predictors the HCM Risk SCD.

	Univariate			**Multivariate**		
	OR	CI	p	OR	CI	p
Galectin-3	**0.999**	**0.998-1.000**	**<0.001**	**0.999**	**0.998-1.000**	**<0.001**
New york heart association	0.196	0.098-0.394	**<0.001**			
Presyncope	4.130	1.793-9.513	**0.001**			
Admitted with heart failure	6.778	2.771-16.580	**<0.001**			
Paroxysmal atrial fibrillation	4.242	1.192-15.100	**0.026**			
Ventricular tachycardia	9.788	3.473-27.585	**<0.001**			
Left atrium volume	0.961	0.936-0.988	**0.004**			
Left atrium volume index	0.937	0.895-0.982	**0.007**			
Interventricular septum thickness	0.846	0.768-0.932	**0.001**			
Left ventricular mass	0.995	0.990-0.999	**0.027**			

CI: confidence interval, HCM: hypertrophic cardiomyopathy, OR: odds ratio, SCD: sudden cardiac death

Discussion

In this study, we investigated whether galectin-3 levels could be a potential predictor of cardiac events, focusing on arrhythmic events, admission to hospital, prognosis and the predicted the HCM Risk-SCD in patients with HCM. One of the results of this study; There was a significant difference between the Galectin-3 level and the 5-year risk of sudden cardiac death, moreover galactin-3 level was significantly higher in patients with the HCM Risk-SCD above 6%.

Galectin-3, which is secreted by macrophages, has been known for its significant role in mediating cardiac fibrosis and inflammation. Serum levels of galectin-3 increases when the destruction and remodeling in the tissues is excessive. Moreover, this increase in galectin-3 levels were shown to be associated with

poor prognosis in recent studies. Galectin-3 was shown to promote cardiac fibrogenesis by activating resting fibroblast (8,9). Supporting this information had been shown significantly correlation between galectin-3 levels and LGE MRI verified replacement fibrosis in nonischemic dilate cardiomyopathy.

The cause of this abnormal fibrosis is related secondary myocardial ischemia caused by to chaotic, disorganized myocytes and abnormal mass of ventricle. In HCM patients there is an imbalance of supply and demand mismatches in coronary blood flow of myocardium, which is due to abnormally increased mass and abnormal intramural coronary arteries with thickened walls and narrowed lumen (10,11). Increased stress and injury cause myocardial damage. This situation causes immune cells to accumulate into the myocardium, resulting in activation of resident fibroblast and deposition of procollagen into extracellular matrix which leads to cardiac fibrosis. As a result of all these negative mechanisms can contribute to myocardial remodeling (12,13). In this study, there are significant correlations between plasma Galectin-3 levels and LVM, LVMI, interventricular septum thickness.

In HCM patients the disorganized cellular architecture and replacement fibrosis predispose to serve an electrically unstable substrate and nidus for reentry ventricular tachyarrhythmias and sudden death (13). In this study, there were positive correlations between serum Galectin-3 levels and percentage of ventricular extrasystole, ventricular tachycardia in HCM group. Furthermore, requirement for CPR and ICD implantation were positive correlated with serum Galectin-3 levels.

Several studies already proved galectin-3 could be a well prognostic marker in Heart failure (HF) for predicting cardiovascular mortality and re-hospitalization after multivariate analysis but not only patient with low ejection fraction (14). A previous study had demonstrated that galectin-3 levels were significantly elevated in patients with HF with preserved ejection fraction (14,16). Galectin-3 might provide an early warning marker for patients who are at risk for development of HF and may allow medical treatment. In this study NYHA class III symptom defining patients were significantly higher in higher galectin-3 levels. Galectin 3 levels and percentage of hospitalization due to heart failure were significantly correlated.

Although the main causes of cardiac mortality in HCM are SCD, heart failure or thromboembolic events, SCD has always been the most frightening complication ever since it was first described which actually makes a lot of sense. Although there are many new parameters for risk assessment today, very few of them are accepted for clinical use the HCM Risk SCD assessment is one of them which

entered the ESC guideline in 2014. In a recent study evaluating patients with HCM, there was no correlation between galectin levels and the HCM Risk SCD (17). This may be due to the fact that the number of patients was relatively small, or because of the short duration of follow-up, symptomatic changes could not be followed for as long as enough time. As is known, the structural changes in HCM occasionally may be delayed until later in midlife (18,19). But, in that study, the mean age of patients included in the study were 20 years old. Unlike that study, in our study, there was a significant correlation between galectin-3 levels and the HCM Risk SCD. Moreover, in galectin-3 was observed as an independent high-risk predictor for the HCM Risk SCD in univariate and multivariate analyses.

Study limitations

There are several limitations associated with the study. Study population was relatively small and the other oxidative stress markers were not assessed. Pediatric patients were not included in our study. The follow-up period of the study was not long enough for monitoring patients and it is an important disadvantage.

Conclusion

These results shape the concept of considering galectin-3 as a new target for therapeutic intervention or recognizing patients with high risk for sudden cardiac death or malign arrythmias at an early stage of compensated hypertrophy in failure-prone hearts. Our results suggest that galectin-3 may provide some information about disease severity and galectin-3 is an independent predictor of high risk for HCM Risk-SCD in HCM. Therefore, an early recognition of failure-prone hearts and intervention with new anti-inflammatory and antifibrotic agents might provide additional benefit over existing treatment strategies.

References

1. Elliott PM, Anastasakis A, Borger MA, Borggrefe M, Cecchi F, Charron P, et al. 2014 ESC Guidelines on diagnosis and management of hypertrophic cardiomyopathy: the Task Force for the Diagnosis and Management of Hypertrophic Cardiomyopathy of the European Society of Cardiology (ESC). Eur Heart J 2014;35:2733-79.
2. Begley DA, Mohiddin SA, Tripodi D, Winkler JB, Fananapazir L. Efficacy of implantable cardioverter defibrillator therapy for primary and secondary prevention of sudden cardiac death in hypertrophic cardiomyopathy. Pacing Clin Electrophysiol 2003;26:1887-96.
3. Teare D. Asymmetrical hypertrophy of the heart in young adults. Br Heart J 1958;20:1-8

4. O'Mahony C, Jichi F, Pavlou M, Monserrat L, Anastasakis A, Rapezzi C, et al. Hypertrophic Cardiomyopathy Outcomes Investigators. A novel clinical risk prediction model for sudden cardiac death in hypertrophic cardiomyopathy(HCM Risk-SCD). Eur Heart J 2014;35:2010-20.
5. Ho JE, Liu C, Lyass A, Courchesne P, Pencina MJ, Vasan RS, et al. Galectin-3, a marker of cardiac fibrosis, predicts incident heart failure in the community. J Am Coll Cardiol 2012;60(14):1249-56.
6. Schiller NB, Shah PM, Crawford M, DeMaria A, Devereux R, Feigenbaum H, et al. Recommendations for quantitation of the left ventricle by two dimensional echocardiography. American Society of Echocardiography Committee on Standards, Subcommittee on Quantitation of Two-Dimensional Echocardiograms. J Am Soc Echocardiogr 1989;2:358-67.
7. Devereux RB, Koren MJ, de Simone G, Okin PM, Kligfield P. Methods for detection of left ventricular hypertrophy: application to hypertensive heart disease. Eur Heart J 1993;14:8–15.
8. Vergaro G, Del Franco A, Giannoni A, Prontera C, Ripoli A, Barison A, et al. Galectin3 and myocardial fibrosis in nonischemic dilated cardiomyopathy. Int J Cardiol 2015;184:96-100.
9. Yu L, Ruifrok WP, Meissner M, Bos EM, van Goor H, Sanjabi B, et al. Genetic and pharmacological Inhibition of Galectin-3 Prevents Cardiac Remodeling by Interfering with Myocardial Fibrogenesis. Circ Heart Fail 2013;6:107-17.
10. Nienaber CA, Gambhir SS, Mody FV, Ratib O, Huang SC, Phelps ME, et al. Regional myocardial blood flow and glucose utilization in symptomatic patients with hypertrophic cardiomyopathy. Circulation 1993;87:1580-90.
11. Amin HZ, Amin LZ, Wijaya IP. Galectin-3: a novel biomarker for the prognosis of heart failure. Clujul Med. 2017;90(2):129-32.
12. Nienaber CA, Gambhir SS, Mody FV, Ratib O, Huang SC, Phelps ME, et al. Regional myocardial blood flow and glucose utilization in symptomatic patients with hypertrophic cardiomyopathy. Circulation 1993;87:1580-90.
13. Özyılmaz S, Püşüroğlu H. Assessment of the relationship between the ambulatory electrocardiography-based micro T-wave alternans and the predicted risk score of sudden cardiac death at 5 years in patients with hypertrophic cardiomyopathy. Anatol J Cardiol 2018;20(3):165-73.

14. Zile MR, DeSantis SM, Baicu CF, Prescott CB, Stroud RE, Thompson SB, el al. Plasma Galectin-3 Levels in Patients with Structural and Clinical Manifestations of Hypertensive Heart Disease: Relationship to Determinants of Matrix Composition. Abstract 12433. Circulation. 2010;122:A12433.

15. Maron MS, Zenovich AG, Casey SA, Link MS, Udelson JE, Dorothee M et al. Significance and relationship between magnitude of left ventricular hypertrohy and heart failure symptoms in hypertrophic cardiomyopathy. Am J Cardiol 2005 Jun 1;95(11):1329-33.

16. Besler C, David Lang D, Daniel Urban D, Rommel KP, Von Roeder M, Fengler K,et al.Plasma and Cardiac Galectin-3 in Patients With Heart Failure Reflects Both Inflammation and Fibrosis Implications for Its Use as a Biomarker. Circ Heart Fail 2017 Mar;10(3):e003804.

17. Gawor M, Śpiewak M, Janas J, Kożuch K, Wróbel A, Mazurkiewicz Ł, el al. The usefulness of soluble ST2 and galectin-3 as novel biomarkers for better risk stratification in hypertrophic cardiomyopathy. Kardiol Pol 2017;75(10):997-1004.

18. Kampmann C, Wiethoff CM, Wenzel A, Stolz G, Betancor M, Wippermann CF, et al. Normal values of M mode echocardiographic measurements of more than 2000 healthy infants and children in central Europe. Heart 2000;83:667–672.

19. Maron BJ, Rowin EJ, Casey SA, Lesser JR, Garberich RF, McGriff DM, et al. Hypertrophic cardiomyopathy in children, adolescents, and young adults associated with low cardiovascular mortality with contemporary management strategies. Circulation 2016;133(1):62-73.

Influence of Three Different Scanning Techniques in Full-Arch Implants Digital Impression Using Intraoral Scanners: A Randomized Controlled Cross-Over Trial

Adolfo DI FIORE[1], Roberto MENEGHELLO[2], Gianpaolo SAVIO[3], Lorenzo GRAIFF[1], Carlo MONACO[4], Edoardo STELLINI[5]

Abstract

Aims: The purpose was to compare three different techniques of scanning in a full-arch digital impression. Digital impression accuracy and time of scanning of inexperienced operators were assessed.

Methods: A polymethyl methacrylate acrylic (PMMA) model of an edentulous mandible with six scan-abutment was used as a master model and its dimensions measured with a coordinate measuring machine. Three different techniques of scanning (MetA; MetB and MetC) were applied on the master model with an intraoral scanner (Zfx, Zimmer-Biomet). Nine students were divided in three groups. All students were instructed how to use the technique assigned. Each group knows only the scanning technique assigned. Each student performed 3 scans. The acquisition times (minutes) of each scan were recorded. All the digital impressions were imported and analysed with a CAD software (Rhinoceros 5.0, RobertMcNeel) and compared with the master model, obtaining the scanning accuracy. One-way analysis of variance with a post hoc analysis (Bonferroni's test) was used to compare the three groups.

Results: Statistically significant difference was present between MetA, MetB and MetC (p value = 0.02). The mean total treatment time was of 14.5 min (SD 4.5 min) for the group MetA; 11.5 min for MetB and 12.1 min for MetC.

Conclusions: The scanning methods have a great influence on the accuracy of full-arch implants. The time analysis showed that with the increasing of the

1 Adjunct Professor, Department of Neuroscience, Dental School, University of Padova, Italy.
2 Assistant Professor, Departments of Management and Engineering, University of Padova, Italy.
3 Assistant Professor, Departments of Civil, Environmental and Architectural Engineering, University of Padova, Italy.
4 Researcher, Assistant Professor, Division of Prosthodontics and Maxillofacial Rehabilitation, Department of Biomedical and Neuromotor Sciences (DIBINEM), Alma Mater Studiorum—University of Bologna, Bologna, Italy.
5 Dean, Dental School, University of Padova, Italy.
DOI: 10.17932/EJOH.2020.022/ejoh_v01i1003

number of scans the scan time decreases.

Keywords*: digital impression, scanning techniques, intraoral scanner, accuracy, strategy*

Introduction

The accuracy is a primary factor for long term clinical success and survival of an implant-supported fixed dental prosthesis (FDP). However, the insufficient accuracy during the impression-making technique and/or manual steps during prosthesis fabrication may lead to misfit of the prosthesis and subsequent to technical, mechanical, and biological complication such as occlusal discrepancies screw or abutment loosening, fracture of the prosthetic components, implant fractures, and loss of osseointegration (1-5). Today, conventional impression with different techniques and materials represent a commonly used procedure in general dental practice (6). With the implementation of the intraoral scanner (IOS), many prosthetic procedures as tray selection, dispensing and setting of impression materials, splinting the impression coping pick-up have been eliminated, while patient comfort is increased, the protocols have been simplified, less potential gag reflex, no potential deformation of the impression and time to clinical treatments have been reduced (7,8). However, there are different obstacles and deficiencies to address in intraoral impressions. The additional cost of purchasing an IOS, the learning curve for adjusting to the new methodology, scanner displacement during the scanning accuracy are the major limitations at the digital workflow. An important factor in clinical handling is the scanning strategy. In the dental market there are different IOS, which differ for the scanning technologies (9). Thus, there is a low knowledge on the relationship between accuracy, repeatability and methods of scanning. In the different field of medicine, several researches have conducted to know the learning curve of new devices (10,11). In literature the majority of studies on intraoral digital impression investigated the accuracy of digital impressions (12-15) or compared the working time of digital and conventional impression methods (16).

Only two studies have been conducted to evaluate the methods of scanning (17,18) and one article evaluated the experience curve with two different IOS (19). The purpose of this randomized crossover in vitro study was to compare three different techniques of scanning in a full-arch digital impression and the time of scanning of digital impression by inexperienced operators.

Materials and Methods

Master Model

A virtual model of a mandibular edentulous with six scan-abutment positioned vertically at different height was designed by means of a computer-aided design (CAD) software (SolidWorks Corporation). The shape of the master model resembled a mandibular implant-supported full arch rehabilitation. Six scan-abutments were positioned symmetrically corresponding to the mandibular first molars, first premolars, and lateral incisors. All the scan-abutment geometries (i.e. regular cylinders) were parallel to each other with a diameter of 4 mm and incorporated into the master model. The regular geometry of scan-abutments was chosen, following metrologists expertise due to: i) the favourable design to perform the calibration measurements using a coordinate measuring machine, ii) the unfavourable design to stress stitching algorithm/procedure adopted by scanning systems. Subsequently the master model, with integrated scan-abutments, was manufactured in PMMA by a CNC machine tool to serve as a clinically relevant simulation model (master model). PMMA as the master model material was adopted in order to ensure adequate stiffness, strength, dimensional stability and to eliminate the need for spraying the model. Soft tissue was simulated using silicone (Vestogum, 3 M) in order to enable accurate measurements (Fig.1).

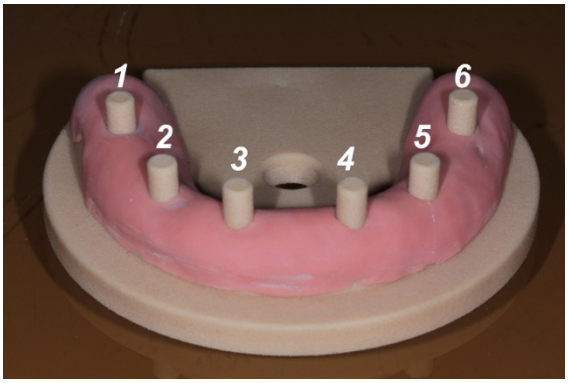


Figure 1. *Master Model*

Calibration Plan and Procedure

The experimental campaign consisted in three phases: 1) calibration of the master model using the OGP SmartScope Flash CNC 300 with the contact system; 2) acquisition of the master model by expert operators with eight Ios; 3) recurrent calibration of the master model using the CMM with the contact system. The master model was measured with a coordinate measuring machine (CMM) (OGP SmartScope Flash,CNC 300), an optomechanical system that is capable

of moving a measuring probe to determine the spatial coordinates of points on a workpiece surface. The measuring system is capable of a 3D maximum error assessed as E3-xyz (L) = 2.8 + 5L/1000 µm (with L, in millimeters, equal to the measured distance, according to ISO 10360 standard). A high-accuracy contact-probe with ruby sphere of 1.5mm of diameter was used to measure the points of the scan-abutment upper and lateral surfaces to locate them in a x, y and z coordinate reference frame. Recurrent verification of the master model was required between scanning sessions with Ios to check the dimensional stability of the master model. The calibrations of the master model were performed based on the points in Figures 2a and 2b: a partial, preliminary, reference frame on the master model was defined, then the scan-abutments were measured. For each scan-abutment a plane (Fig 2c) and a cylinder (Fig. 2d) were identified, adopting specific sets of points. Finally, the position of each scan-abutment was computed as the intersection between the plane and the axis of the cylinder. The coordinates of the probed points and intersections were transferred into a 3D CAD geometric modelling software program (Rhinoceros 5.0) and analysed with a specific evaluation protocol, developed in IronPython, to estimate the position and orientation of each scan-abutment. This procedure was repeated five times. A mean of the five measurements performed with the CMM was used as reference position of scan-abutments for the evaluation of the accuracy of each digital impression obtained by eight different IOS.

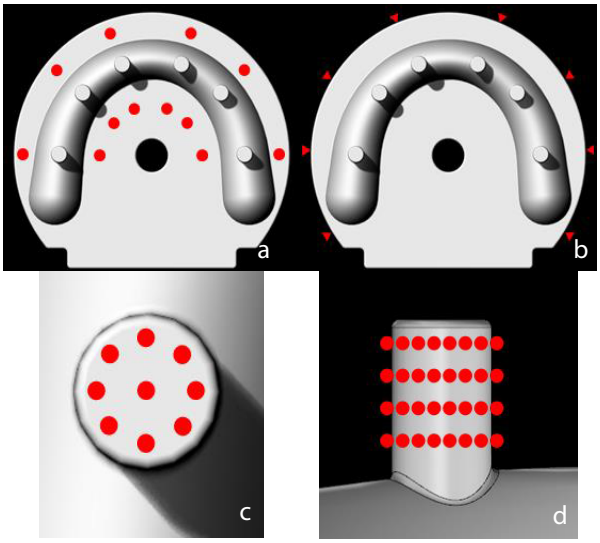


Figure 2. *The measurements of the master cast: a) Points in the XY plane. b) Points on the outer circumference. c) Measurement of 9 points on the upper plane of the scan-abutment. d) Acquisition of 4 circular sections (260 points) perpendicular to the axis of the scan-abutment.*

Study Design and Impression Procedure

The study was designed as a blind randomized controlled cross-over experiment students of dental school at second year, without any previous digital implant impression procedure experience. The sample was formed by 3 students divided to three groups of scanning's techniques. The impression was made in a controlled-temperature environment (22°C±2°C) with a relative humidity of 45% ±10%. Through a randomization computer-generated were assigned the three different techniques of scanning each group. Three different techniques of scanning (classified as MetA; MetB and MetC) (Fig. 3) performed by an intraoral scanner (Zfx, Zimmer-Biomet) were described by one expert operator (A.D.F.) to groups. All operators were instructed how to use the device, the technique assigned and follow the definite protocol. Each group knows only the scanning technique assigned. Each student performed 3 scans. For each methodology 9 detections were performed. The acquisition times (minutes) of each scan were recorded. The digital impression from each group were executed on three separate days. The operators in each group performed the acquisition alternately. The scanning technique MetA consisted of positioning the intraoral scanner parallel to the occlusal surface of the scan-abutments in position 46. Move the scanner in parallel to the occlusal surface toward the mesial surface, positioning the intraoral scanner parallel to the facial surface of the scan-abutments in position 46 and move scanner in parallel to the facial surface toward the mesial surface, positioning the intraoral scanner parallel to the lingual surface of the scan-abutments in position 46 and move scanner in parallel to the lingual surface toward the mesial surface. Continue the acquisition of scan-abutment to the element in position 36 (Fig. 3a). The scanning technique MetB consisted of positioning the intraoral scanner parallel to the occlusal surface of the scan-abutments in position 46. Move the scanner in a rotating motion from occlusal to lingual and forth until arriving the scan abutments in position 36. To enable interdental scanning, the scanner has to be held slightly shifted and rotated (Fig. 3b). The technique of scanning MetB was recommended by the manufacturer. The scanning technique MetC consisted of positioning the intraoral scanner perpendicular to the midline facing the facial surface of the scan-abutment in position 42. Continue scanning in an occlusal direction and then in the distal direction from the scan-abutment 42 to acquire the scan-abutment in position 44 and in position 46. The lingual surfaces were scanned through the execution of a semicircle movement during the scan of the occlusal surface. Once concluded the scanning of the 4th quadrant, it starts to scan the facial surface of the scan-abutment in position 32 in the same way as the 4th quadrant (Fig. 3c). The steps of acquisition of the master model were divided into three phases: 1) calibration of the master model using the OGP SmartScope Flash CNC 300 with contact system; 2) acquisition of the master model by students

divided into three groups with intraoral scanner; 3) re-calibration of the master model using the OGP SmartScope Flash CNC 300 with contact system.

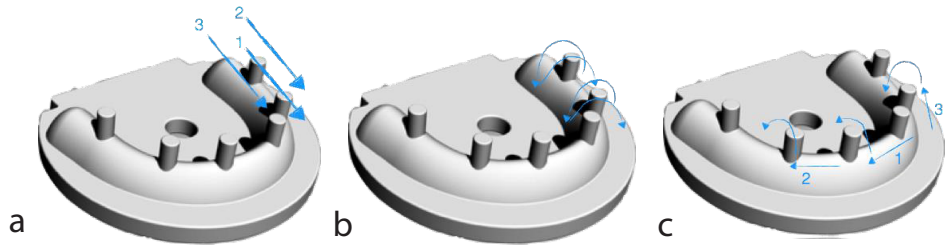


Figure 3. *Scanning technique: a) MetA; b) MetB; c) MetC.*

Accuracy Assessment

The STL file imported in the 3D CAD software (Rhinoceros 5.0) was furtherly processed to perform 3D position and distance analysis. A software plug-in called "Scan-abut" was developed in order to automatically segment the mesh of the scan-abutment by curvature analysis (Fig.4). The segmented dataset was then filtered (reduced), with 2σ Gaussian criterion, and two independent fitting were computed to calculate the upper plane surface and the later cylindrical surface of the scan-abutment (Fig.5a; Fig. 5b). From the intersection of the cylinder axis with the plane, a centre point was assessed, which identifies the scan-abutment position (Fig. 5c).

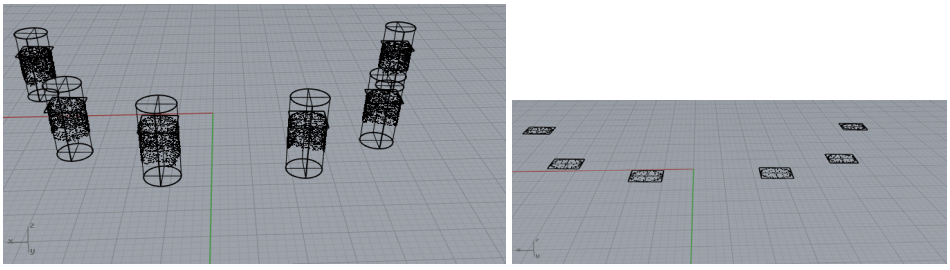


Figure 4. *The software application called "Scan-abut" was realized as a plug-in for Rhinoceros. The software "scan-abut" segments automatically the surfaces of the scan-abutment (cylindrical area and plan area).*

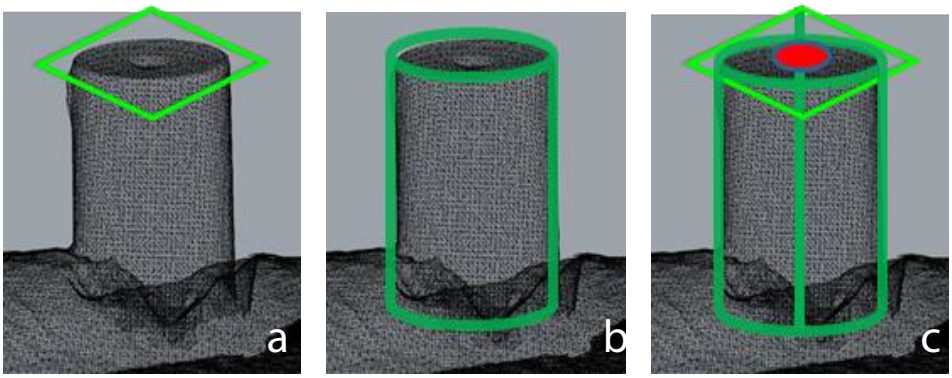


Figure 5. *Construction of the geometric elements during calibration master model: a) construction of the plan of fitting through 9 points measured above. b) Construction of the cylinders of fitting on 4 circular sections. c) Intersection of the axis of this cylinder with the upper floor to define a reference point for each individual scan-abutments.*

To evaluate the absolute position error of scan-abutments, the six scan-abutment positions were aligned with the six reference positions measured by CMM, using a least-square best fitting algorithm. To investigate the accuracy of scanning systems with respect to arch length, a 3D intra-abutment distance was calculated as the 3D linear distance between paired scan-abutments (i.e. distance from scan-abutment 1 to scan-abutment 6). A total of fifteen 3D distances, considering any combinations of six scan-abutments, were calculated for each digital impression (Fig. 6).

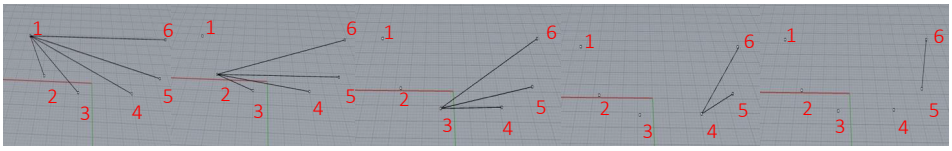


Figure 6. *3D Distance Analysis*

The 3D distance error was calculated as the difference between the effective 3D distance between scan-abutments of the digital impression and the reference 3D distance between scan-abutments of the master model, measured with CMM[15]. The distance error was used to evaluate the relationship between the error and the distance as an indicator of the maximum permissible error (MPE) of the scanning system in accordance to ISO 10360 standards. Descriptive statistical analysis was performed for variables. The distance error was considered as the statistical unit. The accuracy of an impression was determined by two factors: trueness and precision (ISO 5725-1). The trueness described the deviation of the tested impression method from the original geometry, instead the precision

described the deviations between the impressions. The mean of the distance error was considered the trueness, instead the standard deviation the precision. The primary variable was the distance (μm) and the secondary variable was the time (minutes) employed in the execution of digital impression. One-way analysis of variance (ANOVA Test) with a post hoc analysis using Bonferroni's test was used to compare the three groups. The level of statistical significance was set as $\alpha = 0.05$ and with a statistical power of 80%.

Results

Twenty-seven digital impressions were performed with three different scanning methods. The total mean distance error for group with methods MetA was 0.26 mm (SD 0.21), for group with methods MetB was 0.085 mm (SD 0.075) and for group with methods MetC was 0.20 mm (SD 0.26). Statistically significant difference was present between MetA, MetB and MetC (p-value = 0.02). The post hoc analysis showed a no statistically significant difference between MetA and Met C (p-value = 0.53), instead statistically significant difference was present between MetA and MetB (p-value=0.002), MetB and MetC (p= 0.04). The distance error analysis with regression line for the three different scanning techniques were reported in the graphics (Figure 7, 8, 9). The graphics 2 showed that the error with the scanning method MetB had a good linear relation with the scan-abutment distance, instead the MetA e MetC presented no linear relation between error and distance, then more errors dispersion. The mean total treatment time was of 14.5 min (SD 4.5 min) for the group MetA; 11.5 min (SD 3.8 min) for the group MetB and 12.1 min (SD 2.5min) for the group MetC. In the first section of scans with the technique of the group MetA the mean total treatment time was 18.6 min, in the second section 15.3 min and in the third section 9.6 min. In the first section of scans with the technique of the group MetB the mean total treatment time was 15.3 min, in the second section 11.6 min and in the third section 7.6 min with. In the first section of scans with the technique of the group MetC the mean total treatment time was 14.3 min, in the second section 12.6 min and in the third section 9.3 min.

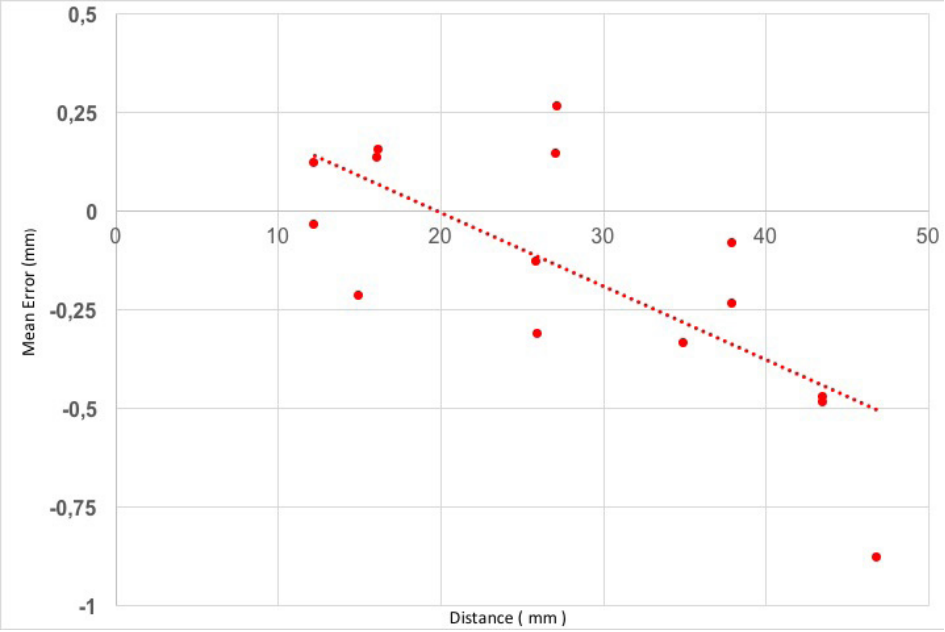


Figure 7. *3D distance analysis with regression line for MetA.*

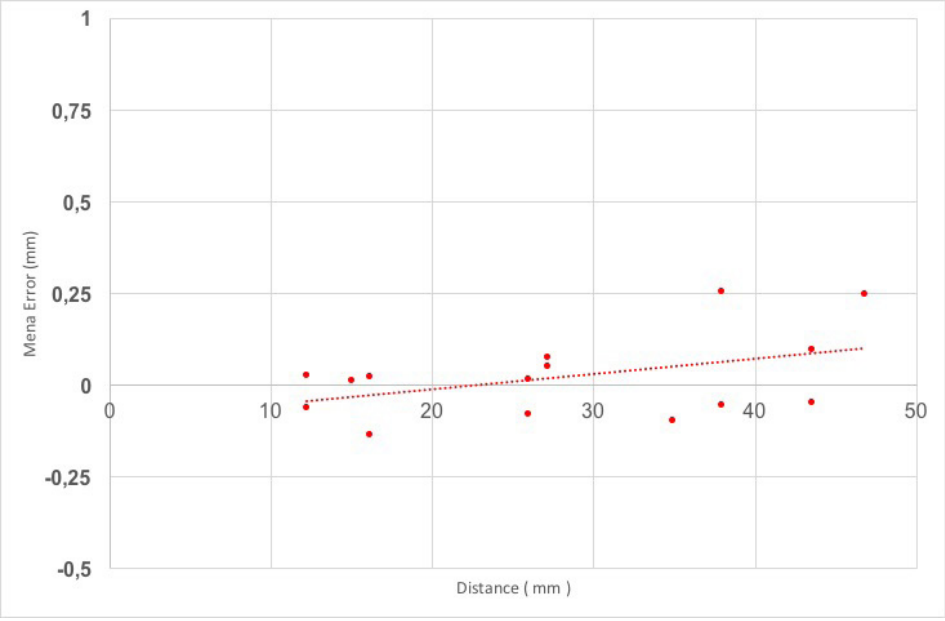


Figure 8. *3D distance analysis with regression line for MetB.*

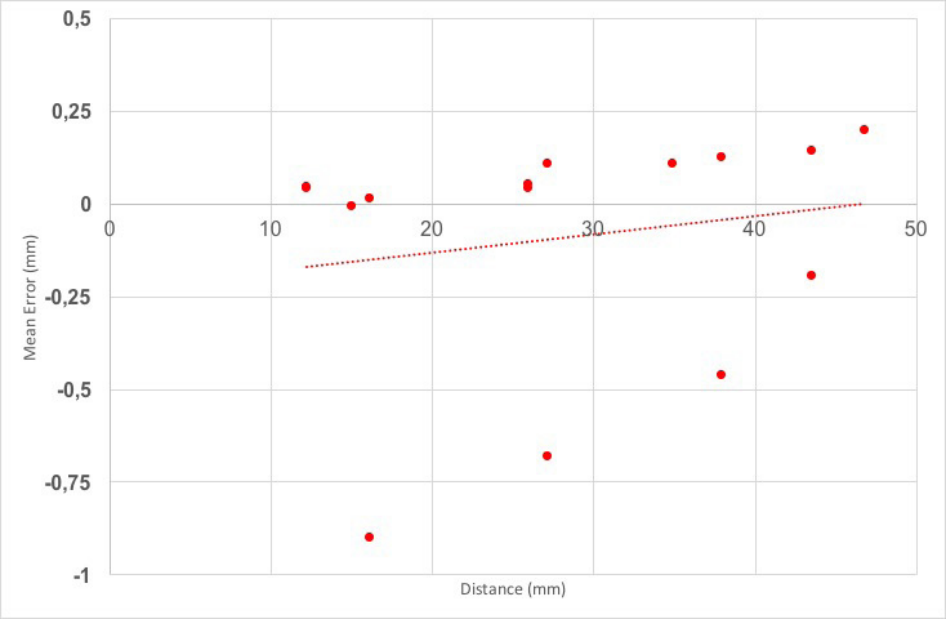


Figure 9. *3D distance analysis with regression line for MetC.*

Discussion

To the best knowledge of the authors, this is one of the three studies that analysed the influence of three different techniques of scanning. Moreover, in this study the authors evaluated the learning curve of digital methodology by inexperienced operators. Based on the results, the scanning technique MetB presented a good linear relation with scan-abutment distance and the less mean distance errors. Thus, the scanning method MetB recommended by the manufacturer provided the highest accuracy in full-arch scans. The time analysis showed that with the increasing of the number of scans the scan time decreases. In literature just two articles compared the scans techniques for digital impression (17,18). Ender and Mehl (17) used three different IOS: Lava COS (3M ESPE;Seefeld,Germany), Cerec Blucam (Sirona Dental System,Bensheim,Germany) and iTero (Caredet Ltd,Yehuda,Israel) with different scanning techniques. The first scanning protocols used with the Lava COS was recommended by the manufacturer and the second was taken from the publication by van der Meer et al. (9). The scanning methods used with the Cerec Blucam were developed by the same authors, instead the iTero scanning protocol was implemented within the acquisition software. However, only with the IOS Lava COS the authors used two scanning methods of which one recommended by the manufacturer. The accuracy of the digital impression obtained with the scanning methods recommended by the manufacturer was

45.8µm, instead with another scanning method was 90.2µm. Thus, the authors concluded that the scanning protocols have a large influence on the accuracy of digital impression. Müller et al (18) used one IOS Trios (3Shape, Copenaghen, Danimark) with three different scanning strategies. The scanning method B was recommended by the manufacturer. The authors concluded that the strategy B had the higher precision that the other methods, but no statistically significant difference between the scan techniques. Thus, the authors recommended the strategy B because provided the highest trueness and precision in full arch scans. In both researches, the master model representing a dentate patient (maxillary dentate jaw) made from a cobalt-chromium alloy, instead in our research used a model representing a mandibular edentulous with six scan-abutment positioned vertically at different height. However, the main difference was the methodology of evaluation of the accuracy. Ender et al. (17) and Müller et al. (18) scanned the model with an industrial reference scanner and the digital models of the reference scan, and the three scan methods were superimposed in software according to the best-fit algorithm. Instead, in our research a software called "Scan-abut" was realized as a plug-in for Rhinoceros 5.0 and the master model was measured with a coordinate measuring machine (CMM). This new methodology created by the authors is more objective and is not influenced by possible error due to the use of a reference scanner and a generic program for superimposed the STL file. Moreover, Ender et al. (17) and Müller et al. (18) used the position analysis to calculate the accuracy. Our research the 3D distance error was performed, because the graphics with regression line showed the relationship between error and distance. Errors dispersion might be related to incorrect software stitching process during the acquisition, then the scanning methods affect the accuracy of digital impression. In this research also the scanning time was examined. We recorded the trend of the scanning time with the three different techniques of scanning and after each session of scans the acquisition time of the master model decreases. From the first to the last session of scans there was a mean decrease of about 50 % of the scanner. These results were comparable to another research (19). Kim et al. (19) compared the experience curves of two intraoral scanners and evaluated whether repeated scanning experience could change the scan time. With iTero (Caredet Ltd,Yehuda,Israel), the mean scan time was 23 minutes and 21 seconds and the difference between scan time for the first session and that for the last session was 7 minutes and 26 seconds. Instead with Trios (3Shape, Copenaghen, Danimark), mean scan time was 14 minutes and 25 seconds and the difference between the scan time for the first session and that for the last session was 4 minutes and 23 seconds, considering that the time taken to make a conventional impression was 24 minutes and 42 seconds (23,24). The authors concluded that the time of scanning decreased after repeated scanning with both device and that scanning proficiency increased. However, the experience is a

difficult parameter to measure. Some manufacturer of intraoral digital scanner suggests 15 to 16 scans to archive the learning curve, but Giménez et al. (15) noted that the inexperienced operators obtained accuracy similar to the experienced ones in their last two impressions which indicates that gaining experience is a very subjective issue. The difference of deviations between the experienced and inexperienced group was 44 μm. Lee et al. (25) evaluated the difficulty level and operator's perception between dental students and experienced clinicians when making digital and conventional implant impressions. The authors concluded that the conventional impression was more difficult for the student group respect that clinician group, but the difficulty level of digital impressions was same between the groups and the student group favoured the digital impression technique. In our study all the operators were inexperienced because the authors wanted to evaluate the learning curve of digital methodology, but only digital impression technique was performed. A limitation of the present study was that only one digital intraoral scanner system was used for digital impression and only 3D distance analysis was performed. Further studies should be carried out with different digital intraoral scanners systems to compare the different potential and defects of each.

Conclusion

The scanning methods have a great influence on the accuracy of digital impressions for abutments in full-arch implant rehabilitation. We decided to use only the scanning method MetB for future scanning with this Ios. The time analysis showed that with the increasing of the number of scans the scan time decreases.

Acknowledgments

The authors have no commercial or financial dealings that may pose a conflict of interest or potential conflict of interest. The authors thank Ing. MatteoTurchetto for technical support.

References

1. Christensen GJ. Will digital impressions eliminate the current problems with conventional impressions? J Am Dent Assoc. 2008;139:761–763.
2. Lee H, So JS, Hochstedler JL, Ercoli C. The accuracy of implant impressions: a systematic review. J Prosthet Dent. 2008;100:285–291.
3. Eliasson A, Wennerberg A, Johansson A, Ortorp A, Jemt T. The precision of fit of milled titanium implant frameworks (I-Bridge) in the edentulous jaw. Clin Implant Dent Relat Res. 2010;12:81–90.

4. Di Fiore A, Meneghello R, Savio G, Sivolella S, Katsoulis J, Stellini E. In Vitro Implant Impression Accuracy Using a New Photopolymerizing SDR Splinting Material. Clin Implant Dent Relat Res. 2015;17(Suppl 2):721–729.
5. Vigolo P, Majzoub Z, Cordioli G. Evaluation of the accuracy of three techniques used for multiple implant abutment impressions. J Prosthet Dent. 2003;89:186–192.
6. Papaspyridakos P, Chen CJ, Gallucci GO, Doukoudakis A, Weber HP, Chronopoulos V. Accuracy of implant impressions for partially and completely edentulous patients: a systematic review. Int J Oral Maxillofac Implants. 2014;29:836–45.
7. Malaguti G, Rossi R, Marziali B, Esposito A, Bruno G, Dariol C, Di Fiore A. In vitro evaluation of prosthodontic impression on natural dentition: a comparison between traditional and digital techniques. Oral Implantol (Rome) 2017;9:21-27.
8. Lee SJ, Gallucci GO. Digital vs. conventional implant impressions: efficiency outcomes. Clin Oral Implants Res. 2013;24:111–115.
9. Di Fiore A, Meneghello R, Graiff L, Savio G, Vigolo P, Monaco C, Stellini E. Full arch digital scanning systems performances for implant-supported fixed dental prostheses: a comparative study of 8 intraoral scanners. J Prosthodont Res 2019;63:396-403.
10. Prasad SM, Maniar HS, Soper NJ, Damiano RJ Jr, Klingensmith ME. The effect of robotic assistance on learning curves for basic laparoscopic skills. Am J Surg 2002;183:702-7
11. Yohannes P, Rotariu P, Pinto P, Smith AD, Lee BR. Comparison of robotic versus laparoscopic skills: is there a difference in the learning curve? Urology 2002;60:39-45.
12. Ender A, Mehl A. Accuracy of complete-arch dental impressions: a new method of measuring trueness and precision. J Prosthet Dent. 2013;109:121–128.
13. Patzelt SB, Emmanouilidi A, Stampf S, Strub JR, Att W. Accuracy of full-arch scans using intraoral scanners. Clin Oral Investig. 2014;18:1687–1694.
14. Güth JF, Keul C, Stimmelmayr M, Beuer F, Edelhoff D. Accuracy of digital models obtained by direct and indirect data capturing. Clin Oral Investig. 2013;17:1201–1208.
15. Giménez B, Özcan M, Martínez-Rus F, Pradíes G. Accuracy of a digital

impression system based on active wavefront sampling technology for implants considering operator experience, implant angulation, and depth. Clin Implant Dent Relat Res. 2015;17(Suppl 1):54–64.

16. Papaspyridakos P, Gallucci GO, Chen CJ, Hanssen S, Naert I, Vandenberghe B.Digital versus conventional implant impressions for edentulous patients: accuracy outcomes. Clin Oral Implants Res. 2016;27:465–472.
17. Ender A, Mehl A. Influence of scanning strategies on the accuracy of digital intraoral scanning systems. Int J Comput Dent. 2013;16(1):11-21.
18. Müller P, Ender A, Joda T, Katsoulis J. Impact of digital intraoral scan strategies on the impression accuracy using the TRIOS Pod scanner. Quintessence Int. 2016;47:343–349
19. Kim J, Park JM, Kim M, Heo SJ, Shin IH, Kim M. Comparison of experience curves between two 3-dimensional intraoral scanners. J Prosthet Dent. 2016 Aug;116(2):221-30.
20. Savio G, Meneghello R, Concheri G. Optical properties of spectable leses computed by surfaces differential quantities. Adv Sci Lett 2013;19:595–600.
21. Chandran DT, Jagger DC, Jagger RG, Barbour ME. Two- and three-dimension- al accuracy of dental impression materials: effects of storage time and moisture contamination. Biomed Mater Eng 2010;20:243–249.
22. Ziegler M. Digital impression taking with reproducibly high precision. Int J Comput Dent 2009;12:159–163.
23. Di Fiore A, Vigolo P, Graiff L, Stellini E. Digital vs Conventional Workflow for Screw-Retained Single-Implant Crowns: A Comparison of Key Considerations. Int J Prosthodont. 2018;31:577-579.
24. Kim W, Kim K. Correct methods for using alginate impression materials.[SEP]J Korean Dent Assoc 2005;43:576–581.
25. Lee SJ, Macarthur RX 4th, Gallucci GO. An evaluation of student and clinician perception of digital and conventional implant impressions. J Prosthet Dent. 2013;110:420–423.

Does Long-Term Playing Violin Cause Unilateral Hearing Loss?

Özlem KONUKSEVEN [1], Merve MERAL[1], Ayşe Nur KARA[1], Melis ÖZDEMİR[1], Gülnaz TANDOĞRU[1]

Abstract

Objective: This study compared the differences between two ears, the one which is close to the violin and the far one from the violin, in individuals who have been playing violin, and evaluated by using Distortion Product Otoacoustic Emission.

Methods: 30 individuals between the ages of 18-30, playing violin for at least 2 hours a day for 5 years and having no history of hearing loss or ear diseases were included in the study. Pure tone audiometry test and Distortion Product Otoacoustic Emission test were apLONplied on all subjects included in the study. The differences in these measurements for between two ears were subjected to statistical analyses.

Results: In all frequencies (996 – 7998 Hz) SNRs of the ear close to the violin and the ear far from the violin were obtained normal, above 6 dB SNR in the results of Distortion Product Otoacoustic Emission. However, there were not statistically significant differences between two ears ($p>0.05$), only at 1416 Hz a statistically significant difference was observed between the two ears ($p = 0.03$).

Conclusion: The violinists had better hearing function than expected. But noise-induced hearing loss happens slowly over time and may be hard to detect at first. Violinists are at risk for occupational exposure to high noise. Therefore, the violinists with normal hearing should be monitored by DPOAE which shows noise-induced damage in outer hear cells.

Keywords: *audiometry, otoacoustic emission, noise-induced hearing loss, violin, sound exposure*

1 Department of Audiology, Faculty of Health Sciences, Istanbul Aydin University, Istanbul, Turkey
DOI: 10.17932/EJOH.2020.022/ejoh_v01i1004

Introduction

High noise level causes mechanical damage in the inner ear, usually causing biochemical and cell changes in the outer hair cells and cell damage in the nerve fibers. As a result, temporary or permanent noise-induced hearing loss may occur (1, 2). Prolonged exposure to low noise levels may have the same effect as short exposure to high noise levels. For example, listening to a 100 dB sound for 15 minutes will have the same effect as listening to a sound of 85 dB for 8 hours (3). Noise-induced hearing loss is the most common occupational disease in the USA. The average of 16% of adult hearing losses around worldwide are caused by occupational exposure to high noise (4).

The function of outer hair cells damaged by noise is evaluated by the otoacoustic emission test. With the otoacoustic emission test, very small intensity sound waves originating from the outer hair cells in the cochlea are recorded with a sensitive microphone placed in the external ear canal. There are two types of otoacoustic emissions used for clinical testing: transient evoked otoacoustic emissions (TEOAEs) and distortion product otoacoustic emissions (DPOAEs). DPOAEs are used to obtain frequency-specific data regarding cochlear sensitivity (5). For DPOAE measurements, the signal-to-noise ratio (SNR), which is a measure of the level of DPOAEs, should be 6 dB and above. Studies have demonstrated that noise exposure can lead decrease results of DPOAEs (6, 7).

Since musical instruments produce very loud sounds, they may cause hearing loss. Musicians are averagely exposed to sounds of 79-98 dB intensity during concerts and rehearsals. This intensity is in the range of 85-105 dBA in individuals who play the violin, which is the most well-known instrument of the stringed instrument family (8). Violin's fundamental frequencies are 196-3136 Hz, and its harmonics are in the range 4-15 kHz. While playing the violin, the intensity of the sound emanating from the instrument is harmful for the ear which is close to the violin (9). It was observed that the left ear of musicians using string instruments was exposed to an average of 4.6 dBA sounder than their right ears (8).

The aim of this study was to compare the differences between two ears, close to violin and the far one from the violin, in individuals who have been playing violin and evaluated by using DPOAE.

Material and Methods

The study was conducted in Istanbul Aydın University Faculty of Health Sciences Audiology Laboratory between April and May 2019. It was approved by the Istanbul Aydin University Non-Interventional Clinical Research Ethics Committee (registration number 2019/77) on April 25th, 2019. 30 individuals, 5 males and 25 females, between the ages of 18-30 were included in the study.

Inclusion criteria were determined as playing the violin for at least 2 hours a day for 5 years and having no history of hearing loss or ear diseases. External auditory canal pathologies, perforation in the eardrum, congenital ear anomalies are defined as an exclusion criteria Otoscopic examination was performed on all subjects included in the study, and Pure tone audiometry (PTA) test and DPOAE test were applied. DPOAE results were compared between the ear close to violin and the far one from the violin.

Audiometric evaluation

PTA was performed with Otometrics Madsen Astera model device. It was performed following audiometric evaluation procedures in a standard silent cabin complying with ANSI standards. Air conduction evaluations has been performed using Telephonic TDH-39 (Telephonics, USA) headphones in the range of 0.25-8 kHz, and bone conduction evaluations using a Radioear B-71 (Radioear, USA) brand bone conduction vibrator in the range of 0.5-4 kHz. Pure tone avarege (PTA) were calculated by using the hearing thresholds at frequencies of 500, 1000, 2000 Hz, and Godmann's classification (0 -25 dB HL normal hearing, 26 -40 dB HL very mild hearing loss, 41 -55 dB HL mild hearing loss, 56 -70 dB HL moderate hearing loss, 71 -90 dB HL severe hearing loss, 91 and above dB HL very severe hearing loss) for both ears.

Otoacoustic Emission Test

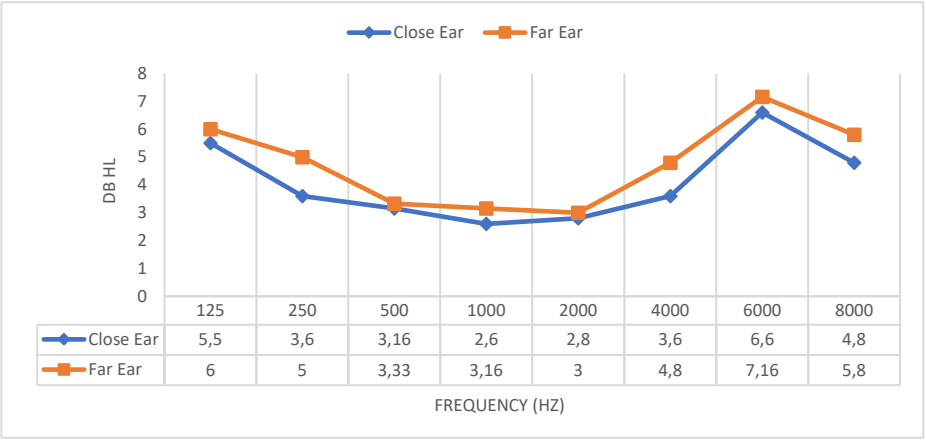
DPOAE test was evaluated using Otometrics Madsen Capella model device and a bandwidth in the range of 1-8 kHz was selected. 65 dB SPL at Ll and 55 dB SPL at L2 were used. Two pure tones (F1 and F2) were used as acoustic stimuli. The SNR value was used as 6 dB intensity. DPOAE test results were evaluated according to the SNR value at 13 different frequencies (996, 1191, 1416, 1679, 2001, 2382, 2832, 3359, 4003, 4755, 5654, 6728, 7998 Hz).

Statistical Analysis

Whether there is a difference between the results of the ear close to violin and the far one from the violin is tested with Paired T test for the samples which has normal distribution, and with Wilcoxon Signed Ranks Test for the samples which has not normal distribution. A value of $p < 0.05$ was considered the limit of significance. The normality of the distribution will be tested with the Shapiro-Wilk test. The homogeneity of variances will be tested with Levene Test. In cases where the data are normally distributed and the variances are homogeneous, the Wilcoxon Signed Ranks test will be applied. SPSS 22.0 package program will be used for data analysis.

Results

This study examined 30 individuals (25 females and 5 males), aged between 18 and 30 (22±2,19) years old (mean 24,10 ± 5,46). One subject held the violin close to their right ear, and 29 (96.7%) held the violin close to their left ear. As analyzing the anamnesis taken 11 individuals (36.7%) had tinnitus and 19 individuals (63.3%) had no tinnitus; one (3.3%) The individuals included in the study have been playing the violin for 7.47 ± 2.67 years, with an average of 4.07 ± 1.43 hours a day. As the result of the pure tone audiometry test, the degrees of hearing of 30 individuals were determined normal. There were not statistically significant differences between two ears ($p>0.05$). Individuals' pure tone thresholds of the ears close to the violin and the ears far from the violin are shown on the Figure 1.



	125	250	500	1000	2000	4000	6000	8000
Close Ear	5,5	3,6	3,16	2,6	2,8	3,6	6,6	4,8
Far Ear	6	5	3,33	3,16	3	4,8	7,16	5,8

Figure 1: *Pure tone threshold means of the ear close to the violin and the ear far from the violin*

As the result of the DPOAE test, SNR of 30 individuals was compared. Since SNR values at 996 Hz data were not normally distributed, they were compared with the Wilcoxon Signed Ranks test. SNR values at 1191 Hz, 1416 Hz, 1680 Hz, 2002 Hz, 2383 Hz, 2832 Hz, 3359 Hz, 4003 Hz, 4756 Hz, 5654 Hz, 6729 Hz 7998 Hz were compared with the Paired T test. In all frequencies, SNRs of the ear close to violin and the ear far from the violin were determined above 6 dB (Table 1). However, a statistically significant difference was observed between the two ears at 1416 Hz ($p = 0.03$).

Table 1: SNR comparison of DPOAE of ears close and far from the violin

Frequency	Close Ear		Far Ear		Sig (2-tailed)
	Mean ± Sd	Min - Max	Mean ± Sd	Min - Max	
996 Hz	15.53 ± 6.60	7 - 27	16.36 ± 6.15	6 - 27	,437
1191 Hz	17.63 ± 6.91	6 - 32	17.70 ± 7.95	1 - 31	,961
1416 Hz	**16.40 ± 6,54**	**6 - 30**	**18.60 ± 5.78**	**8 - 28**	**,031***
1679 Hz	16.93 ± 6.69	3 - 30	16.57 ± 6.59	0 - 27	,692
2001 Hz	15.33 ± 6.67	0 - 30	14.06 ± 5.92	-1 - 25	,381
2382 Hz	12.53 ± 4.28	3 - 24	11.8 ± 4.77	-4 - 22	,758
2832 Hz	13.00 ± 5.03	3 - 24	12.26 ± 5.50	0 - 23	,824
3359 Hz	15.56 ± 5.07	8 - 24	16.8 ± 5.46	7 - 27	,248
4003 Hz	14.46 ± 4.25	8 - 23	13.9 ± 5.98	-2 - 26	,703
4755 Hz	11.83 ± 6.35	-3 - 21	11.46 ± 6.23	-9 - 29	,831
5654 Hz	12.23 ± 5.88	1 - 26	11.03 ± 6.55	-2 - 23	,427
6728 Hz	12.86 ± 5.89	-5 - 24	10.96 ± 7.00	-9 - 27	,294
7998 Hz	8.33 ± 4.47	-4 - 18	8.5 ± 7.28	-7 - 19	,890

Discussion

The presence of unilateral hearing loss in individuals exposed to violin noise for a long time was investigated in this study. The SNR value differences between two ears, close to the violin and the far one from the violin were compared by DPOAE at each frequency in the range of 996 – 7998 Hz.

In the literature there are studies about the evaluation of hearing loss due to the noise in musicians. In a research paper, investigated the presence of noise-induced hearing loss in individuals playing violin. In the study, individuals playing violin were evaluated just before and after playing the violin, temporary hearing loss was found at 4 kHz on left ear both at pure tone threshold and TEOAE tests (8). Schmidt et al. (8) were obtained that first violinists had a slightly worse hearing on the left ear compared with the right ear, for high frequencies. In our study, hearing thresholds and DPOAE results were normal in both ears. However, statistically significant difference was observed between the two ears at 1416 Hz of DPOAE while violinist PTA at 1416 Hz was normal. At the basis of the

knowledge that is violin's fundamental frequencies are between 196-3136 Hz, this may be explained violin's should be monitored with via DPOAE even if PTAs are normal. On the other hand, another explanation of this result may be that audiological test results were considered to be normal since individuals were not evaluated immediately after noise exposure or permanent hearing loss has not yet occurred as it causes temporary hearing loss.

The OSHA hearing conservation amendment mandates audiometric surveillance of workers who are exposed to noise levels equal to or exceeding 85 dBA on an 8-hour time-weighted average (10). There are different results in the literature regarding the sound level which violinists are exposed. Schmidt et al. (11) determined that there was exposure to 95–96 dB in the left ear and 89–92 dB in the right ear. In another study the ranges of average sound levels were 86-93 dB(A) for violins and violas (12). Playing the violin for 2 hours a day, which is our inclusion criteria, may not be sufficient hour to cause hearing loss. Occupational standards specify a maximum allowable daily noise dose, expressed in percentages. For example, a person exposed to 85 dBA per NIOSH or 90 dBA per OSHA over an 8-hour work shift, will reach 100% of their daily noise dose. %100 noise dose for 2 hours is 91 dBA per NIOSH or 100 dBA per OSHA (13, 14).

In conclusion, the violinists had better hearing function than expected. But noise-induced hearing loss happens slowly over time and may be hard to detect at first. Violinists are at risk for occupational exposure to high noise. Therefore, violinists with normal hearing should be monitored by DPOAE which shows noise-induced damage in outer hear cells.

This study was limited by the relatively small sample size. A larger sample size might have led to significant differences. In addition, while evaluating hearing loss, the sound exposure of violin should be determined in both ears. Future studies should examine hearing function by classifying violin players by work experience (in years) and the number of normal working hours per week.

References

1. Dinh, C. T., Goncalves, S., Bas, E., Van De Water, T. R., Zine, A. (2015). Molecular regulation of auditory hair cell death and approaches to protect sensory receptor cells and/or stimulate repair following acoustic trauma. Front Cell Neurosci, 9: 96.
2. Turcot, A., Girard, S. A., Courteau M, Baril, J., Larocque, R. (2015). Noise-induced hearing loss and combined noise and vibration exposure. Occup Med, 3: 238-244.
3. World Health Organization. (2019). WHO-ITU global standard for safe listening devices and systems. https://apps.who.int/iris/bitstream/hand

le/10665/280085/9789241515276-eng.pdf?ua=1. Acces: 25.08.2020

4. Nelson, D. I., Nelson, R. Y., Concha-Barrientos, M., & Fingerhut, M. (2005). The global burden of occupational noise-induced hearing loss. American Journal of Industrial Medicine, 48(6), 446–458. https://doi.org/10.1002/ajim.20223
5. Kathleen, C. M. C., James, E. P. (2012). Audiology, in: K.J. Lee (Ed.), K.J. Lee's Essential Otolaryngology Head and Neck Surgery, tenth ed., The McGraw-Hill Companies, pp. 49–51
6. Lapsley, Miller, J. A., Marshall, L. & Heller, L. M. (2004). A longitudinal study of changes in evoked otoacoustic emissions and pure-tone thresholds as measured in a hearing conservation program. Int J Audiol , 43 , 307 – 322 .
7. Lapsley, Miller, J. A., Marshall, L., Heller, L. M. & Hughes, L. M. (2006). Lowlevel otoacoustic emissions may predict susceptibility to noise-induced hearing loss. J Acoust Soc Am, 280 – 296 .
8. Schmidt, J. H., Pedersen, E. R., Paarup, H. M., Christensen-Dalsgaard, J., Andersen, T., Poulsen, T., & Bælum, J. (2014). Hearing loss in relation to sound exposure of professional symphony orchestra musicians. Ear and Hearing, 35(4), 448–460. https://doi.org/10.1097/AUD.0000000000000029
9. Chasin, M. (2012). Music and hearing aids. Trends in Amplification 16(3) 136–139.
10. Hallmo, P., Borchgrevink, H. M. & Mair, I. W. (1995). Extended high-frequency thresholds in noise-induced hearing loss. Scand Audiol, 24, 47-52.
11. Schmidt, J. H., Pedersen, E. R., Juhl, P. M. (2011). Sound exposure of symphony orchestra musicians. Ann Occup Hyg. 55, 893–905.
12. Royster, J. D., Royster, L. H., & Killion, M. C. (1991). Sound exposures and hearing thresholds of symphony orchestra musicians. The Journal of the Acoustical Society of America, 89 (6), 2793
13. National Institute for Occupational Safety and Health (1998). Criteria for a recommended standard: Occupational noise exposure. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
14. Occupational Safety and Health Administration (1983). 29CFR1910.95 Occupational Noise Exposure: Hearing Conservation Amendment.

Evaluation of Family Functions of Parents with Cerebral Palsy Children

N. Melis MİSYAĞCI[1], Lale A. BÜYÜKGÖNENÇ[1]

Abstract

Background: Family functions of families with children with cerebral palsy (CP) may be affected in to care burden directly.

Objectives: In this study, it was aimed to evaluate the family functions of parents of children with cerebral palsy (CP).

Methods: The sample of the descriptive study was made up of the parents of 118 children diagnosed with CP in Istanbul and Ankara provinces. All of the data obtained in the study were evaluated with SPSS 23.0 for Windows statistical package program.

Results: The average scores of the parents who have children with CP who participated in the study on the Family Assessment Scale dimensions ranged from 1.62 ± 0.54 / 0.62 to 2.40 ± 0.58. Depending on the sociodemographic characteristics of the parents, the dimensions of the family assessment scale are related to the age, marital status, educational status, age of spouses, education status of spouses, employment status, income status, number of children, having another disabled child, sharing care, child; A significant correlation was found between the child's other health problems and school attendance, degree of cerebral palsy, time elapsed since diagnosis, and use of spasticity-reducing medication ($p < .05$).

Conclusion: Nurses and health professionals should consider the child and the family as a whole while providing care, and should evaluate the functions of the family with all its sub-dimensions, considering that the problem in the family may also affect the child's care.

Keywords: *cerebral palsy, child, family, family function*

Introduction

Cerebral palsy (CP) has been defined as one of the most common motor disorders in childhood, and it is a group of permanent disorders of movement and posture

1 Cyprus Science University Faculty of Health Sciences Nursing Department Lecturer
DOI: 10.17932/EJOH.2020.022/ejoh_v01i1005

development due to non-progressive damage to the developing fetus or infant's brain during the antenatal, perinatal or early postnatal period (1,2). According to the National Institute of Neurological Disorders and Stroke, it has been defined as a group of neurological disorders that are seen in the neonatal and early childhood periods and permanently cause deficits in muscular coordination, balance, and movement (3). CP causes a series of pathophysiological changes which are related to apoptosis in the neuron and inflammatory amendments in the central nervous system (4). CP happens in 1 in 500 live births. Generally, the diagnosis has been made between age 12 and 24 months. However, it can be made before 6 months' corrected age (5). Important risk factors causing CP; placental anomalies are grouped as major and minor birth defects, low birth weight, meconium aspiration, emergency cesarean section, birth asphyxia, neonatal seizures, respiratory distress syndrome, hypoglycemia, and neonatal infections (6).

Family is known one of the important and basic components of society and is a structure in which parents take the equal responsibility of taking care of their children (7). While the family functions of families with healthy children are dynamic and variable, in addition to the existing responsibilities of families with disabled children, the problems arising from the caregiver roles. These crisis makes family functions more sensitive and an issue that needs to be considered (8). The fact that the child joining the family does not develop normally, and the caregiving process is long and challenging, sometimes causes psychological, socioeconomic, social and family problems (8,9).

Family members with a disabled child experience high rates of anxiety, sorrow, anger, shock, denial, loneliness, social isolation, disappointment and regret. They also have difficulty adapting to multiple problems and conflicts as well as maintaining balance between family members. In addition, their ability to cope is low compared to healthy families (9,10,11,12). Considering all this reasons, it gains importance in analyzing existing or potential problems before it emerges.

Any factor that disrupts family dynamics affects family functions. If the family structure is vulnerable to coping with these changes, various impairments of family function are observed. Some factors that cause internal and external crises disrupt the family structure. For example environmental factors, sociological changes, economic conditions which cause financial problems, illness and health status, presence of disabled children in a family, parents' perception of family structure, negative parent-child relationships, parental behaviours and society's perspective on family are some of the factors that affect family functions (13).

Because family is a structure that forms the basis of a society formed by the combination of two different people to achieve the same goal, some problems affect the family in the short term but some of them require lifelong family

adaptation. Families with healthy functions are expected to stay healthy or adapt, even if problems arise. The adaptation of the family to these changes depends on the strength in its internal structure and external support. Having a disabled child is an important factor that changes family functions in many ways. Therefore, it is very important to increase their strength, help to deal with disability with family centered nursing care and to reorganize family functions accordingly (14,15). In this study, it is aimed to evaluate the family functions of parents who have a child with CP.

Materials and Methods

Research Type: This research is a descriptive and cross-sectional study.

Place and Time of the Research: The research was conducted at the Children with Cerebral Palsy Association (SERÇEV) Istanbul branch, special education school in Ankara, Turkey Spastic Children's Foundation (TSÇV) between 08.02.2017-29.06.2017.

Research Population and Sample

The research population formed by the parents of children with SP registered to TSÇV, Istanbul branch of SERÇEV and the special education school in Ankara. According to the inclusion criteria; A total of 118 families, 59 of whom were registered in Turkish Spastic Children 6 of whom were registered in Istanbul branch of SERÇEV and 53 of whom were enrolled in a special education school in Ankara were included in the study.

Inclusion Criteria

Sample selection criteria; Parents have children in the 0-18 age group with a diagnosis of CP, being literate and having no communication barriers.

Data Collection Tools

The data in the study were collected by using face-to-face interview method with Socio-demographic Question Form and Family Assessment Device (FAD).

Sociodemographic Question Form (SQF):

It is a form consisting of 25 questions developed by the researcher to determine the demographic characteristics of the parents and children participating in the study. In this form, the age of the parent (mother or father), marital status, educational status, income level, employment status, the number of children with disabilities, the presence of other children with disabilities, the status of receiving help in the care of the child, the parents' education about CP, There are questions that are thought to affect family function such as the child's age, gender, age at which the diagnosis of CP was diagnosed, the degree of spasticity, the use of drugs that

reduce spasticity, the health problems experienced in addition to CP, the status of attending school, and whether or not he received regular rehabilitation services (16).

Family Assessment Device (FAD):

Developed within the framework of the Family Research Program by Brown University School of Medicine, Department of Psychiatry and Human Behaviors and Butler Hospital in the USA, it is a measurement tool that determines the subjects in which the family can or cannot fulfill its functions. It was obtained by applying the McMaster Model of Family Functioning to families clinically and consists of seven subscales. These are the sub-dimensions of the McMaster Model, six of which address each problem area in family functions one by one, and one focuses on general functions. Some of the questions describe healthy functions and some describe unhealthy functions. The validity and reliability study of the scale was conducted by Ebstein et al and also Turkish validity and reliability study of Turkey gained by Bulut (17). The scale consists of 60 items, 32 of which are reverse-coded, and evaluates seven different parts. These sections (subscales); problem solving, communication, roles, emotional responsiveness, showing due care, behavioral control and general functions.

In FAD, points from 1 to 4 can be given to options. Those who chose the option "I totally agree" got 1 point, those who chose the "strongly agree" option got 2 points, those who said "slightly agree" got 3 points, and those who answered "I totally disagree" got 4 points. Since some items were prepared positively and some were prepared in a negative way, the answer "I totally agree" in some expressions and "I totally disagree" in others indicates being healthy. The evaluation of FAD is obtained by dividing the total score obtained from a dimension for each individual by the number of questions in that dimension and obtaining the average score (18).

Collection of Data

The data in the study were collected using face-to-face interview method with Socio-demographic Question Form and FAD. In this study, the data were collected between February 22 -April 6 2017 on different days of the week. The data was collected in the range of 09:00 to 17:00 hours according to availability of families in Spastic Children Foundation before or after the appointment time at the family waiting room. The data collection process in the special education center in Ankara was carried out by the researcher in the parents' waiting room of the school for a day, between 13.00-16.00. At SERÇEV, data were collected through the association's Istanbul representative. It took about 15 minutes to fill in the Personal Information Form and FAD.

Evaluation of Data

All of the data obtained in the study were processed with SPSS 23.0 for Windows statistical package program. Before proceeding of the data, it was checked whether the data were within the limits determined by data collection tools (SQF and FAD), and whether it contained errors and serious deficiencies. Then, the normality distributions of the data groups were examined with the Kolmogorov-Smirnov (K-S) test for the selection of statistical analyzes to be applied depending on the purpose and research questions of the study. T-test and Mann Whitney U tests were used to analyze the data. In this study, p value was accepted as 0.05.

Research Questions

A total of seven questions and related question subtitles were used in the study. These are listed as follows;

1. Do some sociodemographic characteristics of parents who have a child with CP affect family functions?

1.a. Age

1.b. Marital status

1.c. Education status

1.d. Age of spouse

1.e. Education status of spouse

1.f. Employment status

1.g. Income status

1.h Number of children owned

1.i. Disability in other children

1.j. The state of sharing the care of the child

1.k. Training status about CP

2. Do some sociodemographic characteristics of the child affect the family functions of the parents?

2 a. Child's age

2.b. Gender

2.c. Age at which CP was diagnosed

2.d. Using a drug that reduces spasticity

3. Does the child's degree of spasticity affect the parents' family functions?

4. Do the presence of other health problems of the child affect the family functions of the parents?

5. Does getting help in the care of the child affect the family functions of the parents?

6. Does the child's attendance at school affect the family functions of the parents?

7. Does regular use of rehabilitation services affect the family functions of the parents?

Ethical Aspect of the Research

Before starting the research, the study was submitted to the Koç University Human Research Ethics Committee and accepted (decision number 2016.297. IRB3.144 on 08.02.2017). In addition the study was approved by the Spastic Children's Foundation of Turkey on 12.11.2016 and SERÇEV on 12.12.2016. After the parents who participated in the study were informed about the purpose of the study, their consent was obtained.

Results

While 88.1% of the parents participating in the study are mothers, 1.9% are fathers. 94.1% of the parents stated that they were married. When the mothers' ages are examined; It was found that 16.3% were 20-29 and 83.7% were 30 and over. 23.1% of them are university graduates; It was observed that 86.6% of them did not work. 71.4% of the fathers are in the 40-49 age group, 7.1% are primary school, 14.3% high school and 71.4% are university graduates. 57.1% of the fathers were working; 42.9% of them stated that they did not work. 61.0% of the parents evaluated their economic status as medium. While 85.6% of the parents stated that they do not have any other disabled children; 12.7% of them stated that they also have other physically or mentally disabled children. While 50% of the parents stated that they were someone with whom they regularly shared the care of their children with CP, it is seen that the person who received the most help was spouse with 33.9%. When the parents included in the study were asked if they had any education related to CP; While 39.8% of them stated that they received training, 50% stated education was sufficient, and the other 50% found it insufficient. 44.1% of the children are in the 7-12 age group, 28% are in the 1-6 age group and the same proportion is between the ages of 13-18. 62.7% of the children are boys and 78.8% attend school. It was observed that 44.8% went to special education schools, 18.4% to public schools and schools where inclusive education continues. When parents were asked whether their children had any other health problems with CP, 42.4% answered yes.

Table 1. Children's Disease-Related Characteristics (N=118)

Characteristics	Number	%
Time Since Diagnosis		
36 months and under	15	12.7
37-72 months	25	21.2
73-108 months	37	31.3
109 months and over	29	24.6
Unanswered	12	10.2
Spasticity Degree		
Mild	29	24.6
Moderate	52	44.1
Severe	34	28.8
Unanswered	3	2.5
Use of Drugs to Reduce Spasticity		
Yes	23	19.5
No	88	74.6
Unanswered	7	5.9
Number of Days/Weeks of Rehabilitation		
1 Day	25	21.2
2 Days	52	44.1
3 Days	19	16.1
4-5 Days	22	18.6
Rehabilitation		
Yes	115	97.5
No	3	2.5

Table 1 shows the characteristics of children related to the disease. 12.7% of children have been diagnosed with CP for 36 months and less, 21.2% have been diagnosed with CP for 37-72 months, 31.3% have been diagnosed with SP for 73-108 months, and 24.6% have been diagnosed with CP for 109 months and longer. In children covered by the study, spasticity was mild in 24.6%, moderate in 44.1% and severe in 28.8%. 74.6% of children were found not to use drugs that reduce spasticity, and the proportion of those who took the drug was 19.5%. In addition, 97.7% of children receive a regular rehabilitation service, 21.2% of children attend a rehabilitation center one day a week, 44.1% of children attend two days, 16.1% of children attend three days, and 18.6% of children attend a

rehabilitation center four or five days.

Table 2. Average and standard deviation values of the family assessment device (n=118)

Dimension	**Min-Max**	$\overline{X}$ **± SS**
Problem Solving	1-4	1.62 ± 0.62
Communation	1-3	1.75 ± 0.59
Roles	1-3	2.09 ± 0.53
Affective Responsiveness	1-4	1.72 ± 0.67
Affective Involvement	1-4	2.40 ± 0.58
Behavior Control	1-3	2.04 ± 0.42
General Functioning	1-3	1.62 ± 0.54

According to the sub-dimensions of the parents‘ Family Assessment Device (FAD), the average score ranges from 1.62±0.54/0.62 to 2.40±0.58. When the cut point is taken as an average score of 2.00, problem solving, communication, affective responsiveness and general functioning, below the mean score; the roles, behavior control, and affective involvement sub-dimension scores above the cut score. When the mean scores of the scale sub-dimensions of the parents are listed in ascending order; it followed as problem solving (1.62±0.62), general functions (1.62±0.54), affective responsiveness (1.72±0.67), communication (1.75±0.59), behavior control (2.04±0.42), roles (2.09±0.53), and showing the affective involment (2.40±0.58).

In Table 3, the difference between parents was found to be statistically significant compared to the mother or father of the parent interviewed, with respect to roles, affective responsiveness and affective involment ($p<0.05$). Between roles and the affective involvement depending on the mother’s educational status and the difference between the average score according to the mother’s working status in the problem solving sub-dimension were statistically significant ($p<0.05$). The difference in the subscales of communication and affective responsiveness as well as depending on the income status of the parents as well as the difference between the average score on the subscales of emotional responsiveness and showing the affective involment were statistically significant ($p<0.05$).According to parents ‘ status of having other disabled children, sharing care, and receiving education related to CP; the difference between the score averages, whether parents have someone to share their child’s care properly, problem solving and general functions was significant ($p<0.05$).

Table 3. FAD scores based on sociodemographic characteristics of parents

Sociodemographic Characteristics	Num	Problem s.		Commu.		Roles		Affective Respons.		Affective Involv.		Behavior Control		General Funct.	
		$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	Ss
Parents															
Mother	104	1,63	0,63	1,78	0,61	**2,13**	**0,53**	**1,78**	**0,68**	**2,44**	**0,58**	2,05	0,42	1,65	0,54
Father	14	1,59	0,57	1,50	0,36	**1,74**	**0,38**	**1,26**	**0,44**	**2,12**	**0,50**	2,02	0,43	1,41	0,47
U		600,50		408,00		**286,50**		**266,00**		**378,00**		445,00		395,50	
P		0,969		0,143		**0,028**		**0,003**		**0,039**		0,550		0,121	
Marital Status															
Married	111	**1,60**	**0,60**	1,74	0,58	2,10	0,53	1,72	0,66	2,40	0,58	**2,05**	**0,42**	1,63	0,55
Single	7	**2,03**	**0,87**	1,76	0,74	1,97	0,45	1,81	0,91	2,43	0,52	**1,89**	**0,31**	1,47	0,33
U		**213,00**		269,50		274,50		329,00		280,00		**198,00**		264,50	
P		**0,007**		0,958		0,516		0,891		0,876		**0,008**		0,708	
Mother's age															
20-29 years old	17	1,56	0,49	1,76	0,61	2,21	0,58	1,76	0,62	2,41	0,82	**2,21**	**0,51**	**1,71**	**0,69**
30-39 years old	53	1,70	0,66	1,88	0,61	2,15	0,54	1,86	0,68	2,47	0,47	**1,99**	**0,40**	**1,74**	**0,53**
40-49 years old	34	1,55	0,65	1,64	0,61	2,06	0,49	1,67	0,71	2,41	0,60	**2,00**	**0,41**	**1,44**	**0,43**
KW		1,32		2,93		2,06		0,30		1,36		**6,09**		**7,71**	
P		0,518		0,231		0,758		0,361		0,507		**0,039**		**0,021**	
Mother's Education															
Primary school	25	1,67	0,72	1,88	0,66	**2,41**	**0,43**	1,97	0,77	**2,72**	**0,51**	2,09	0,40	1,65	0,46
Secondary School	16	1,64	0,65	1,78	0,57	**2,17**	**0,46**	1,80	0,56	**2,43**	**0,59**	2,02	0,30	1,76	0,63
High School	33	1,59	0,56	1,86	0,58	**2,08**	**0,59**	1,82	0,65	**2,30**	**0,53**	2,04	0,47	1,69	0,58
University and above	30	1,62	0,64	1,62	0,64	**1,95**	**0,50**	1,60	0,67	**2,36**	**0,62**	2,04	0,45	1,55	0,52
KW		0,03		2,85		**11,25**		4,90		**9,31**		0,46		1,47	
P		0,999		0,415		**0,010**		0,179		**0,025**		0,928		0,689	
		$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	Ss
Working Status Of Mother															
Working	13	**2,13**	**0,78**	1,91	0,56	2,29	0,40	1,75	0,59	2,56	0,52	2,13	0,31	1,74	0,50
Not Working	90	**1,55**	**0,57**	1,76	0,62	2,10	0,54	1,79	0,69	2,42	0,59	2,03	0,44	1,64	0,55
U		**274,00**		369,00		364,50		477,00		434,50		343,00		343,00	
P		**0,014**		0,419		0,147		0,972		0,447		0,279		0,455	
Father's age															
30-39 ages	4	**2,00**	**0,47**	1,72	0,33	1,82	0,43	1,17	0,17	2,46	0,65	2,03	0,66	1,61	0,77
40-49 ages	10	**1,41**	**0,53**	1,40	0,34	1,70	0,38	1,30	0,51	1,97	0,36	2,01	0,33	1,34	0,36
U		**7,00**		9,00		11,00		12,50		10,00		12,50		11,00	
P		**0,044**		0,156		0,569		0,843		0,213		0,544		0,639	
Working Status Of Father															
Working	8	1,83	0,60	**1,73**	**0,28**	1,84	0,40	**1,47**	**0,55**	2,29	0,54	2,06	0,55	1,58	0,60
Not Working	6	1,31	0,41	**1,22**	**0,23**	1,57	0,32	**1,06**	**0,14**	1,93	0,41	1,96	0,23	1,24	0,22
U		10,50		**4,50**		8,00		**6,00**		14,00		16,00		12,50	
P		0,127		**0,016**		0,255		**0,039**		0,313		0,804		0,371	
Income Status															
Enough	21	1,59	0,69	1,65	0,60	1,95	0,45	**1,42**	**0,53**	**2,13**	**0,45**	1,97	0,42	1,45	0,43
Modarete	72	1,63	0,58	1,81	0,59	2,15	0,57	**1,83**	**0,66**	**2,46**	**0,61**	2,04	0,44	1,68	0,56
Not Enough	25	1,64	0,69	1,67	0,59	2,06	0,46	**1,70**	**0,76**	**2,46**	**0,53**	2,11	0,36	1,61	0,55
KW		0,39		1,58		2,31		**7,50**		**5,66**		1,06		2,19	
P		0,823		0,454		0,316		**0,024**		**0,042**		0,588		0,335	
Number of children															
1 child	34	1,65	0,58	1,73	0,58	**2,01**	**0,51**	**1,82**	**0,69**	2,45	0,59	**2,11**	**0,40**	1,61	0,48
2 children	55	1,61	0,64	1,73	0,60	**2,06**	**0,55**	**1,61**	**0,64**	2,38	0,57	**1,95**	**0,34**	1,55	0,55
3 children and above	29	1,62	0,64	1,79	0,61	**2,25**	**0,49**	**1,87**	**0,71**	2,39	0,60	**2,18**	**0,55**	1,77	0,56
KW		0,05		0,09		**5,39**		**5,63**		0,15		**6,78**		1,28	
P		0,952		0,912		**0,044**		**0,041**		0,863		**0,037**		0,281	

According to whether the child had any other health problems other than CP, the mean values of FAD sub-dimensions of the parents for all dimensions other than behavior control and depending on the child's school attendance status, the difference between the average score of parents who attend and do not attend school were significant in the roles, emotional response, behavior control and general functions ($p<0.05$).

Table 4. Parents' FAD scores based on children's disease-related characteristics.

Characteristics Of The Child's State With CP	Num	Problem s.		Commu.		Roles		Affective Respons.		Affective Involv.		Behavior Control		General Funct.	
		$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	ss	$\overline{X}$	Ss
Degree of child spasticity															
Mild	29	1.65	0.58	1.75	0.53	2.00	0.51	**1.74**	**0.66**	**2.43**	**0,63**	2,03	0,53	1,63	0,54
Moderate	52	1.68	0.70	1.78	0.62	2.14	0.53	**1.81**	**0.69**	**2.46**	**0,49**	2,07	0,37	1,66	0,53
Severe	34	1.54	0.54	1.70	0.61	2.08	0.51	**1.60**	**0.68**	**2.29**	**0,65**	2,05	0,38	1,58	0,55
KW		0.50		0.30		1.65		**5.63**		**7.86**		0.64		0.73	
p		0.778		0.862		0.438		**0.043**		**0.029**		0.727		0.694	
Time since diagnosis															
36 months and under	15	1.50	0.61	1.63	0.49	2.09	0.52	1.63	0.55	**2.47**	**0,68**	1,97	0,59	**1,67**	**0,48**
37-72 months	25	1.64	0.50	1.80	0.50	2.13	0.62	1.78	0.60	**2.49**	**0,60**	2,09	0,41	**1,74**	**0,51**
73-108 months	37	1.54	0.56	1.69	0.57	2.06	0.45	1.70	0.65	**2.50**	**0,55**	2,02	0,29	**1,59**	**0,56**
109 months and above	29	1.78	0.77	1.81	0.74	2.08	0.55	1.75	0.82	**2.30**	**0,54**	2,06	0,48	**1,53**	**0,56**
KW		2.43		1.05		0.11		1.07		**6.07**		1.23		**6.83**	
p		0.488		0.790		0.990		0.784		**0.028**		0.746		**0.022**	
Using Spasticity-reducing medication															
Yes	23	**1.56**	**0.54**	1.80	0.58	**2.05**	**0.48**	**1.68**	**0.55**	2.38	0,68	**1,98**	**0,30**	**1,59**	**0,59**
No	87	**1.81**	**0.62**	1.73	0.58	**2.24**	**0.53**	**1.83**	**0.68**	2.39	0,56	**2,15**	**0,45**	**1,81**	**0,52**
U		**576.00**		566.00		**529.00**		**571.00**		594.50		**540.00**		**560.00**	
p		**0.024**		0.610		**0.026**		**0.039**		0.601		**0.036**		**0.011**	
Rehabilitation															
Yes	115	1.61	0.61	1.74	0.58	2.08	0.53	1.71	0.65	2.39	0,58	2,04	0,41	1,63	0,54
No	3	1.94	1.11	2.00	1.02	2.27	0.51	2.22	1.30	2.81	0,44	2,28	0,86	1,33	0,12
U		132.00		116.50		110.00		109.00		74.00		81.50		74.50	
p		0.664		0.608		0.487		0.406		0.134		0.764		0.525	

In Table 4, when the subscale averages of the parents involved in the study were taken into account, the average score of the parents of children with moderate spasticity in all subscales of the FAD was higher than the parents of children with mild or severe spasticity. The difference in the subscales of affective responsiveness and showing the affective involment and the time elapsed since the diagnosis of the child and the mean of the affective involment and general functions of the subscale score as well as problem solving, roles, affective responsiveness, behavior control and general functions between both groups, depending on whether a child with CP is taking a drug that reduces spasticity were statistically significant ($p<0.05$).

Discussion

Having a new baby in the family requires reorganization of roles and also new routines need to be established in the family but if the child is disabled, expectations and plans change. Therefore, it impacts the dynamics of the family dimensions. Families are trying to get used to this role change. Having a child with CP can lead to a deterioration of the family functions in family life (16,20). In the organization of nursing care for families with children with disabilities, it is important to evaluate the functions of family structures. According to the our results, mothers participated in the study more than fathers. Most of the parents were over the age of 30 as well as majority were graduated from college and more than half of the mothers are unemployed. In consonance with sociodemographic

characteristics of the studies of Fiss et al. (2013) most of the relationships of the children were with their mothers. The education level for majority of the families is high school and above and most of them are unemployed. The sociodemographic characteristics of this study are in parallel with the results of our study (20).

The fact that most of the mothers are unemployed can be explained by the high need for continuous care of the child with CP and the fact that the mothers mainly assume the care responsibility. The main responsibilty of mothers in society is characterized by childcare. The majority of the care burden of the child is on the mothers. The reason for their unemployment may be that mothers quit their jobs to take care of their children. In the study conducted by Turan et al, most of the mothers who care for disabled children are housewives. They found that families with income equal to and less than expenses are more (21). According to the another research which the relationship between CP and socioeconomic status was systematically examined, families with low socioeconomic status were reported to increase the risk of CP in 8 out of 20 studies (22).

While half of the parents stated that they are someone with whom they share the care of their children regularly, it is seen that the biggest helper is their spouse in our research. In a study by Cigerli et al. (2014) some parents expect more attention-sharing from their spouses and some want support from the social environment and preferred to form groups with other disabled families (23).

Half of the families participating in our research stated that the education related to CP is insufficient. Providing education is one of the nursing roles. Family-centered nursing care is very important in order to receive sufficient education about the current situation of the children, to eliminate uncertainties and also to improve the quality of care. In addition to all these, family members of children with neurodevelopmental disabilities such as CP, who received more family-centered approach, reported less depression and distress (24).

Most of the children participating in our research are male. In the study conducted by Köseoğlu et al. (2014) which examined the demographic characteristics of children with CP, 51 of the 132 cases were found to be girls 38.6% and boys 61.4% (24). Our results on gender are similar to this study (25).

In our study, the mean scores of the sub-dimensions of problem solving, communication, roles, affective involvement and general functions were found to be higher in the parents who stated that they had other disabled children. There is an important relationship between affective involvement score and other disabled child in the family as stated in our research. Having more than one disabled child in the family causes an increase in the number of family members to be cared for. In this case, it is inevitable that time allocated to care and treatment will be

a priority in the family. The burden of care causes family members not to show enough love, care and affection for each other. Şimşek et al. (2015) found that families with a disabled child postponed their desire to have a child thinking that their next child may also be disabled. When families learn that they have another disabled child, their shock is undeniable. (26).

The mean scores of all sub-dimensions of parents who stated that they did not share their child's care with another person were found to be higher than the mean scores of parents who stated that they shared care. In terms of the problem solving general functions score in our research, the care and treatment of the child with CP increases the responsibilities and burden of the parents. It is observed that families who do not share the care of the child equally cannot provide enough coping power in the period from the emergence of problems to the solution process. This can be explained by the fact that all care-related responsibilities are placed on one person and therefore these person cannot provide and show problem solving skills (15,19).

Conclusion and Recommendations

Nurses and health professionals should consider the child and family as a whole while providing care. They should evaluate the family functions with all sub-dimensions, considering that the problem in the family may also affect the care of the child. Low family functions should be improved by family-centered nursing care, and the quality of family functions should be ensured.

References

1. Graham K, Rosenbaum P, Paneth N, Dan B, Lin JP, Damiano D, et al. Cerebral palsy. Nature Reviews Disease Primers. 2016;2. 15082. 10.1038/nrdp.2015.82.
2. Yalçınkaya YE, Karaağaç F, Ayna AB, Önş K. Body Weight Percent in Children with Cerebral Palsy. Okmeydanı Medical Journal. 2015;31(3): 144-147.
3. National Institute of Neurological Disorders and Stroke (NINDS). NINDS Cerebral Palsy Information Page.2016.
4. Marret S, Vanhulle C, Laquerrière A. Pathophysiology of cerebral palsy. Handbook of clinical neurology. 2013;111. 169-76. 10.1016/B978-0-444-52891-9.00016-6.
5. Novak I, Morgan C, Adde L, Blackman J, Boyd, RN, Brunstrom-Hernandez J, CioniG, et al. Accurate Diagnosis and Early Intervention in Cerebral Palsy: Advances in Diagnosis and Treatment. JAMA pediatrics. 2017;171(9), 897–907. https://doi.org/10.1001/

jamapediatrics.2017.1689

6. McIntyre S, Taitz D, Keogh J, Goldsmith S, Badawi N, Blair E.A Systematic Review Of Risk Factors For Cerebral Palsy İn Children Born At Term İn Developed Countries. Dev Med Child Neurol. 2013;55 (6): 499-508.
7. T.C. Prime Ministry General Directorate of Family and Social Research. Family Values Survey climate of Turkey. (Edition 1) Ankara: Manas San. Tic. Ltd.Şti Advertising Services Media Planning.2010:14-204.
8. Sivrikaya T, Tekinarslan İÇ. Stress, Social Support and Family Burden in Mothers with Mentally Disabled Children. Ankara University Faculty of Educational Sciences Special Education Journal. 2013;14 (2): 17-29.
9. Yıldırım A, Vaccines, HR, Karakurt P. Determination of Mental Status of Mothers of Disabled Children. İ.Ü.F.N. Both. Journal. 2012;20 (3): 200-209.
10. Lara EB, Pinos C. Families with a Disabled Member: Impact and Family Education. Procedia - Social and Behavioral Sciences. 2017;237. 418-425. 10.1016/j.sbspro.2017.02.084.
11. Wiegand-Grefe S, Sell M, Filter B, Plass-Christl A.Family Functioning and Psychological Health of Children with Mentally Ill Parents. International journal of environmental research and public health. 2019;16(7), 1278. https://doi.org/10.3390/ijerph16071278
12. Girgin BA, Balcı S.Home Care Needs of Physically Handicapped Child and Family. Gümüşhane University Journal of Health Sciences. 2015;4 (2); 305-317.
13. Spratt T.Families with multiple problems: Some challenges in identifying and providing services to those experiencing adversities across the life course. Journal of Social Work. 2011;11.343-357. 10.1177/1468017310379256.
14. Iacolinoa, C.Pellerone M.Pace U,Ramaci T,Castorina V. Family functioning and disability: a study on Italian parents with disabled children. 2016;39-52. 10.15405/epsbs.2016.05.5.
15. Bernardi F, J Härkönen D, Boertien, AR, Bastaits K. Mortelmans D.Effects of family forms and dynamics on children's well-being and life chances: literature review. Families and Societies Working Paper Series. 2013;3:2-32.
16. Duran S. Families of Mentally Disabled Children and Psychiatric Nursing.

Turkiye Klinikleri J Psychiatr Nurs-Special Topics. 2018;4(1):74-80.

17. Cakmak FH, Gul H.Factors associated with problematic internet use among children and adolescents with Attention Deficit Hyperactivity Disorder. Northern clinics of Istanbul. 2018;5(4), 302–313. https://doi.org/10.14744/nci.2017.92668
18. Yigit T ,Parlar H.The Relationship Between Family Assessment and Problem Solving Assessment Levels: Relationship Between Family Assessment and Problem Solving Assessment Levels.2018; 1.36-44.
19. Shevell M, Oskoui M, Wood E, Kirton A, Van Rensburg E, Buckley D, NG P, Majnemer A.Family-centred health care for children with cerebral palsy. Developmental medicine and child neurology. 2019;61(1), 62–68. https://doi.org/10.1111/dmcn.14053
20. LaForme Fiss, Chiarello LA, Bartlett D, Palisano RJ, Jeffries L, Almasri N, Chang HJ. Family ecology of young children with cerebral palsy. Child: care, health and development.2014;40(4), 562–571. https://doi.org/10.1111/cch.12062
21. Turan F,Dalgıç Aİ. Family Burden Among Parents Of Children With Intellectual Disability. Journal of Psychiatric Nursing. Journal of Psychiatric Nursing. 2017;8(1):9-16.
22. Solaski M, Majnemer A, Oskoui M Contribution of socio-economic status on the prevalence of cerebral palsy: a systematic search and review. Dev Med Child Neurol. 2014 Nov; 56 (11): 1043-51.
23. Ciğerli Ö, Topsever P, Alvur TM, Görpelioğlu S.Parenting Experiences of Parents with Disabled Children From the Time of Diagnosis: Accepting the Difference. Turkish Journal of Family Medicine and Primary Care. 2014; 8 (3): 86-92.
24. Aydın R, Nur H.Family-Focused Approach in the Treatment of Children with Cerebral Palsy, Turkish Phys Medicine Rehab Derg. 2012; 58: 229-35.
25. Köseoğlu E, Karaoğlan B, Zinnuroğlu M.Demographic Data and Clinical Features of 132 Cases with Cerebral Palsy, FTR Bil Der. 2014; 17: 161-165.
26. Şimşek TT, Taşçı M, Karabukut D.The Willingness to Have Another Child in Families With Chronically Handicapped Children and Its Effect on Parent Unity, Turk Pediatri Ars.2015; 50: 163-9.

Original Article

Investigation of the Awareness Levels of Covid-19 in University Students

Osman ÖZŞAHİN[1], Özer AKGÜL[1], Reyhan ÇALIŞKAN[1], Burcu SAPMAZ[1], Yaşar Ali ÖNER[1, 2]

Abstract

Nowadays, COVID-19 infection caused by the SARS-CoV-2 has become a very serious health problem. The World Health Organization accepted COVID-19 as a Pandemic at the same time that the first case appeared in our country on March 11, 2020. COVID-19 infection was not only a fatal health problem, but also caused great damage to the economies of countries. The virus cannot be stopped against all the measures taken worldwide, and still continues to be effective. With this study, randomly selected 300 students from Istanbul Aydin University were included. Results from this study revealed that the information about COVID-19 was mostly obtained from the media, with only half of the participants wearing a mask, and the importance of hand washing in protection from COVID-19 was partially known by the participants. In addition, it was determined that 44% of the participants thought that the precautions taken account in our country during the epidemic process was sufficient. It was thought that there is a need for more comprehensive studies with higher number of participants who live in different geographic regions, have culturally variable patterns, and differ in socioeconomic and socio-demographic terms.

Keywords: *SARS-CoV-2, COVID-19, awareness*

Introduction

With different transmission routes, many infectious agents can cause extensive outbreaks. When the pandemic is examined in terms of its word meaning, it is also in ancient Greek, Pan: All + Demos: People derive from their origin (1). The pandemic term is a general name that can be used for epidemics that affect and

1 Istanbul Aydin University, School of Medicine, Department of Medical Microbiology, Istanbul, Turkey
2 Corresponding Author
DOI: 10.17932/EJOH.2020.022/ejoh_v01i1006

spread on a continent basis, as well as for epidemics that affect the whole world. The effects of pandemics on humans may vary depending on many reasons such as virulence of the agent, community immunity, lifestyle, and socioeconomic status (2). Known pandemics in history can be listed as plague, Spanish flu, Asian flu, cholera, typhus, Ebola and smallpox (3, 4). Recently, outbreaks of SARS in 2003, bird flu in 2007, swine flu in 2009, MERS in 2012, Ebola in 2014 and Zika virus in 2015 were occurred (5).

Towards the end of December 2019, cases of pneumonia of unknown etiology started to be seen in Wuhan, China's Hubei province. After a while, the World Health Organization (WHO) announced that the factor in these unknown cases was a new virus belonging to the Coronavirus family. The results of the primer analyze revealed that there is a serious similarity between this new virus and SARS (Severe Acute Respiratory Syndrome) epidemic in 2002. Thus, newly described this virus was named SARS-CoV-2 by WHO and the disease it caused was named COVID-19. Despite all global precautions and quarantine efforts, the incidence of the virus continues to increase. COVID-19 infection has spread across continents, causing high deaths in many countries. Accordingly, this epidemic was accepted as Pandemic by the World Health Organization on March 11, 2020 (6).

In our country, the first case was detected on March 11, 2020. It is very important to increase awareness about the COVID-19 disease caused by the SARS-CoV-2 virus, which is the most important problem of our day, and to prevent false information. With this study, it is aimed to examine the knowledge and awareness levels of students at Istanbul Aydin University with other sociodemographic data such as age and gender.

Materials and Methods

This study was carried out between 01 September 2020 - 15 October 2020 with the participation of students at Istanbul Aydin University. In this study, it is aimed to measure the knowledge / awareness levels of university students due to the increasing importance and information pollution after SARS-CoV-2 was accepted as a pandemic. For this purpose, a questionnaire consisting of 17 questions was prepared (Form 1). The survey study was initiated after the approval of the Ethics Commission of Istanbul Aydin University dated 31.08.2020 and numbered 88083623-020.

A total of 300 students who accepted to participate in the study in different education programs were randomly included in the study. While preparing the questionnaire questions used in the study, the limited literature data and awareness-based studies conducted on other infections were examined and the questions included in the questionnaire were prepared to measure the level of

knowledge and / or awareness. In order to predict the success of the questions in the questionnaire towards the targeted measurement of awareness, a preliminary study was conducted in which 25 people were first included. In the light of the data and feedback obtained from the preliminary research, the survey questions were revised and finalized. In the survey, the sociodemographic profiles of the participants were evaluated with the first 6 questions, and the COVID-19 awareness and / or knowledge levels were evaluated in the other questions. In the survey, it was aimed to create a more comprehensive study by allowing more than one option to be marked as an answer to some questions.

The questionnaire used in this study conducted during the pandemic period was sent online to the students who agreed to participate in the study in order to eliminate the risk of possible contamination and to reach more people. The data was obtained using a web-based interface. The data obtained from this research were transferred to the Microsoft Excel program and the distribution of the responses to the questionnaire was expressed as number (n) and percentage (%).

Results

It was determined that 172 (57.3%) of 300 students included in the study were female and 128 (42.6%) were male. Thirty people (10%) are under the age of 18, 186 people (62%) in the 18-24 age range, 42 people (14%) in the 25-29 age range, 29 people (9.6%) in the 30-35 age range and 13 individuals (4.3%) were found to be over the age of 35. When their marital status was examined, it was seen that 16 people (5.3%) were married, 281 people (93.6%) were single, and 3 people (1%) were divorced. It was determined that 84 people (28%) had a job, 216 people (72%) did not work. When the participants were asked whether they had a regular health check or not, it was seen that 159 people (53%) did not undergo regular health checks, 63 (21%) had a health check every 6 months, and 78 (26%) had a health check annually. The detailed information of the participants, including their education departments and other sociodemographic data, are shown in Table 1.

Table 1. Sociodemographic data of the participants

Sociodemographic Data		n	%
Gender	Male	128	42.6
	Female	172	57.3
Age (year)	<18	30	10
	18 – 24	186	62
	25 – 29	42	14
	30 – 35	29	9.6
	>35	13	4.3
Marital Status	Married	16	5.3
	Single	281	93.7
	Divorced	3	1
Job Status	Yes	84	28
	No	216	72
Regular Health Check Period	No	159	53
	Every 6 month	63	21
	Every 1 year	78	26
Faculties or Schools	School of Medicine	64	21.3
	Faculty of Engineering	37	12.3
	Faculty of Health Sciences	36	12
	Faculty of Sports Science	27	9
	School of Dentistry	29	9.6
	Faculty of Arts and Sciences	18	6
	Faculty of Economics and Administrative Sciences	23	7.6
	Undergraduate	41	13.6
	Postgraduate	25	8.3
Total		300	100

It was determined that 200 (41.6%) of the 300 students included in the study had information about COVID-19 from the media. Forty-one of the participants (9.7%) did not use any protective equipment against COVID-19; it was determined that 27 (6.4%) of them used special clothes, 210 (50%) of them used masks and 142 (33.8%) of them used gloves. It was determined that 48 (16%) people who thought that routine practices such as hand washing are insufficient to protect from COVID-19, 111 (37%) were undecided and only 141 (47%) believed that hand washing was protective and effective. As an interesting result, it was determined that 34 (7%) of the participants considered the use of antibiotics to protect against COVID-19. Sixty-three of the participants (20.1%) reported that there was no treatment for COVID-19, 40 (12.8%) had thought that have effective vaccine, and 209 (66.9%) reported that early diagnosis and treatment is possible for COVID-19.

Discussion

The COVID-19 pandemic caused by the SARS-COV-2 virus, which emerged in China in December 2019 and affected the whole world over time, has become a very serious health problem today. COVID-19 infection was not only a fatal health problem, but also caused great damage to the economies of the country. In addition, pandemics affects the society psychology negatively. The virus cannot be stopped against all the measures taken worldwide. The free distribution of protective materials by the state is an important factor in directing / using masks and disinfectants across the country in the fight against COVID-19 (7). In a study with included 520 participants, researchers have found that the rate of using protective materials such as masks and gloves increased by 85-90%. In our study, it was found that 210 people (50%) used masks and 142 people (33.8%) used gloves (8). In our study, it was observed that the answers given to the question of using protective equipment differ according to the gender of the participants, and the rate of using protective equipment in women was higher than that of men. This result is in line with the fact that women pay more attention to hygiene in routine than men.

In the study conducted by Pragma research and consultancy (9), 44% of the measures taken in our country were answered as “I don’t trust”; and it was seen that this response and the trust response at the rate of 44.6% found in our study were the opposite. When the sociodemographic characteristic of the participants in both studies are compared, it is seen that the number of participants over the age of 30 was 42 (14%) in our study, and this rate was 64% in the Pragma research and consultancy study. Moreover, while our study is limited to university students only, the fact that the other study consists of 12 provinces throughout the country and different education levels.

In a study on the seasonal flu pandemic (10), 35 people (27.7%) out of 126 respondents answered yes to the "Do you think the pandemic process was well managed?" question; in our study, it was observed that 134 out of 300 participants (44.6%) answered yes to the same question. This result shows that possible epidemics can be intervened more effectively in our country compared to the past. This situation can be explained by the fact that there is a serious progress day by day in the health infrastructure and health system in our country and / or the social perception is in this direction.

As a suggestion for the measures to be taken in Pragma research and consultancy work (9), 58% of the participants suggested that the border gates should be closed; in our study the rate of participants who gave the same answer to a similar question was 3 (7.3%). The proportional difference between these two studies is thought to be due to the difference between the age groups of the participants. It was thought that the participants over the age of 30 in our study were 14% and 64% in the other study, and the difference observed could be explained by the prediction that young people are more willing to travel.

The results obtained from this study are limited to the students at Istanbul Aydin University. However, with this study, which aims to shed light on the awareness of COVID-19 in our country, it was understood that during the time the research was conducted, a large amount of information was obtained from the media, only half of the participants used masks, and the fact that hand washing is important in protection from COVID-19 was understood by the general audience. It is thought that there is a need for more comprehensive studies involving people living in different geographic regions, with culturally variable patterns, with varying socioeconomic levels and sociodemographic differences, and these studies are important in the management of pandemics that are still ongoing in our country as in worldwide.

References

1. Yenen OŞ. Küreselleşme ve Enfeksiyon Hastalıkları", KlinikToplantısı. İzmir, 2012. Available at: https://www.klimik.org.tr/wp-content/uploads/2012/11/Küreselleşme-ve-Enfeksiyon-Hastalıkları-Prof.-Dr.-Osman-Şadi-YENEN-18.10.2012-İzmir.pdf
2. Aytaç N. Bulaşıcı Hastalıklar. Available at:
3. http://bizdosyalar.nevsehir.edu.tr/abd8eed055737930c7ad890a4023bf60/2-sinif-bulasici-hastaliklar.pdf
4. Türkiye Bilimler Akademisi. COVID-19 Pandemi Değerlendirme Raporu. http://www.tuba.gov.tr/files/images/2020/kovidraporu/

Covid-19%20Raporu-Final+.pdf

5. İspanyol Gribi. TÜBİTAK. Available at:
6. http://6.https//services.tubitak.gov.tr/edergi/user/yaziForm1.pdf?cilt=48&sayi=891&sayfa=80&yaziid=38144
7. Parıldar H. Tarihte Bulaşıcı Hastalık Salgınları. Tepecik Eğit. ve Araşt. Hast. Dergisi. 2020;30(Ek sayı):19-26.
8. Akgül Ö. SARS-CoV-2/COVID-19 Pandemisi. Tıp Fakültesi Klinikleri Dergisi. 2020;3(1):1-4.
9. Jonhs Hopkins University & Medicine. Coronavirus Resource Center. COVID-19 Dashboard. Available at: https://coronavirus.jhu.edu/map.html
10. Karataş Z. COVID-19 Pandemisinin Toplumsal Etkileri, Değişim ve Güçlenme. Türkiye Sosyal Hizmet Araştırmaları Dergisi. 2020;4(1):3-17.
11. Koronavirüsü Farkındalığı Araştırma Raporu. Pragma Araştırma ve Danışmanlık. Available at: https://pragmaresearch.com.tr/wp-content/client/Koronavirus_farkindalik_arastirmasi_raporu_pragma_2020.pdf
12. Eskiocak M, Porsuk AÖ. Ücretsiz mevsimsel grip aşılarını yaptıran kişilerin, ücretsiz pandemik grip aşısı karşısındaki tutum ve davranışları. Türkiye Halk Sağlığı Dergisi. 2011;9(2):108-112.

FORM 1

1) Age (year)

a) <18 b) 18 – 24 c) 25 – 29 d) 30 – 35 e) > 35

2) Gender

a) Female b) Male

3) I am studying in the department of ……

4) Marital status

a) Single b) Married c) Divorced

5) Do you have a job?

a) Yes b) No

6) Do you have regular health checks?
a) No *b) Every 6 months* *c) Once a year*

7) How did you learn about Coronavirus (COVID-19)?
a) From health institutions (hospital, health center, etc.)
b) From media (TV, newspaper, internet, etc.)
c) From my friends
d) From my family
e) From the University

8) Do you use protective equipment against Coronavirus (COVID-19)?
a) No *b) I wear special clothes* *c) I use a mask* *d) I wear gloves*

9) Do you believe that your daily routine practices protect you against Coronavirus (COVID-19)?
a) Yes *b) No* *c) I am undecided*

10) What are the symptoms of Coronavirus disease (COVID-19) in your opinion?
a) I don't know *b) Respiratory failure* *c) High fever*

11) Do you think there is a carrier status for coronavirus?
a) Yes *b) No* *c) I have no idea*

12) Which group do you think is most at risk for the Coronavirus (COVID-19)?
a) Those with hereditary / genetic diseases
b) Those with a weak immune system
c) Those with existing infection / virus-related disease
d) Those who constantly come into contact with more than one person
e) I don't know

13) How do you think the coronavirus (COVID-19) transmission route is?
a) By respiratory tract
b) Direct contact such as handshaking
c) Through inanimate environments

d) By blood
e) Sharing personal belongings
f) Being in the same place

14) What should be done to protect against coronavirus (COVID-19)?
a) Hands should be washed frequently
b) Alcohol-based disinfectants should be used
c) Antibiotics should be used

15) Where do you think information and health services should be provided for worldwide pandemics such as Coronavirus (COVID-19)?
a) Ministry of Health b) Media c) Universities d) All

16) Do you think the studies conducted for coronavirus (COVID-19) in our country sufficient? If your answer is no, what else do you think should be done?
a) Yes b) No (……….)

17) What do you know about coronavirus (COVID-19) treatment?
a) No cure b) Has a vaccine c) Available only in early diagnosis

High Level Darunavir Resistance in a Patient with HIV-1 RNA Rebound Under Antiretroviral Treatment

Müge TOYGAR DENİZ[1], Murat SAYAN[2,3], Sıla AKHAN[1]

Abstract

Today, antiretroviral therapies are successful in chronic HIV infection and have improved survival outcome. However antiretroviral drug resistance, coinfection, comorbidity and management of drug interactions are prominent in long-term treatments. In this study, we aimed to present the management of antiretroviral treatment in the light of high levels of darunavir resistance in a patient who is incompatible with antiretroviral therapies. HIV-1 drug resistance analysis was frequently applied because our patient was not compatible with the treatment. Minimally interacting agents with antiretroviral therapy could be selected in developing pulmonary tuberculosis. In addition, in the developing acute renal failure, genetic barrier anxiety could be left behind. Our findings suggest that HIV-1 drug resistance analysis should be an integral part of the management of antiretroviral treatment in developing co-infections and comorbidities in an incompatible patient.

Keywords*: HIV, darunavir, protease inhibitors, drug resistance*

Introduction

Chronic HIV infection continues to increase worldwide. According to the latest information from the Joint United Nations Program on HIV / AIDS (UNAIDS), 37.9 million people worldwide live with HIV (1). Although there is a relative increase of 20% in the total number of patients compared to 2010, the number of new HIV infections diagnosed as of the end of 2018 is 1.7 million and this

1 Kocaeli University Faculty of Medicine, Department of Clinical Microbiology and Infectious Diseases, Kocaeli, Turkey
Phone number: +90 506 585 65 24 - +90 262 303 70 84
e-mail: mugedeniz90@gmail.com
2 Kocaeli University, Faculty of Medicine, Clinical Laboratory, PCR Unit, Kocaeli, Turkey
3 Near East University, DESAM Institute, Nicosia, Northern Cyprus
DOI: 10.17932/EJOH.2020.022/ejoh_v01i1007

number has decreased by 16% compared to 2010. Similarly, by the end of 2018, the annual rate of HIV-related deaths has been reduced by 33% compared to 2010. This relative improvement in the HIV infection dynamics appears to have been achieved by increased access to antiretroviral therapy. According to the World Health Organization (WHO) data, today 23.3 million people living with HIV have access to antiretroviral treatment. According to estimation analysis, it is targeted to reach 33 million people by 2030 (2). On the other hand, in Turkey, there are 24,237 HIV-infected individuals confirmed as of July 2020 and approximately five people are infected with HIV-1 every day (3). According to other source, the International Pharmaceutical Market Database's (IMS) current data for Turkey (October 2019) 16,806 of our patients have access to antiretroviral treatment and 338 cases of the patients are under treatment with darunavir (11).

A combination treatment of two nucleoside reverse transcriptase inhibitor (NRTI) and non-nucleoside reverse transcriptase inhibitor (NNRTI), integrase inhibitor (INI) or enhanced protease inhibitor (PI) drug groups is recommended for an HIV-infected individual who has not previously received antiretroviral therapy (9). This combination treatment regimen is called combined antiretroviral therapy (cART), and studies have shown that HIV replication is suppressed and CD4 + T lymphocyte cell count increases when this form of treatment is started (7,8).

In Turkey, the primary antiretroviral resistance ratio was determined to be 7.6% in patients infected with HIV. The distribution of resistance by drug groups is 4.2% in the NRTI group, 1.7% in the NNRTI group, and 1.7% in the PI group (12). However, a significant part of drug resistance emerges as acquired resistance due to inappropriate drug use.

Darunavir (DRV), a non-peptidic protease inhibitor, is effective on HIV protease by inhibiting enzymatic dimerization. DRV is an agent that is effective against PI resistant HIV strains both in vitro and in vivo, has a high genetic barrier, and resistance development is rare (5). In order to determine that the level of resistance to darunavir is high, at least four mutations must be present among the major mutations in the gene region encoding HIV protease (I50V / L, I54A / L / M / S / T / V, L76V, V82A / C / F / L / M / S / T, I84A / C / V, N88D/G/S/T, L90M in, N88D / G / S / T, L90M) (4).

This study aims to present the management of a case with a high level darunavir resistance seen in our country for the first time.

Case Report

A twenty-five-year-old male patient was admitted to our hospital in 2009 after receiving positive results from the HIV antibody test before being operated on due to spontaneous pneumothorax. In routine tests, the patient's hemogram and biochemistry values were normal, CMV IgM negative, CMV IgG positive, toxoplasma IgM and IgG negative, anti-HCV, HBs Ag, anti-HBs, anti-HBc IgG negative, and anti HAV IgG positive serology result. Lymphocyte cell count was 98 cells / mm3, HIV-1 RNA load was 1,260,000 IU / ml. Antiretroviral drug resistance test before treatment showed the patient was sensitive to all drug groups. The patient was started on tenofovir / emtricitabine (TDF + FTC) + lopinavir / ritonavir (LPV / r) therapy and prophylaxis treatment for opportunistic infections.

Because the patient took medication irregularly, HIV-1 RNA did not become negative in May 2011, no resistance was detected to the NNRTI, NRTI and PI group drugs. HIV-1 drug resistance analysis was done by the Sanger dideoxy sequencing method. In the HIV-1 pol gene, the protease region (codon 1 to 99) and reverse transcriptase site (codon 1 to 235) were sequenced. In the resulting nucleotide sequences, mutations were identified in the Stanford HIVdb v8.7 program and clinical significance analyses were performed according to the World Health Organization-Transmitted Drug Resistance Mutation (WHO-TDRM) list (6). The treatments and drug resistance analyses performed since the beginning of patient follow-up are shown in Table 1. In addition, the patient's HIV-1 RNA load and CD4 + T lymphocyte cell count dynamics in the time series are shown in Figure 1.

In January 2018, antituberculosis treatment was initiated on the patient with positive asido-resistance bacilli (ARB) analysis in the sputum and compatible lung tomography. Antiretroviral therapy was administered as TDF / FTC + efavirenz (EFV) due to drug interaction. Because of a high resistance barrier and minimal drug interaction, the patient's treatment was arranged as TDF / FTC + dolutegravir (DTG) in May 2018. The patient's irregular drug use was ongoing at this time. In the control analyzes requested in the first month of this treatment, the number of CD4 + T lymphocyte cells was 33 cells / mm^3, the HIV-1 RNA load was 3.440.000 IU / ml, and the concurrent resistance analysis showed sensitivity to zidovudine (ZDV), EFV, DRV agents and INI drug. The new treatment was arranged as DRV / r + EFV due to sensitivity to the group.

In the HIV-1 drug resistance analysis done in November 2018, in the NRTI drug class, D67G, K70E gene mutations; in the NNRTI drug class, L100I, K103N gene mutations; in the PI drug class, V32I, M46I, I47V, V82A, I84V gene mutations;

and in INI drug class, L33F, K43T, F53L gene mutations were detected. Upon determination of these mutations, it was determined that the NNRTI group was highly resistant, the PI group was highly resistant, and the NRTI group was considered to be abacavir, stavudine, didanosine-moderately resistant, tenofovir low-level, and ZDV sensitive. This is why the new treatment was arranged as ZDV + TDF / FTC + DTG.

In February 2019, as a result of abdominal tomography taken due to prolonged diarrhea, abdominal pain, vomiting and inability to urinate, a fistula extending from the anorectal junction to the bladder and right renal abscess as well as grade 2 hydronephrosis was detected. Operation was not considered by general surgery clinics and a bilateral nephrostomy was opened in the patient for postrenal acute renal failure. Treatment with meropenem and tigecycline antibiotherapy and antiretroviral therapy was changed to ZDV + tenofovir alafenamide / emtricitabine / cobicistat / elvitegravir (TAF / FTC / EVG / c) due to the high creatinine value (2.67 mg / dl). Under this treatment, the control HIV-1 RNA load was negative in August 2019, and the number of CD4 + T lymphocyte cells was determined as 60 cells / mm3. However, the general condition of the patient worsened and exitus was accepted due to intra-abdominal sepsis.

Discussion

DRV, which is an agent that is difficult to develop resistance to due to incompatibility in our case, was chosen, but during the 5th month of treatment, a high level of darunavir resistance was encountered. Disruption of a potent antiretroviral agent makes treatment management more difficult, although the treatment options are much more common today. On the other hand, with DTG, another agent with high genetic barrier, resistance mutations developed against the drug groups that the patient has previously used irregularly are suppressed. It should be remembered that HIV mutations are archived and can be detected in the plasma again as a result of drug group changes, even if they are sensitive to drug resistance analysis. In our case, the K103N mutation associated with EFV resistance was able to reappear long after treatment. On the other hand, the M184V mutation associated with the NRTI class is blamed for resistance to emtricitabine. However, despite the presence of a M184V mutation, when a potent antiretroviral is added from another drug class, M184V may not cause a problem (10). This detail can be valuable if there are limited options in patient management.

Increased viral load of our patient after one month of TDF / FTC + DTG caused drug changes to be made despite the high genetic barrier of DTG. However, the reason why the resistance test result turns out to be EFV sensitive is most likely

because the high genetic barrier dolutegravir suppresses mutated strains in the plasma. Drug changes should be made by experts by evaluating the patient's previous drug history and resistance history together.

In the follow-up of our case as a result of being incompatible with treatment, HIV-1 drug resistance analysis was frequently used. In developing pulmonary tuberculosis, minimally interacting EFV and DTG agents could be selected with antiretroviral therapy, as well as genetic barrier anxiety could be left behind in developing acute renal failure. Our findings show that HIV-1 drug resistance analysis should be an integral part of antiretroviral therapy management in patients' co-infections and comorbidity.

Conflict of Interest

The authors did not report any conflicts of interest.

References

1. United Nations Joint Program on HIV / AIDS (UNAIDS) Data. [Internet]. (assessed date: 17 August 2020). https://www.unaids.org/en
2. World Health Organization, HIV / AIDS statistics. [Internet]. (assessed date: 21 November 2019). https://www.who.int/
3. T.C. Sağlık Bakanlığı, Bulaşıcı Hastalıklar Daire Başkanlığı. [Internet]. (assessed date: 20 November 2019). https://hsgm.saglik.gov.tr
4. Hoffmann C, Rockstroh JK, Kamps BS, editors. HIV Medicine 2007. 15th Ed. In:. Flying Publisher – Paris, Cagliari, Wuppertal.
5. Katlama C, Esposito R, Gatell JM, Goffard J-C, Grinsztejn B, Pozniak A, et al. Efficacy and safety of TMC114/ritonavir in treatment-experienced HIV patients: 24-week results of POWER 1. AIDS 2007; 21(4):395-402.
6. Sayan M, Sargin F, Inan D, Sevgi DY, Celikbas AK, Yasar K, et al. HIV-1 Transmitted drug resistance mutations in newly diagnosed antiretroviral naive patients in Turkey. AIDS Res Hum Retroviruses 2016;32(1):26-31
7. Moore RD, Bartlett JG. Dramatic decline in the HIV-1 RNA level over calendar time in a large urban HIV practice. Clin Infect Dis 2011;53(6):600-604.
8. Lee FJ, Amin J, Carr A. Efficacy of initial antiretroviral therapy for HIV-1 infection in adults: a systematic review and meta-analysis of 114 studies with up to 144 weeks' follow-up PLoS One 2014;9(5):e97482

9. Guidelines for the use of antiretroviral agents in adults and adolescents with HIV (Last updated: October 2018). [Internet]. (assessed date: 23 November 2019) https://aidsinfo.nih.gov

10. Roger Paredes, Philip L. Tzou, Gert van Zyl, Geoff Barrow, Ricardo Camacho, Sergio Carmona, et al. Collaborative update of a rule-based expert system for HIV-1 genotypic resistance test interpretation PLoS One 2017; 12(7): e0181357.

11. İnternational Medical Statistics. [Internet]. (assessed date: 3 December 2019). https://www.sd.imshealth.com/tr/Pages/default.aspx

12. Sayan M, Sargın F, Inan D, Sevgi D Y,Çelikbaş A K, Yaşar K, et al. Transmitted antiretroviral drug resistance mutations in newly diagnosed HIV-1 positive patients in Turkey J Int AIDS Soc. 2014;17(4 Suppl 3):19750.

Challenges of Outward Facing Mobility Opportunities for Nursing Students: Pre and Peri Covid-19

Sheila CUNNINGHAM[1]

Introduction

The Covid-19 global pandemic has brought into stark relief our interdependence and relationship with other countries in many professional spheres including nursing and allied health professions. The global reach of nursing has grown both before this pandemic and will continue to grow exponentially. Irrespective of the makeup of societies nursing exists everywhere; whether it is based upon professional education and licensing or professional registration or employment systems. It is argued that nurses need to 'think globally' and that diversity; complexity; professional voice; leadership and inter disciplinary working are essential for global nursing (1, 2).

Regardless of location and societal or professional status, cultural diversity and sensitivity are essential nursing competencies (3, 4). However, while culturally appropriate care is essential and there is consensus on its need within the nursing literature, the evidence base for how best to develop cultural nursing competence is unclear (2). Comparing and contrasting our own health care systems such as with an international experience or mobility brings an appreciation of differences and possibilities in the wider, global context (5, 6). Arguably, COVID-19 has accelerated the need not only for an increased cultural awareness but an analysis of the differences; both positive and negative, when responding to global health issues.

Long term, attention to cultural competence in nursing programs is thought to provide students with deeper self-awareness with culturally diverse patients, colleagues and environments (5). Gosse and Katic – Duffy found "collaboration between … partners promoted mutual cultural sensitivity, cultivated respect for diversity, enhanced awareness of health disparities and different health care systems". Collaboration also promotes critical thinking regarding complex health issues in resource- limited settings and supports the delivery of culturally competent care (6).

1 Middlesex University, Department of Nursing, London, England
DOI: 10.17932/EJOH.2020.022/ejoh_v01i1008

The benefits of international nursing placements

The notoriously slow adoption of online learning in higher education in general has been galvanized by one dominant, single factor of COVID-19. An unprecedented acceleration to online learning and giving students continued access to their courses, emerged in a matter of days. This, one could argue, has been a catalyst to embedding new ways of working and learning longer term and opens the gates of innovation for vocational type programs. Radcliffe-Thomas et al (7) argue this is welcomed by students who appreciate studying in a 'borderless' online environment where they could hone their cultural awareness for their industry whilst building skills in digital literacy. This could be argued as one of the very few positives of the pandemic.

Although increasing online learning presents opportunities for global nurse education collaboration, the practical, immersive application of these skills is still best achieved through international clinical placements. The nursing literature is alive with personal accounts from students across the globe who have been transformed both professionally and personally through their international placement experiences. As with all placement experiences the potential for growth is astonishing (8). International placement contexts can add another dimension and accelerate this growth further (9). Core to this is the characteristic of experience in a 'high stakes' learning situation – central to international placements - where there is greater affective engagement by students. As their perspectives, resilience and adaptability are challenged so does the impact of the placement experience (8).

Students benefit tremendously from international exchange with overall increased chances of a higher degree classification and graduate level employment (10). Gains were particularly evident with black and minority ethnic (BAME) students, and those from a lower socio-economic background which reflect the nursing student population.

The challenges of outward facing mobility opportunities

The potential of outward facing opportunities is sporadic and yet to be fully realized especially in the United Kingdom (UK). These mobilities or exchanges under the Erasmus (or non-funded) route mean a period of exchange to a different host country either a university or clinical placement. In 2015-16 nursing had one of the lowest international mobility rates: 1.7 % compared with a 7.2% average across the overall student population of the UK (10). Whilst this was pre-pandemic the current crisis has led to increased nursing student interest and recruitment and added pressures for broader and innovative placements. It is time to plan to capitalize and develop this. In the UK Go International's 'Stand Out'

publicity campaign (10) aims to double the percentage of UK-domiciled students who study, work or volunteer abroad during their degrees. A key aim is to 'create a new generation of global graduates, and a higher education culture in which international opportunities are an aspiration for all students.

In the international context, despite compelling testimonies as to the transformative benefits of international placements, Browne and Fetherston (5) found profound variability from one education institution to the next. In addition, there was no clear consensus in the literature on what structures, support and assessments lead to greater student learning. Barriers to outward mobility are reported: insufficient funding, fear of isolation and security, language skills and the impact on friendships and relationships. However, it is the phenomena of culture shock that is most cited. Students report this as occurring mostly when they are unprepared for the different cultural norms and beliefs within their international placement. Therefore 'allowing students the time to debrief, and self-reflect is critical to process the experiences of learning from different cultures and health care system' (6). Practice learning specifically needs guidance and support to make learning explicit (8). This is a challenge in overtly different ways of working, practicing and support structures. In any country attitudes and values in mentors in the clinical learning environments has a powerful impact on student learning (11, 12) and an effective learning environment. The question remains then how one assures supportive quality environments especially of an international mobility placement experience.

Quality indicators for international clinical placement learning: the HEALInt project

Effective partnership working is core to successful transcultural teaching and embedding a global perspective in academic and practice learning. Clinical learning environments (CLE) abroad offer opportunities but are also subject to the same unpredictability as placements anywhere. Guidance emanating from UK professional bodies advocates assuring safety for students and staff, regular risk assessments, audits of the learning environment to confirm adequate levels of supervision and that planned experiences reflect the intended programme outcomes. While quality assurance of clinical learning environments is well established as a prospective approach in the UK (Nursing and Midwifery Council [NMC], 2008), documentation and processes for educational audit evaluation of CLE vary even between UK universities (13). There remains limited literature on proactive prospective measures in any other country or collective quality benchmarks. Saarikoski, Warne and others (14) challenged the quality of CLEs in Europe and developed the Clinical Learning Environment and Supervision Scale CLES and subsequent CLES +T. These emphasised retrospective quality

measurement via their widely validated evaluation tools (14). The challenge of developing a prospective audit and benchmark process in European CLEs lead partner universities from the UK, Spain, Malta, Finland and Poland to pursue an Erasmus+ funded project termed 'HEALINT'. This produced a robust pan-European quality audit process for CLEs through establishing an International Quality Audit System for nursing and healthcare institutions hosting exchange nursing students. This was mapped to national and international priorities and other professional requirements. The intention is to ensure confidence in the quality of the clinical placement environments but also to promote and extend such opportunities and collaborative working. The dearth of existing or complex benchmarks in various countries offered an opportunity to positively contribute to this area. It drew together key documents and requirements, devised a shared joint benchmark and evaluation process. In addition, this collaborative process acts to review what a placement has to offer in respect of best practice in pedagogical support for nursing or healthcare students. It further facilitated opportunities to explore different cultural and practical nursing care environments.

This HEALint project is now an endorsed International Working Agreement (IWA) standards document. There are four overall project outputs available on the project website (www.healtint.eu).

1. Collate benchmark of quality indicators
2. Devise a clinical learning environment quality audit instrument
3. Outline training and guidance for audit processes
4. Evaluation of the tools and outputs

The project outputs are sustainable through the IWA endorsement but also through wider dissemination and use. This is now being expanded in an Erasmus+ funded (HEAL4ALL) to other healthcare professionals undertaking international placement. In time it is hoped International placement experiences for healthcare professional students which build cultural awareness and competency is not an add-on option for the few but an opportunity for the many.

Conclusion

The global pandemic has meant many students placements in home countries were suspended not in the least, exchanges. Once placements resume as before this project and outputs provide a means to quality assure CLEs but seek to expand and strengthen international placement experiences. The importance of global nursing influences can be reflected in both the academic and practice component of courses via a macro-level perspective in the curriculum and a micro-level perspective on placement. Whilst the 'macro-level' can be experienced online (7)

there remains the need for authentic, 'micro-level' clinical placements learning environments which can only be experienced in real life.

References

1. Thorne, S.E (2006) Nursing education: key issues for the twenty first century. Nurse Education Today 26: 614-621
2. Smith. N., Hennefer. D. L., Brettle. A., Jiang. X., Ho. R..k, Xiao. H. (2012) Nursing knowledge and skills for global employability: a systematic literature review and synthesis. University of Salford. [online] https://usir.salford.ac.uk/id/eprint/22914/1/Global_Nurse_Employability_PMI2_Connect.pdf
3. Papadopolous, I. (ed) (2006) Transcultural health and social care: development of culturally competent practitioners. London: Churchill Livingstone. Elsevier.
4. Leininger, M. (2002) Cultural care theory: a major contribution to advance transcultural nursing knowledge and practice. Journal of Transcultural Nursing 13(3): 189-192
5. Browne, C. A. and Fetherston, C. M. (2018) 'How do we facilitate international clinical placements for nursing students: A cross-sectional exploration of the structure, aims and objectives of placements', Nurse Education Today, 66, pp. 1-7.
6. Gosse, N. L. and Katic-Duffy, A. (2020) 'Nursing student and faculty perceptions of reciprocity during international clinical learning experiences: A qualitative descriptive study', Nurse Education Today, 84.
7. Radclyffe-Thomas, N., Peirson-Smith, A., Roncha, A., Lacouture, A. and Huang, A. (2018) 'Developing Global Citizenship: Co-creating Employability Attributes in an International Community of Practice', in Morley, D.A. (ed.) Enhancing Employability in Higher Education through Work Based Learning. Switzerland: Palgrave Macmillan, pp. 255-275.
8. Morley, D. A., Marchbank, P., Steyger, T., Taylor, L., Diaz, A. and Calleja, P. (2020) 'Designing and supporting extraordinary work experience', in Morley, D.A. and Golam, M.J. (eds.) Applied learning in higher education. Real world learning and innovation across the curriculum: Palgrave Macmillan.
9. Cunningham. S. (2014) A Global Learning Experience: Narratives of European Immersive Clinical Nursing Exchanges. The European

Conference on Education (IAFOR) Official Conference Proceedings. [online] http://papers.iafor.org/wp-content/uploads/papers/ece2014/ECE2014_03021.pdf Last accessed 20/09/20

10. Universities UK International (2018) Gone International: Expanding opportunities. Report on the 2015–16 graduating cohort. Available at:
11. https://www.universitiesuk.ac.uk/International/Documents/Gone%20International_expanding%20opportunities_digital.pdf
12. Salminen, L., Stolt, M., Saarikoski, M., Suikkala, A., Vaartio. H., Leino-Kilpi. H., 2010. Future challenges for nurse education: a European perspective. Nurse Education Today. 30 (3), 233-238. https://doi:10.1016/j.nedt.2009.11.004 .
13. Jokelainen, M. 2013. Mentorship in Placement Learning Environments. Systematic Review and Finnish and British Mentors´ Conceptions. Publications of the University of Eastern Finland Dissertations in Health Sciences 184, Kuopio. [online] Available: http://epublications.uef.fi/pub/urn_isbn_978-952-61-1199-5/urn_isbn_978-952-61-1199-5.pdf Accessed 02/09/20.
14. Council of Deans for Health (2017) Outward student mobility for nurse, midwife and AHP students.
15. Hall, C., Higgins, C, Narayanasamy, M and Feliciano, S. (2019) Supporting Internationalisation of Traineeships in the Healthcare Sector (HEALINT) Briefing Paper. Development of the HEALINT Protocol. Available at: https://healint.eu/wp-content/uploads/sites/18/2020/03/HEALINT-Briefing-Paper-Development-of-the-HEALINT-Protocol.pdf

Maternal Mortality Ratio at a University Hospital in Somaliland: 17 Years Experience

Amal Farah ADAN[1], Shukri Mohamed DAHIR[1], Abdirizak Osman MOHAMED[1], Edna ADAN ISMAIL[1,2]

The International Federation of Gynecology and Obstetrics (FIGO) and World Health Organization (WHO) have defined Maternal Mortality Ratio (MMR) as number of women dying from any cause while pregnant or within 42 days of its termination irrespective of its duration and site of pregnancy per 100.000 live births (1). When long-term global trends are considered for maternal mortality, it is striking that every 100th to 200th birth led to the mother's death (2).

Maternal Mortality Ratio (MMR) Worldwide

The leading causes of maternal mortality are classified as direct or indirect. Direct causes are those related to obstetric complications of pregnancy, labor and delivery, and the post-partum periods. Direct causes account for 80% of maternal deaths (3). Indirect causes are those relating to pre-existing medical conditions that may be aggravated by the physiologic demands of pregnancy. Worldwide, approximately 300.000 women die each year due to pregnancy related complications (4).

Hypertensive disorders complicating pregnancy are common and pre-eclampsia and eclampsia are the major causes of maternal morbidity and mortality. Globally, 10% of all pregnancies are complicated by hypertension, while pregnancy-induced hypertension cases comprise 5-8% of the whole (5).

Maternal Mortality Ratio in Low-Income Countries

The MMR in low-income countries is always higher and in 2017 averaged 462 per 100.000 live births, versus 11 per 100.000 live births in high income countries. According to the Fragile States Index, 15 countries were considered to be "very high alert" or "high alert" for MMR, including South Sudan, Somalia, Central African Republic, Yemen, Syria, Sudan, the Democratic Republic of the Congo,

1 Maternity Hospital, Edna Adan University, Hargesia, Somaliland
2 Corresponding Author
DOI: 10.17932/EJOH.2020.022/ejoh_v01i1009

Chad, Afghanistan, Iraq, Haiti, Guinea, Zimbabwe, Nigeria and Ethiopia since these countries had MMR ranging from 31 in Syria to 1.150 in South Sudan in 2017 (6).

Sub-Saharan Africa and Southern Asia accounted for 254.000 (86%) of the estimated global maternal deaths in 2017. Sub-Saharan Africa alone accounted for roughly two-thirds (196.000) of maternal deaths, while Southern Asia accounted for nearly one-fifth (58.000).

Southern Asia achieved the greatest overall reduction in MMR between 2000 and 2017, with a decline of nearly 60%, from an MMR of 384 down to 157. The statistics of sub-Saharan Africa are also encouraging according to the United Nations Inter-Agency Estimates statistics, indicating that from 1990 to 2015, the global MMR declined by 44% – from 385 deaths to 216 deaths per 100.000 live births (7).

Maternal Mortality Features of Somaliland

The first report of The World Health Organization (WHO) on MMR for Somaliland was 1.044 per 100.000 live births and belonged to the period of 1994-1996 when the state was at its youngest stage (8). The MMR has declined to 955 in 2011. The numbers are estimates only, because similar to many of the other low-income countries, the majority of maternal deaths in Somaliland occur outside the health facilities and there are no functioning civil registration systems to keep track. One fact is certain, maternal deaths are twice as high in rural areas than urban (40.6% vs 20.7%), and this ratio remains more or less unchanged (8).

Maternal Mortality Ratio at the Edna Adan University Hospital

The Edna Adan University Hospital (EAUH) is a not-for-profit charity since 2002. It was stablished as a Maternity Hospital but because of public demand and need, it also became a general and referral hospital for medical, surgical and pediatric patients. Since that date, 62.000 patients were treated as inpatients and 235.000 as outpatients, and 26.036 women have been assisted to deliver babies.

Among the 26.036 women who gave birth, 69 women were lost due to maternity causes, making the MMR at the EAUH to be 265 per 100.000 live births. This is far below the MMR of the country which is estimated by WHO to be 829 in 2017. In spite of the fact that the EAUH receives a high number of complicated and referred cases, the MMR of the hospital is about one third of the national average and although a great reduction has been managed, the MMR is considered as still too high. A further reuction could not be achieved due mostly to the fact

that women were brought to the hospital too late when their conditions had deteriorated to the terminal point. Eclampsia, post-partum haemorrhage and anemia were the leading causes of MMR at EAUH. Puerperal infection, prolonged or obstructed labour, ante-partum haemorrhage, pulmonary embolism, maternal distress, cardiac failure was among other causes. Although the incidence of is on the decline due to improved diagnosis and management, pre-eclampsia and eclampsia still remain the major contributor to poor maternal and fetal outcome in developing countries (1).

A major contribution to the prevention of maternal mortality starts with the community and the quality of the antenatal care women receive during each pregnancy, as well as the training quality of the health workers and the emergency preparedness of the facility. EAUH has 1.000 midwives providing pregnant Somaliland women with medical monitoring, treatment and education.

References

1. Maternal mortality. WHO. Available at: https://www.who.int/news-room/fact-sheets/detail/maternal-mortality
2. UNFPA. (2018). In United Nations Population Fund. Retrieved from https://www.unfpa.org/about-us
3. Lewis G. Maternal mortality in the developing world: why do mothers really die? Obstetric Medicine 2008; 1: 2–6.
4. The Millennium Development Goals Report 2015. United Nations Development Program. Available at: https://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf
5. Cummingham F. Gray et al. Williams Obstetric. 24th edition, Chapter 24, Hypertensive disorder in pregnancy. McGraw Hill Medical Publishing Division, 2014; 706-749.
6. The Fund for Peace. Fragile States Index. Washington, D.C.: The Fund for Peace. Accessed through Resource Watch. https://reliefweb.int/report/world/fragile-states-index-2017
7. Trends in Maternal mortality 2000 to 2017. World Health Organization, UNICEF, World Bank Group, the United Nations Population Division. Available at:
8. https://apps.who.int/iris/bitstream/handle/10665/327596/WHO-RHR-

19.23-eng.pdf?sequence=13&isAllowed=y

9. Maternal Mortality in Somalia: What ARC is doing to combat this crisis. Available at:https://reliefweb.int/report/somalia/maternal-mortality-somalia-what-arc-doing-combat-crisis#:~:text=Women%20in%20Somalia%20have%20a,deaths%20per%20100%2C000%20live%20births.

WRITING RULES

Manuscript Preparation

General Rules

Articles should be organized according to the ICMJE recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals updated in December 2019 (http://www.icmje.org/icmje-recommendations.pdf). CONSORT (www.consort-statement.org) for randomized trials, STROBE for observational studies (http://strobe-statement.org/), PRISMA for systematic reviews and meta-analyses (http://prisma-statement.org/), STARD for studies of diagnostic accuracy (http://www.equator-network.org/reporting-guidelines /stard/), ARRIVE for experimental animal studies (https://arriveguidelines.org/), and TREND for non- randomized public behavior (https://www.cdc.gov/trendstatement/) are other guidelines to help authors design their articles.

The upper limit of plagiarism determined by the editorial board for the journal is 20 percent. The filtering options in the plagiarism detection program are set to neglect references, quotes, and text sections of less than five words.

If there is an institution that supports the study, the last word of the article title should have an asterisk (*) and the information on the same page should be given as a footnote.

Manuscript Format

Title page

A separate title page should be submitted and this page should include:

- The full title of the manuscript, as well as a short title (running title) up to 50 characters,
- Name(s), affiliations, highest academic degree(s) and ORCID ID(s) of the author(s),
- Grant information and detailed information on the other sources of support,
- Nameandaddress,phone(includingthemobilephonenumber) number and email

address of the corresponding author,

- Acknowledgment of the individuals who contributed to the preparation of the manuscript without fufilling the authorship criteria.

Abstract Title

An English abstract should be submitted with all kind of manuscripts with the exception of Brief Reports and Letters to the Editor. The abstract of an Original Article should be constructed with subheadings (Objective, Methods, Results, and Conclusion). All acronyms and abbreviations used in the manuscript should be defined at first use, both in the abstract and in the main text. The abbreviation should be provided in parentheses following the definition. Please refer to Table 1 below for word count specifications.

Keywords

Table 1. Limits in Manuscript Types

Article Type	Text Words	Abstract Words	Keywords	References	Tables	Figures/ Images
Original Article	7.500	300	5	30	10	10
Review Article	10.000	250	5	50	10	20
Case Report	1.500	200	3	20	No tables	10
Brief Report	2.000	No abstract	No keywords	20	No tables	10
Letter to the Editor	1.000	No abstract	No keywords	10	No tables	No figures/ images

Manuscript Evaluation

Authors may send their articles, which are prepared in accordance with the below stated publishing and editorial principles, together with the "article presentation form" via e-mail to the provided addresses. Providing the permissions of all authors is obligatory. EJOH Editorial Board is authorized to decide whether or not to accept articles through international peer-reviews. Following the Section Editors' preliminary reviews, the articles which are in accordance with the EJOH publication rules are sent to two reviewers determined by the Editor in Chief, for evaluation. In case of disagreement between the assigned reviewers, the manuscript

is sent to a third reviewer. The articles which are sent back to the authors for further improvement, correction or revision should be edited accordingly and delivered back to the journal within one month at the latest. The results of corrections or revisions of the authors are re-examined by the reviewers and their decisions are reported to the editor. Manuscripts designated as appropriate for publication by the reviewers are sent to the statistical editor and if approved, the publication process begins. The articles which are found to be conflicting with this guideline, will be rejected and will not be issued.

Manuscript Types

The aim of the EURAS Journal of Health is to publish original research papers of qualified scientific value on health issues. Reviews to highlight relevant outstanding topics and developments, as well as case reports and brief reports or short notes to provoke research and discussion are also within the scope. The EURAS Journal of Health encourages and enables health professionals in the primary, secondary and tertiary health services to publish their research and reviews.

Original Article: Research article is the most important type of manuscript because it provides new information as a result of original research. The main text of original articles should be structured in detail with Introduction, Materials and Methods, Results, Discussion, and Conclusion subtitles and sections. Conclusions are supported by statistical analysis which is mainly necessary. Statistical analyses must be in accordance with international statistical reporting standards (Altman DG, Gore SM, Gardner MJ, Pocock SJ. Statistical guidelines for contributors to medical journals. Br Med J 1983:7;1489–93).

Information on statistical analyses should be supplied in a separate subheading under the Materials and Methods section and the statistical software that was used during the process must be included. Units should be prepared in accordance with the International System of Units (SI).

Limitations, drawbacks, and the shortcomings of original articles should be mentioned in the Discussion section before the conclusion paragraph.

Review Article: It is prepared by experts who have extensive knowledge in a particular field and whose intensive scientific background is translated into numeros

publications with high impact potential. Experts should describe and evaluate the current level of knowledge of a topic and guide future studies in the field. EJOH may also invite submissions from such authors. The main text should contain Introduction, Research Consequences, and Conclusion sections.

Case Report: Rare or challenging cases which are considered to be interesting and educative and those offering new therapies or revealing knowledge not included in the literature also are accepted for publication. Case Report should include the Introduction, Case Presentation, Discussion, and Conclusion sections.

Brief Report: Brief reports are similar to original research in that they build up with same structure such as content, format and guidelines but are designed for small scale scientific research outcomes that may contain preliminary data and initial findings that indicate need for further investigation. Brief reports are shorter than manuscripts and must contain significant data as in original research articles.

Letter to the Editor: It discusses important or neglected aspects of a previously published article for educative purposes. The text should be unstructured. Abstract, Keywords, and Tables, Figures, images, and other media should not be included. The manuscript that is being commented on must be properly cited within this manuscript.The manuscript that is being commented on must be properly cited within the Letter.

Writing Rules

Page Layout: Standart A4-sized format. Margins: top 3.5; down 2.5; left 2.5; right 2 cm with 170 mm X 240 mm overall text space.

Font: Times New Roman style and 11 pt. font size are used for the whole text. All article should be justified. Single line spacing should be used throughout the main text and between the paragraphs.

Title: Bold capital letters in 14-pt must be used fort he main title. Subtitles should be written in bold and 11 pt,. After the title, author names, author ORCID numbers and e-mail addresses should be stated in 11 pt font size, with two lines of space.

Abstract: Single paragraph in 11-pt, including subsections for Objective, Materials

and Methods, Results and Conclusion sections are needed.

Keywords should be in italic, bold type and 11 pt.

Figures and Images: Figures, graphics and photographs should be submitted as separate files (in TIFF or JPEG format). The files should not be embedded in a Word document or the main document. Images should not be labeled (a, b, c, etc.) to indicate figure subunits. When there are figure subunits, the subunits should not be merged to form a single image. Each subunit should be submitted separately through the submission system. As requested for the whole submission, the figures should also be blinded. Any information within the images that may indicate an individual or institution should be blinded. The minimum resolution of each figure should be 300 DPI. Figure legends can be supported by thick and thin arrows, arrowheads, stars, asterisks, and similar marks can be used on the images. Figure legends should be listed at the end of the main document. All submitted figures should be clear in resolution and large in size in order to prevent delayed evalutaion process.

When a drug, product, hardware, or software program is mentioned within the main text, product information, including the name of the product, the producer of the product, and city and the country of the company (including the state if in USA), should be provided in parentheses in the following format: “Discovery St PET/CT scanner (General Electric, Milwaukee, WI, USA)”

Tables

- The number of tables allowed for each type of manuscript is stated in Table 1.
- The tables should effectively display the information about desired levels of detail, so that the length of the text is also shortened. Each table should be printed on a separate page with double spacing.
- The table numbers should be given according to their order in the text, and each one should contain a short title. Authors should make explanations in footnotes, not in titles. All non-standard abbreviations should be explained in footnotes. The following symbols should be used for footnotes, respectively (*,†,‡,§,||,¶,**,††,‡‡).
- Statistical measurements of the variation (i.e. Standart error, standart deviation) should also be included. If data from another published or unpublished source are used, the cited source should be fully informed before its permission is obtained.

- Tables with a lot of data (backup) take up a lot of space and can only be suitable for electronic publications or they can be provided directly to the readers by the authors. In such a case, an appropriate expssion should be added to the text. Such tables should be submitted with the article for the evaluation by reviewer.

References: References are numbered and listed by their order of appearance in text; the text citation is followed by the appropriate reference number in parentheses. All references should be cited in text. While citing publications, priority should be given to the most up-to-date publications and accuracy of references is the responsibility of the authors. The DOI number should be provided ıf an ahead-of-print publication is cited. Journal titles should be abbreviated in accordance with the journal abbreviations in Index

Medicus/ MEDLINE/PubMed. All authors should be listed if there are six or fewer authors in the study. In case of six or more authorship, the first six authors should be listed followed by "et al.

Journal Article: Blasco V, Colavolpe JC, Antonini F, Zieleskiewicz L, Nafati C, Albanèse J, et al. Long-term outcome in kidney recipients from donors treated with hydroxyethylstarch 130/0.4 andhydroxyethylstarch 200/0.6. Br J Anaesth 2015;115(5):797-8.

Book Section: Philips SJ, Whisnant JP. Hypertension and Stroke. Editors: Laragh JH, Brenner BM. Hypertension pathophisiology, diagnosis, and management. 2nd ed. New York: Raven Press, 1995: 465–78.

Book with a Single Author: Jarvis C. Physical Examination and Health Assessment. 3rd ed. Philadelphia: W.B. Saunders Company; 2000.

Book with editor: Breedlove GK, Schorfheide AM. Adolescent pregnancy. Wieczorek RR, editor. 2nd ed. White Plains (NY): March of Dimes Education Services; 2001. p: 32-47.

Editor(s) as Author: Huizing EH, de Groot JAM, editors. Functional reconstructive nasal surgery. Stuttgart-New York: Thieme; 2003.

Conference Proceeding: Bengisson S. Sothemin BG. Enforcement of data protection, privacy and security in medical informatics. In: Lun KC, Degoulet P, Piemme TE, Rienhoff O, editors. MEDINFO 92. Proceedings of the 7th World Congress on Medical Informatics; 1992 Sept 6-10; Geneva, Switzerland.

Amsterdam: North-Holland; 1992. pp.1561-5.

Short Report: Cusick M, Chew EY, Hoogwerf B, Agrón E, Wu L, Lindley A, et al. Early Treatment Diabetic Retinopathy Study Research Group. Risk factors for renal replacement therapy in the Early Treatment Diabetic Retinopathy Study (ETDRS), Early Treatment Diabetic Retinopathy Study KidneyInt: 2004. Report No: 26.

Thesis: Borkowski MM. Infant sleep and feeding: a telephone survey of Hispanic Americans [dissertation]. Mount Pleasant (MI): Central Michigan University; 2002.

Manuscripts Accepted for Publication, Not Published Yet: Slots J. The microflora of black stain on human primary teeth. Scand J Dent Res. 1974.

Epub Ahead of Print Articles: Cai L, Yeh BM, Westphalen AC, Roberts JP, Wang ZJ. Adult living donor liver imaging. DiagnIntervRadiol. 2016 Feb 24. doi: 10.5152/dir.2016.15323. [Epub ahead of print].

Manuscripts Published in Electronic Format: Morse SS. Factors in the emergence of infectious diseases. Emerg Infect Dis (serial online) 1995 Jan-Mar (cited 1996 June 5): 1(1): (24 screens). Available from: URL: http:/www.cdc.gov/ncidodlElD/cid.htm

Webpage: Author. Title. Available at: URL. Accessed Access Date, Access Year.

Peer Review and Acceptance

Manuscripts are judged on the significance of the contribution to the literature, the quality of analysis and the clarity of presentation. Papers are expected to demonstrate originality and meaningful engagement with the global literature.

Except where otherwise stated, manuscripts are double-blind peer reviewed by anonymous reviewers in addition to the Editor. Final acceptance or rejection rests with the Editor-in-Chief, who reserves the right to refuse any material for publication.

Article Withdrawal

According to our publication policies, the author of the article has to cooperate with

the Editor-in-Chief of the journal in withdrawal procedures, only if the reasons are compelling and unavoidable.

For withdrawal of a manuscript authors need to submit the petition containing his / her rationale to the editorial board in a printed signed form indicating that all authors have approved the withdrawal. Reasons for withdrawal should be stated clearly.

Authors must not assume that withdrawal process is completed until they have received appropriate notification to this effect from the editorial office. If the copyright of the article was transferred to the EJOH during the submission process, the author cannot send the work to another journal for evaluation unless the request for withdrawal of this work is approved.Cases of plagiarism, authorship disputes or fraudulent use of data will be handled in accordance with COPE guidelines.

Conflict of Interest

Authors must conceive any conflict of interest related to their submission. This statement must include any financial, personal or other relationships within three years of beginning the submitted work. When there is no such relationship, the authors must type "The authors declared they do not have anything to disclose regarding conflict of interest with respect to this manuscript."

Authorship

The list of authors should accurately illustrate who contributed to the work and how. All those listed as authors should qualify for authorship according to the following criteria:

- 1. Have made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; and
- 2. Been involved in drafting the manuscript or revising it critically for important intellectual content; and
- 3. Given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content; and
- 4. Agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately

investigated and resolved.

Contributions from anyone who does not meet the criteria for authorship should be listed, with permission from the contributor, in an Acknowledgments section (for example, to recognize contributions from people who provided technical help, collation of data, writing assistance, acquisition of funding, or a department chairperson who provided general support). Prior to submitting the article all authors should agree on the order in which their names will be listed in the manuscript.

The list of authors should accurately illustrate who contributed to the work and how. All those listed as authors should qualify for authorship according to the following criteria:

Authors must conceive any conflict of interest related to their submission. This statement must include any financial, personal or other relationships within three years of beginning the submitted work. When there is no such relationship, the authors must type “The authors declared they do not have anything to disclose regarding conflict of interest with respect to this manuscript.”