



International Healthcare Research Journal (IHRJ)

E - I S S N : 2 4 5 6 - 8 0 9 0

Volume 5, Issue 7 (October 2021)



EDITORIAL TEAM

Patron

Dr. C.V. Ananthakrishnan, MD (Orthopaedics), Senior Joint Replacement Surgeon, Ex-Clinical Associate Professor (Dept. of Orthopaedic Surgery), Texas Tech University, School of Medicine, Lubbock, Texas, USA, Ex-Medical Director, St. Mary of the Plains Hospital Texas, USA.

Editor-In-Chief

Dr. Vatsul Sharma, MDS, Consultant Dental Specialist, Ex-Senior Lecturer, Sri Sukhmani Dental College, Dera Bassi (SAS Nagar) 140507, Punjab India.

Co-Editor

Dr. Sahil Thakar, MDS, Assistant Professor, Department of Public Health Dentistry, School of Dental Sciences, Sharda University, Greater Noida, India.

Editorial Coordinator (North America)

Dr. Arushi Khurana (MBBS, MD, Advanced Hematology Fellow, Lymphoma), Mayo Clinic, Rochester, Virginia, USA.

Editorial Coordinator (South America)

Dr. Antonio Vaz de Macedo (Clinical Hematologist, MD), Head, Haematology Clinic, Hospital da Polícia Militar; Part of the Hematopoietic Stem Cell Transplantation (HSCT) team at Hospital Luxemburgo, Belo Horizonte, Brazil.

Editorial Coordinator (Australia)

Dr. Ishita Sood, Master of Physiotherapy in Musculoskeletal Disorders, Member, Indian Association of Physiotherapy & Australian Association of Physiotherapy, The Physio Co. , Melbourne, Victoria, Australia.

Editorial Coordinator (Europe)

Dr. Vjollca Ramiqi, Psychiatrist in Unit of Addiction Disease, Public Clinique of Psychiatry of Pristina, Pristina, Republic of Kosovo.

Editorial Coordinator (Asia & Africa)

Parul Chawla, Masters in Systems Biology and Bioinformatics, System Biologist, Bioinformatician, Biostatistician, Pharmacovigilance Professional, India.

Associate Coordinator

Dr. Jayant Kumar Sah, MBBS, MS, M.Ch (Surgical Gastroenterology), Fellowship in Advanced Liver Transplant, Department of Surgery, Institute of Medicine, Tribhuvan University Teaching Hospital, Nepal.

Associate Editor(s)

Dr. Puthuvadathayil Mohamed Shamsuddeen, [MBBS; MRCP(UK); FRCP (Edin)], Consultant Physician, Al Bustan Hospital, Musaffah, Abu Dhabi, UAE.

Dr. Ravneet Malhi, MDS, DJ College of Dental Sciences and Research, Modinagar, India.

Forensic Editor & Advisor

Dr. Taruna Malhotra, M.Sc. (Forensic Odontology), Consultant Dental Surgeon, New Delhi, India.

EDITORIAL TEAM

Technical Advisor

Dr. Manish Sharma, Ph.D, Associate Professor, Department of Physics, School of Basic Sciences and Research, Sharda University, India.

Section Editor

Dr. Sulabh Puri, MD [MBBS, MD (Radiodiagnosis)], Senior Resident, Department of Radiodiagnosis, All India Institute of Medical Sciences, New Delhi, India.

Editorial Board

Dr. Richard J. Gray, (DDS, Endodontics), Private Practitioner & Ex-Assistant Professor, Virginia Commonwealth University, School of Dentistry, USA.

Dr. Anil Sharma, [MBBS, MS(General Surgery)], Private Practitioner, Ex-Registrar, Ram Manohar Lohia Hospital, New Delhi, Ex-Medical Officer Incharge (HCMS), India.

Dr. Girish Joseph, [MBBS, M.D. (Pharmacology)], Drug Safety Physician, APCER, Delhi, India.

Dr. Naimatullah Habibi, [B.Sc. (General Medicine), MD (Doctor of Medicine), MD (Family Medicine)], General Practitioner, Melbourne, Victoria, Australia.

Dr. PACKO Dieu-le-veut saint-cyr Sylvestre, MBBS [Specialty career in Hématology (DES): Diploma of Specialized Study in Hematology, University of Félix Houphouët Boigny (Abidjan)], Hematologist and Urgentist Doctor, Assistant Professor, Institute of Medicine of University of Bangui, Hospital Teacher and Searcher of Hematology Department of University Hospital of Yopougon, Côte d'Ivoire.

Dr. Kuljit Singh Uppal, [MBBS, DLO, MS(ENT)], Ex-Associate Professor, Government Medical College and Hospital (GMCH), Patiala, India.

Dr Mayank Gahlot, MDS, Specialist Orthodontist, Al Attar Center, Karama, Dubai.

Dr. Syed Ameer Haider Jafri, MDS, Registrar, King Salman Armed Force Hospital, Tabuk, Saudi Arabia.

Dr. Bhuvandeep Gupta, MDS, Professor, Department of Public Health Dentistry, ITS Dental College, Hospital and Research Centre, Greater Noida, India.

Dr. Gyanendra Mishra, MDS, Medical Officer Dental, Ministry of Health, Jharkhand, India.

Dr. Vivek Vijay Gupta, MDS, Senior Lecturer, Faculty of Dentistry, SEGi University, Jalan Teknologi 9, PJU5, Kota Damansara, Petling Jaya-47810, Malaysia.

Dr. Ramya Madhuri, MDS, Solumaniah, Riyadh, Saudi Arabia.

Dr. Sheetal Grover, MDS, Reader, Seema Dental College and Hospital, Rishikesh, India.

Dr. Sakshi Kataria, MDS, Senior Lecturer, Sudha Rustagi College of Dental Sciences and Research, Faridabad, Haryana, India.

Name of Publisher & Publication Address

Dr. Vatsul Sharma, 66 A, Day Care Centre, Housing Board Colony, Kalka (Panchkula), Haryana, India-133302.

CONTENTS (VOLUME 5, ISSUE 7, OCTOBER 2021)

S.No	TITLE	AUTHOR NAMES	PAGE NUMBERS	DOI
EDITORIAL COMMENT				
1.	Mukherjee's Equation: An Equation to Calculate GFR of an Obese Asian	Dattatreya Mukherjee	EC1-EC2	https://doi.org/10.26440/IHRJ/0507.10437
SHORT COMMENTARY(IES)				
2.	Paying Obeisance to the Humble "Coconut": A Short Commentary	Shailesh Jain	SC1-SC2	https://doi.org/10.26440/IHRJ/0507.10463
REVIEW(S)				
3.	Evidence Based Decision Making: A Review	Twesha Huidrom, Ravneet Malhi	RV1-RV4	https://doi.org/10.26440/IHRJ/0507.10468
4.	The Wonderful DMARD with Multiple Toxicities	Yashika Kaushal, Ratibha Kaushal, Isha Sharma	RV5-RV10	https://doi.org/10.26440/IHRJ/0507.10470
5.	The Importance of Telemedicine in a Post COVID World	Bhupesh Sharma, Sanjana Manocha, Nyagam Yangzom	RV11-RV14	https://doi.org/10.26440/IHRJ/0507.10467
ORIGINAL RESEARCH(S)				
6.	Assessment of Sleep Habits and Quality of Sleep among Elderly Residing in Rural Areas of Patiala: A Community-Based Cross-Sectional Survey	Yashika Kaushal, Ratibha Kaushal, Isha Sharma, Sheenab Mittal	OR1-OR4	https://doi.org/10.26440/IHRJ/0507.10466



Mukherjee's Equation: An Equation to Calculate GFR of an Obese Asian

DATTATREYA MUKHERJEE

Dear Editor,

Glomerular Filtration Rate [GFR] is an essential value to understand the condition of two kidneys.¹ Currently we are using different formulas to calculate it. One of the formulae is 1973s Cockcroft-Gault formula.² The formula is:

$$C_{Cr} = \frac{[140 - \text{age}] \times \text{wt}}{S.Cr \times 72}$$

Wherein

- C_{Cr} (creatinine clearance) = mL/minute, this reflects the GFR
- Age = years
- Weight = kg
- S_{Cr} (serum creatinine) = mg/dL

Currently the most used formula is 2009 CKD-EPI creatinine equation³ which has parameters like S_{Cr}, Age, Gender, Race.

Now, I have studied and realized that we are missing with an important factor, that is height which is a very important demographic factor. Several studies have shown that BMI is inversely proportional to GFR.⁴ So, after calculating I am proposing an equation which has height as a measuring factor. This equation will be called Mukherjee's equation. The equation is:

$$GFR = \frac{[2100 - \text{age}]}{[0.72 \times S.Cr \times BMI]}$$

Wherein:

- BMI = Weight in Kg/Height in m²
- Age in years
- S_{Cr} in mg/dl

Points to be noted:

1. This formula is for Asian patients
2. Age is more than 18 years

3. Only for obese patients, BMI > 30
4. For female, the value will be multiplied by 0.8

I am proposing this equation and, in my calculation, I have found some differences with the conventional one. I believe this equation will give more precise result than the conventional one. Through this equation, I have tried to create a bridge between Cockcroft and 2009 CKD-EPI. Although, a clinical trial is needed to validate this equation. Through this article, I am first proposing my equation, Mukherjee's Equation in front of the scientific world.

REFERENCES:

1. Medline Plus. Glomerular Filtration Rate, US National Library of Medicine (Online Article). Available from: <https://medlineplus.gov/ency/article/007305.htm> [Last Accessed on 15th August, 2021]
2. National Kidney Foundation. Cockcroft Gault Formula. (Online Article). Available from: https://www.kidney.org/professionals/kdoqi/gfr_calculatorcoc. [Last Accessed on 25th June, 2021]
3. Da Vita. Glomerular Calculator. (Online Article). Available from: <https://www.davita.com/tools/gfr-calculator>. [Last Accessed on 25th June, 2021]
4. Kawamoto R, Kohara K, Tabara Y, Miki T, Ohtsuka N, Kusunoki T, Yorimitsu N. An association between body mass index and estimated glomerular filtration rate. *Hypertens Res.* 2008;31(8):1559-64. doi: <https://doi.org/10.1291/hypres.31.1559>.



© Dattatreya Mukherjee. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY-NC 4.0, which permits unrestricted use, distribution and reproduction in any medium, provided the use is not commercial and the original author(s) and source are cited.

Submitted on: 11-Jul-2021; Accepted on: 12-Oct-2021

Cite this article as:
Mukherjee D. Mukherjee’s Equation: An Equation to Calculate GFR of an Obese Asian. Int Healthc Res J. 2021;5(7):LE1-LE2. <https://doi.org/10.26440/IHRJ/0507.10437>

AUTHOR AFFILIATIONS (*: Corresponding Author):
1. Intern, First Affiliated Hospital of Jinan University, Guangzhou, P.R China (<https://orcid.org/0000-0001-7566-3843>)

e-mail id for correspondence: dattatreyamukherjee4u[at]outlook[dot]com



Paying Obeisance to the Humble “Coconut”: A Short Commentary

SHAILESH JAIN

Every year, on 2nd September, the world unites to thank the humble “coconut” for its immense benefits by observing the “World Coconut Day”. The ever-popular coconut, apart from its other uses, has proven to have various health benefits.

Scientifically known as *Cocos nucifera* L., the coconut is a tree cultivated for its nutritional and medicinal values. Other products of coconut include tender coconut water, copra, coconut oil, raw kernel, coconut cake, coconut toddy, coconut shell and wood based products, coconut leaves, coir pith etc and these products are found in day to day use.¹ Due to its many uses, it is often referred to as the “tree of life”.²

The coconut fruit generally consists of 51.7% kernel, 9.8% water, and 38.5% shell and is an integral part of many South Asian diets.³ Beyond its usage in cooking, coconut oil has attracted attention due to its hypocholesterolemic, anticancer, antihepatosteatotic, antidiabetic, antioxidant, anti-inflammatory, antimicrobial and skin moisturizing properties.

An important component of the coconut, coconut water, in its natural form is a refreshing and nutritious beverage consumed widely due to its beneficial properties to health, mostly which are based on various cultural and/or traditional beliefs.⁴ Since ages, coconut water has been used for oral rehydration and even so for intravenous hydration of patients in remote/rural areas.⁵ Coconut water may also offer protection against myocardial infarction.⁵ As per the results of Alleyne T et al. (2005), regular consumption of either coconut water or mauby (a liquid extracted from the bark of the mauby tree, *Colubrina arborescens*), or particularly, a mixture of them, is effective in bringing about the control of hypertension.⁶

It also has been reported that Tender Coconut Water (TCW) and mature coconut water can reduce the occurrence of lifestyle diseases by reducing the risk of heart disease and has significant hypocholesterolemic, antioxidant and antithrombotic effects. Other researchers also have documented that immature coconut inflorescence helps lower blood glucose in diabetic rats.⁷

Medicinal Values: The various medicinal effects of coconut are as follows:¹

- Electrolytic effect
- Antidote effect
- Antioxidant effect
- Cardioprotective effect
- Antithrombotic effect
- Antiatherosclerotic effect
- Hypolipidemic effect
- Anticholecystitic effect
- Antibacterial effect
- Anticaries effect
- Antidermatophytic effect
- Antiviral effect
- Antifungal effect
- Antiprotozoal effect
- Anticancer effect
- Immunostimulatory effect
- Antidiabetic effect
- Hepatoprotective effect
- Disinfectant effect
- Insect repellent
- Eco-friendly biodiesel
- Hormone like effect

The coconut palm has a significant effect on the rural



© Shailesh Jain. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY-NC 4.0, which permits unrestricted use, distribution and reproduction in any medium, provided the use is not commercial and the original author(s) and source are cited.

Submitted on: 22-Sep-2021; **Accepted on:** 19-Oct-2021

economy of many coastal states where it is grown extensively and provides income to more than 10 million people. Therefore, it is of little amusement that the coconut culture is spreading even to non-traditional belts that, until recently, were considered unsuitable for the purpose.

CONCLUSION

This short commentary is a tribute to the humble coconut and educate people regarding the immense benefits of this humble “fruit”. It is therefore only justified that a day is dedicated on the global level to celebrate the benefits provided by coconut and its products. Through further clinical and evidence-based studies, it is only a matter of time that coconut finds its way into the regular medical practice and drugs are prepared using its extract.

REFERENCES

1. DebMandal M, Mandal S. Coconut (*Cocos nucifera* L.: Arecaceae): in health promotion and disease prevention. *Asian Pac J Trop Med*. 2011;4(3):241-7. [https://doi.org/10.1016/S1995-7645\(11\)60078-3](https://doi.org/10.1016/S1995-7645(11)60078-3).
2. Chan E, Elevitch CR. Species profiles for Pacific island agroforestry, 2006. [Online Article]. Available from: www.traditionaltree.org [Accessed on 3rd September, 2021]
3. Deen A, Visvanathan R, Wickramarachchi D, Marikkar N, Nammi S, Jayawardana BC, Liyanage R. Chemical composition and health benefits of coconut oil: an overview. *J Sci Food Agric*. 2021;101(6):2182-93. <https://doi.org/10.1002/jsfa.10870>.
4. Kobayashi H, Morisaki N, Tago Y, Hashimoto Y, Iwasaki S, Kawachi E, Nagata R, Shudo K. Structural identification of a major cytokinin in coconut milk as 14-O-(3-O-[β-Dgalactopyranosyl-(1→2)-α-D-galactopyranosyl-(1→3)-α-L-arabinofuranosyl]-4-O-(α-L-arabinofuranosyl)-β-D-galactopyranosyl)-trans-zeatin riboside. *Chem Pharm Bull*. 1997; 45:260-4.
5. Campbell-Falck D, Thomas T, Falck TM, Tutuo N, Clem K. The intravenous use of coconut water. *Am J Emerg Med*. 2000; 18:108-111.
6. Alleyne T, Roache S, Thomas C, Shirley A. The control of hypertension by use of coconut water and mauby: Two tropical food drinks. *West Indian Med J*. 2005;54: 3-8.
7. Rajamohan T, Archana U. Nutrition and Health Aspects of Coconut. In: Nampoothiri K., Krishnakumar V., Thampan P., Nair M. (eds) *The Coconut Palm (Cocos nucifera L.) - Research and Development Perspectives*. 2018 Springer, Singapore. https://doi.org/10.1007/978-981-13-2754-4_15

Cite this article as:

Jain S. Paying Obeisance to the Humble “Coconut”: A Short Commentary. *Int Healthc Res J*. 2021;5(7)SC1-SC2. <https://doi.org/10.26440/IHRJ/0507.10463>

AUTHOR AFFILIATION:

1. Reader, Department of Prosthodontics, Crown and Bridge, School of Dental Sciences (SDS), Sharda University, Greater Noida, 201306 (<https://orcid.org/0000-0002-3510-6791>)

Source of support: Nil, **Conflict of interest:** None declared

Contact Corresponding Author at: shailesh.jain[at]sharda[dot]ac[dot]in



Evidence Based Decision Making: A Review

TWESHA HUIDROM^{*1}, RAVNEET MALHI² 

A
B
S
T
R
A
C
T

In today's era, many of the decisions are based upon gut feeling, intuition, or instinct rather than relied on actual scientific data and facts. It's important and essential to do the needful based on facts and not feelings for the best possible outcomes. Evidence based decision making in the field of healthcare describes the integration of basic rules of evidence as they evolve into implementation in daily practices. In dentistry, the principles of evidence-based decision making as well as a very common clinical dilemma to make a decision on whether to save and preserve the natural tooth or to extract and replace it with an implant or any sort of prosthesis is often experienced by a clinician easily. The need of evidence plays a very important role in making decisions. It helps provide a better outcome which will result in fewer casualties.

KEYWORDS: Evidence-Based, Medicine, Dentistry, Decision, Error

INTRODUCTION

"Human history is mostly the story of error and accident."

-Michael A. Ledeen

In today's advanced era, many of the decisions are based upon gut feeling, intuition, or instinct rather than relied on actual scientific data and facts. Though presence of facts and figures is already available but due to the lack of an individual's interest and resistance towards information it results in errors and problems. Everyone, be it a person, a society or an establishment has made errors in the form of imprecise beliefs or decisions. In earlier times, errors and mistakes in evidence-based decision making must have been greater than that in the recent times. Before, the research and the findings were far lesser than that which we can find today.¹ Written material is widely accepted and is like the Holy Grail for evidence-based decision making. It gets updated and new research findings are added so that errors can be decreased giving us better results. Errors can occur anywhere in the process of decision making. It can be on an individual level by considering beliefs and interpretation of information on their own and can result in inaccurate application of the process. Disposition and aversion to information can also result in errors while making decisions. Our main aim is to identify and reduce these errors so that the quality and quantity of the result is not hampered.

The categories which can be included for improvement are basically reduction in time, cost, effort, dispute, disease and many other possibilities.² We know that eliminating all the errors in one go is not possible. But the severity and the frequency can be reduced and should be considered our main goal. Some of the prerequisites which should be followed at an individual level include accepting the fact that there may be errors in any evidence; the individual should be willing to identify the errors and lastly they have to accept that research attempts to obtain justifiable facts and evidence.³

Thus, it's important and essential to do the needful based on facts and not feelings for the best possible outcomes. Evidence-based decision making (EBDM) is an ideal model which we can use to ensure that you are considering relevant facts and not something that is not proven. Evidence based decision making is a process that helps in making decisions about a program, practice, or policy that is grounded in the best available research evidence and informed by experiential evidence from the field and relevant contextual evidence. All the information present in scientific research with good outcome should always be considered while taking a decision. Three categories which are mainly the part of this framework are contextual evidence, best available research evidence and experiential evidence.⁴



© Twesha Huidron et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY-NC 4.0, which permits unrestricted use, distribution and reproduction in any medium, provided the use is not commercial and the original author(s) and source are cited.

Submitted on: 14-Jul-2021; Accepted on: 11-Oct-2021

The decision-making process has three main stages. First is the collection of evidence which basically means gathering evidence from the best available research. Second is the interpretation of the evidence. Third and the final stage are applying the things that we have learned from the evidence. In this we are considering all three stages while making the decision based on the evidence to prevent any issue or problem before it occurs. The characteristics of the decision-making process includes transparency, participation, openness, skilled leadership, facilitation and a definite process. We need to get the best outcomes using these characteristics. We need to know for a fact that every scenario is unique and the evidence differs from situation to situation.⁵

Evidence Based Decision Making in Medical Field:

Historically, evidence based medicine goes back to the 1700s, though it was not clearly explained and advanced until the early 1980s. Evidence based medicine was initially known as 'critical appraisal' to describe the integration of basic rules of evidence as they evolve into implementation in daily practices. Evidence based medicine is defined as a conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients.⁶ They are defined based on 4 important and basic categories, which involve acknowledgment of the patient's problem and making of a structured and well layered clinical question, thorough research in medical literature to bring out the best available evidence to answer the question, critical appraisal of all available evidence and usage of the evidence with all facets and contexts of the clinical conditions. Recent evidence-based decision making research has indicated that the framework and functioning of healthcare facilities has contributed to an organization's functional success by improving and increasing safety, standard and their regulation process. There is very little information accessible about the financial returns of evidence-based investments; such investments are eliminated during the decision-making process.^{6,7}

Healthcare facilities are very costly, dangerous, inefficient and not easily accessible in many places. Though the government has provided many provisions for the betterment of healthcare in places where easy access of healthcare is hard but awareness in a majority of population is still lacking. Many issues arise from a good amount of people ignoring all the pleas from the designated healthcare workers.⁵ The

evidence that has to be collected from the population is decreased due to this issue. Without surveying and collecting evidence, research in that field is going to be a very difficult process. Surveys and research are a very important source of information and updates which are accessed and used by the healthcare professionals to help them in decision making. Updating of such research and content plays a very major role in decision making. In a field where past research with proof and evidence tends to the need to have good results and also good prognosis of the individual, evidence-based decision making is really necessary. Majority of the healthcare professionals are survived by such written material. If the content is written and widely accepted with proof of it being mostly successful, then it is easily considered in the process of implementing the evidence into the treatment or decision making. In a health care setting, be it a private clinic or a hospital, the complicated cases which have a multifaceted treatment process, require an extensive list of evidences and maybe more professionals from a different medical field to create a treatment plan which will give the best prognosis and even help save a life.^{4,6,7}

Sometimes it is possible that going by the book and following the protocols may turn out to be a risk for the patient and he or she may even lose his or her life. So, we do know for a fact that evidence in a lot of cases may not turn out to be useful or helpful for the patient. It can be the worst decision of his or her life and also the medical practitioner who is the one taking the decision will be at a tight spot from that point onwards. There are a lot of things that the medical practitioner has to explain and comply with after taking a decision based on the facts and figures, which in turn didn't help in preserving one's life. Evidence based decision making also helps in medico-legal issues.⁸ In very rare cases the gut feeling of a medical healthcare professional works wonders with the help of evidence. Like if the doctor has all the necessary reports and he knows his way to go about for the treatment but still chooses a different way based on his feeling and intuition, it can turn out be a really bad decision for the patient's life. There's a 50-50 chance when feelings and intuition are followed. But there is 80-90% of a chance that the treatment goes well if we go by the evidence and follows all the protocols. Medical field is literally so vast and big. The need of evidences, research and updating of the research is a sole necessity to make decisions in the

medical field.^{4,6,8,9}

Evidence Based Decision Making in Dentistry:

Usually in dentistry the complicated cases of endodontology, periodontology and oral rehabilitation often pose a dilemma in the clinician's mind as to how they can tackle the situation to give the correct treatment plan. The principles of evidence-based decision making as well as a very common clinical dilemma to make a decision on whether to save and preserve the natural tooth or to extract and replace it with an implant or any sort of prosthesis such as a fixed partial denture is often experienced by a clinician easily. Evidence through investigations and research can prove to provide better closure for the treatment plan.⁹ This will ultimately help in the better diagnosis of the treatment that has to be rendered to the patient. Many cases require a multifaceted treatment approach for the prognosis to be good with least number of complications. The outcome of the treatment may not be compromised if the main goals of the treatment are achieved. However, in a lot of cases where complications hamper the main treatment goals, decrease in predictable outcome is seen or anticipated. The rule of the thumb or the main principle in dentistry is to put a good amount of effort in preserving the natural teeth. Any different treatment outcome may lead to confusion when we try and compare two different treatment alternatives.

Therefore, it should be fully based on the correct measurements of the different treatments. Other factors like patient's preference, prosthetic/periodontal/endodontic considerations or long-term prognosis should be considered and should be recognized in the clinician or practitioner's final decision making.^{10,11}

In a dental practice setting the use of clinical practice guidelines and protocols organized by the decision trees is the most ethical and successful way to go about in that setting? Now what is a decision tree is the question? A decision tree assists the dentist when he or she is presenting with the conditions and patient values are less possible in recommending treatment manners whose benefits and harms are varying and unknown. Best proof based on the 'average patient' is incorporated in the decision tree. Chances, utility and economic data are calculated and surveyed in providing the patient with informed and personalized choices of care. Evidence-based decision-making accounts in a process in which an

individual patient is enlightened of the best probable evidence and all pertinent options. The result of the process is that patient serviceability and cost apprehensions are fully addressed in enhancing the clinical decision. In dentistry, evidence-based decision making is a discipline that provides optimum, clear-cut evidence to dentists and their patients in shared decision making.^{9,12}

In the recent scenario, dentists are being provided with the training of being able to adopt the role of translational researchers in developing evidence based dental practices. Realistically, evidence-based dentistry is not feasible in its current form for the purveying of labor intensive provisions that distinguish recent dental practice. Evidence based decision making also conceptualizes a team proposition in explaining issues and solutions to change the recent dental practice. All these changes integrate a practice that involves an electronic tabulation, centralized and generalized database, knowledge management software and manpower in optimizing effective and useful oral healthcare to dental patients. Scientific, pertinent evidence is important in clinical care, policy making, controversy resolution and law. As a result, evidence-based practice brings together relevant, trustworthy information by in order collecting, inspecting and transferring research findings into clinical, management and strategy areas. One of the main important things in evidence-based decision making is to assess the available evidence to judge what is bad and what is good or better. The available evidence should be graded by the strength of the proof and evidence. The levels of evidence are often considered when applying it. The hierarchy is usually followed because older information keeps getting updated and the newest evidence is often the best evidence. In these levels of evidence randomized trial controls are mostly considered as high level of evidence. In 'Oxford centre of evidence-based medicine' the hierarchical system of classifying scientific evidence is elaborated very well. It provides an evident comprehension regarding the scientific evidence. This may lead to surprising conclusions that may dispute common concepts and even show a reverse pyramid of scientific evidence.^{10,12,13}

Conclusion: The need of evidence plays a very important role in making decisions. It helps provide a better outcome which will result in fewer casualties. We know that newer technologies and recent advancements in scientific researches' will add to the

legitimacy of the evidence which will ultimately result in making better decisions. Better decisions may not always lead to an accurate outcome but in most cases it does help in achieving the goal which is required. We should work on reinforcing and confirming the already present research and findings so that referring the research by the book will result in very fewer casualties.

"The delivery of medical care is to do as nothing as possible"

House of God-1979

REFERENCES

1. Martin GP, McKee L, Dixon-Woods M. Beyond metrics? Utilizing 'soft intelligence' for healthcare quality and safety. *Soc Sci Med.* 2015;142:19–26. <https://doi.org/10.1016/j.socscimed.2015.07.027>
2. Mackey A., Bassendowski S. The history of evidence-based practice in nursing education and practice. *J Prof Nurs.* 2017;33(10):51–5. <https://doi.org/10.1016/j.profnurs.2016.05.009>
3. CDC. Injury Prevention & Control: Division of Violence Prevention (Online Article). Available from: <https://vetoviolence.cdc.gov>. [Last assessed on 12th July, 2021].
4. Gabbay J, Le May A. Practice-based evidence for healthcare: clinical mindlines. Abingdon: Routledge; 2011
5. Barends E, Rousseau D, Briner R. Evidence-based management: the basic principles. In: Kovner A, D'Aunno T, editors. Evidence-Based Management in Healthcare: Principles, Cases and Perspectives. Health Administration Press; Chicago, IL: 2017. pp. 3–20
6. Masic I, Miokovic M, Muhamedagic B. Evidence Based Medicine – New Approaches and Challenges. *Acta Inform Med.* 2008; 16(4): 219–25.
7. Eddy DM. Evidence-based medicine: a unified approach. *Health affairs (Project Hope)* 2005;24(1):9–17
8. Warren JI, McLaughlin M, Bardsley J. The strengths and challenges of implementing EBP in healthcare systems. *Worldviews Evid Based Nurs.* 2016;13(1):15–<https://doi.org/24.10.1111/wvn.12149>
9. Rackett DL, Richardson WS, Rosenberg W, Haynes RB. Evidence-based medicine: how to practice and teach. 2. ed. Edinburgh: Churchill-Livingstone, 2000
10. Tsesis I, Nemkowsky CE, Tamse E, Rosen E. Preserving the natural tooth versus extraction and implant placement: making a rational clinical decision. *Refuat Hapeh Vehashinayim* (1993) 2010;27(1):37–46:75.
11. Iqbal MK, Kim S. A review of factors influencing treatment planning decisions of single-tooth implants versus preserving natural teeth with nonsurgical end-odontic therapy. *J Endod.* 2008;34(5):519–29. <https://doi.org/10.1016/j.joen.2008.01.002>
12. Hofer TP, Kerr EA, Hayward RA. What is an error? *Eff Clin Pract.* 2000;3(6):261–9.
13. Angelos P. Complications, errors, and surgical ethics. *World J Surg.* 2009;33(4):609–11. <https://doi.org/10.1007/s00268-008-9914-0>

Source of support: Nil, **Conflict of interest:** None declared

Cite this article as:

Huidrom T, Malhi R. Evidence Based Decision Making: A Review. *Int Healthc Res J.* 2021;5(7):RV1–RV4. <https://doi.org/10.26440/IHRJ/0507.10468>

AUTHOR AFFILIATIONS: (*Corresponding Author)

1. BDS Intern, D.J. College of Dental Sciences & Research, Modinagar, U.P., India
2. Reader, Department of Public Health Dentistry, D.J. College of Dental Sciences & Research, Modinagar, U.P., India (<https://orcid.org/0000-0001-8486-5308>)

Contact Corresponding Author At: doctortwesha[at]gmail[dot]com



The Wonderful DMARD with Multiple Toxicities

YASHIKA KAUSHAL^{*1}, RATIBHA KAUSHAL², ISHA SHARMA³

A
B
S
T
R
A
C
T

Methotrexate is a type of disease-modifying anti-rheumatic drug (DMARD). It is used to reduce activity of the immune system for people who have certain conditions. Methotrexate is a chemotherapy agent and immune system suppressant. Its use may be limited by concerns regarding its adverse reactions. The occurrence of adverse drug reactions in some cases leads to the therapy discontinuation. Although adverse drug reactions (ADR) of methotrexate generally do not pose a serious threat to the health of patients and a reduction in the dose of methotrexate leads to their elimination, in some cases severe toxicities of the drug occur unpredictably. These facts explain the need for close monitoring of the patient's condition and the identification of potential risk factors for drug toxicity on the part of different organs and functional systems. The purpose of this review is to detail about safety and tolerability of methotrexate.

KEYWORDS: Methotrexate, Adverse Drug Reactions, Toxicity, Patient Safety

INTRODUCTION

Methotrexate is one of the drugs of choice for systemic treatment of moderate to severe forms of multiple disorders. Methotrexate is a highly effective drug that has been used successfully for more than 50 years to treat skin diseases.¹ At present, methotrexate is also used for the treatment of other dermatological diseases, such as vasculitis, bullous dermatosis, and lymphoproliferative diseases.² Methotrexate has proven to be a highly effective drug, but half of patients experience ADR during treatment. The pathogenesis of most ADR of methotrexate is based on its cytotoxic effect on rapidly dividing body cells, primarily the cells of the bone marrow, gastrointestinal tract, and hepatocytes. Methotrexate toxicity effects all the major organs of the body.

Gastrointestinal disorders are the most common ADR of methotrexate: 18.2% of patients report nausea and vomiting; 11.1% have ulcers of the oral mucosa and other mucositis; 7.5% have abdominal pain; and 6.6% of patients note intestinal functional disturbances.³ The primary mechanism of ADR with methotrexate therapy is inhibition of folate metabolism in tissues with high cell proliferation, with a high need for purines, thymidine, and methionine. Since gastrointestinal epithelium is characterized by a rapid rate of cell population turnover, folate deficiency is the major mechanism

in the development of this ADR group.⁴ The incidence of gastrointestinal ADR may be influenced by the patient's genetic characteristics, namely the presence of polymorphisms in the genes encoding the methotrexate transporter proteins.

Hepatotoxicity of methotrexate is one of the most significant ADR of the drug.⁵ The hepatotoxic effect of methotrexate is mainly manifested by two ADR groups: elevated liver enzymes and development of structural changes in the liver.⁶ Liver enzyme elevations occur in 10% of all patients taking methotrexate on the average.

Liver fibrosis usually develops with a long-term use of methotrexate: such structural changes in the liver occur in 25% of patients taking methotrexate for more than 5 years.⁷ While testing liver biopsy specimens from patients with rheumatoid arthritis treated with methotrexate, accumulation of polyglutamate forms of methotrexate and folate deficiency was found in cells, which may indicate that the hepatotoxicity of methotrexate is associated with folate depletion due to the action of polyglutamate forms of the drug.⁸ Polyamine synthesis, accumulation of adenosine and deoxyadenosine, impaired metabolism of homocysteine and purines are also thought to play a role in the formation of the hepatotoxic effect of



© Yashika Kaushal et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY-NC 4.0, which permits unrestricted use, distribution and reproduction in any medium, provided the use is not commercial and the original author(s) and source are cited.

Submitted on: 26-Sep-2021; Accepted on: 29-Oct-2021

methotrexate. According to the results of studies in mouse models, the cause of methotrexate-induced liver fibrosis is the stimulation of collagen synthesis by the accumulation of adenosine: adenosine binds adenosine A₂ receptors on the hepatic fat-storing stellate cells, which are potentially fibrogenic and stimulate collagen production.⁹ Methotrexate triggers the lipid peroxidation process, which leads to the synthesis of reactive oxygen species and damage to liver cells. Possible risk factors for these ADR should be considered when predicting the risk of methotrexate-induced hepatotoxicity.

Other risk factors for increased hepatotoxicity of methotrexate include persistent elevated aminotransferases, alcohol use, chronic liver disease, history of hepatotoxic drug use or exposure to hepatotoxic substances, hereditary predisposition to genetically determined liver diseases, alpha-1 antitrypsin deficiency, and hemochromatosis.⁶ To predict the hepatotoxicity of methotrexate, a complete blood count, liver enzyme testing, serologic studies to identify hepatitis B and C biomarkers, and ruling out other risk factors for increased hepatotoxicity, including genetic ones, are required before starting therapy. Since the drug is excreted by kidneys and impairment of their function may increase the risk of hepatotoxicity, creatinine and urea levels should be assessed. Regular monitoring of aminotransferases as an early and reliable marker of liver injury is now considered sufficient in the first stages of therapy. Additional specific tests to assess liver status are recommended in case of risk factors for hepatotoxicity or abnormal liver chemistry.

Some patients develop hematologic abnormalities, such as myelosuppression manifested by macrocytic anemia, leukopenia, lymphopenia, thrombocytopenia, hypogammaglobulinemia, and pancytopenia. The mechanism of methotrexate-induced thrombocytopenia is based on the release of free oxygen radicals that activate terminal protein kinases, which are involved in the initiation of platelet apoptosis.¹⁰

The risk factors for hematological toxicity include the elderly, persons with renal insufficiency, hypoalbuminemia, those non-complying with dosing regimen of the drug or folic acid, and alcohol users. Cases of pancytopenia and thrombocytopenia have been described in patients with risk factors with low-dose methotrexate. Patients without risk

factors are advised to monitor blood parameters once a week during the first month of methotrexate use and every two weeks during the second and third months. After the fourth month of therapy, in the absence of ADR, the frequency of blood tests can be reduced to every 2–3 months. It should be considered that 4 to 6 weeks after increasing the dose of methotrexate, the risk of hematologic ADR increases, and the patient's state should be closely monitored during this period. Since impaired renal function is one of the most serious predisposing factors for ADR, it is advised to measure the glomerular filtration rate in elderly patients and in those with reduced body weight, even if the blood creatinine and urea nitrogen values are normal. If a patient has impaired renal function, each subsequent methotrexate intake and dose increase should be preceded by test results that do not reveal any negative changes.

Patients taking methotrexate have a higher risk of interstitial pneumonia, pneumocystis pneumonia, and pulmonary fibrosis.⁶ The phenomena of pulmonary toxicity have been observed in patients treated with both low and high doses of the drug, suggesting that the mechanism of toxicity is not conditioned by the methotrexate influence on folate metabolism only.¹¹ The alleged and investigated mechanisms of the pulmonary toxicity of methotrexate are hypersensitivity reactions, direct cytotoxic effect of methotrexate on lung tissue, activation of mitogen-activated protein kinases, immunosuppression, and impaired cytokine expression, causing an inflammatory response in lung tissues and destruction of lung tissue.¹² Bronchoalveolar lavage and histological examination of the lung tissue confirm that the pathogenesis of lung injury is based on the hypersensitivity reaction.¹³ Damage to the epithelium and manifestations of fibrosis suggest a direct cytotoxic mechanism of methotrexate effect.¹⁴

The toxic effect of methotrexate on renal function is a common ADR at high doses of the drug, but in rare cases methotrexate can cause kidney damage leading to kidney failure, even at low doses. Various mechanisms of low-dose methotrexate nephrotoxicity are assumed. Methotrexate has been established to cause renal tubular cell edema and necrosis, leading to irreversible damage to kidney tissue.¹⁵ The drug is excreted primarily by the kidneys and being relatively insoluble in the acidic medium of urine, may have a direct toxic effect on

the renal tubular epithelium or precipitate in the renal tubular lumen, causing intratubular obstruction. These processes result in a decreased glomerular filtration rate. Methotrexate causes damage to the cells of the renal glomeruli and renal tubules by increasing the oxidative stress the role of which has been identified in the pathogenesis of chronic kidney disease. The mechanism suggested is an increase in the markers of oxidative stress, 4-hydroxynonenal and malonic aldehyde, with long-term use of low doses of methotrexate [16]. Another alleged mechanism of methotrexate-induced nephrotoxicity is decreased blood flow in the renal tissues and consequently impaired renal excretion of water and salts by the kidneys due to the increasing adenosine concentrations in the plasma and intercellular fluid and subsequent activation of adenosine receptors.¹⁷

Methotrexate affects the body's immune response and increases the risk of opportunistic infections. Cases of pneumocystis pneumonia, atypical actinomycosis, aspergillosis, cryptococcosis, meningitis and herpes virus infections, reactivation of tuberculosis, exacerbations of chronic hepatitis have been described with methotrexate treatment. Weekly low-dose methotrexate has been established to affect T cell activity¹⁸, however, it is suggested that an increased risk of infectious diseases may be caused by imbalance in the immune system due to chronic inflammation resulting from the underlying disease or the presence of concomitant disorders and comorbidities.

Methotrexate is prohibited in pregnant women due to the teratogenicity of the drug. Fetal malformations have been observed with methotrexate at all gestational ages, but the most pronounced teratogenic effect of methotrexate is observed during the first 6–8 weeks of pregnancy.¹⁹ Methotrexate is also prohibited in lactating women because it is found in breast milk and can cause ADR in the baby. Oligospermia, a negative effect of methotrexate on spermatogenesis, has also been described in the literature.²⁰

Methotrexate is a risk factor for the development of squamous cell carcinoma of the skin.²¹ It has been found that long-term therapy with methotrexate is associated with the development of Epstein-Barr virus-associated lymphoproliferative diseases, which spontaneously regress after discontinuation of

methotrexate.²² In addition, a study of the rate of malignancy risk increases has found that patients with rheumatoid arthritis treated with methotrexate were 50% more likely to have cancer compared to the general population, with five-fold increased risk of non-Hodgkin lymphomas and three-fold increased risk of melanoma and lung cancer.

ADR of mucositis, ulceration of psoriatic lesions, hyperpigmentation, alopecia, toxic epidermal necrolysis, nodulosis, and anaphylaxis have been described in patients taking methotrexate.²³ One of the skin ADR of the drug is methotrexate-induced nodulosis. It is assumed that the mechanism of formation of these giant cells is based on the methotrexate effect on the increase in adenosine synthesis and its interaction with adenosine A₁ receptors.²⁴ Methotrexate-induced alopecia is thought to be caused by folate deficiency; it rarely occurs with low-dose methotrexate and resolves on its own several months after therapy discontinuation.

At the start of methotrexate therapy, some patients experience headaches, dizziness, weakness and emotional liability. One of the alleged mechanisms of methotrexate-induced neurotoxicity is the effect of increased release of adenosine and its accumulation in the central nervous system. The role of adenosine as a neurotransmitter and neuromodulator in the CNS has been experimentally confirmed: its increased accumulation is associated with the occurrence of headaches, nausea and somnolence. Adenosine has an inhibitory effect in the CNS: when binding to adenosine A₁ receptors in the perifornical area of hypothalamus, adenosine can regulate the awakening and falling asleep processes, which may explain the weakness and somnolence that some patients experience after taking methotrexate.²⁵ In children treated with high doses of methotrexate, its neurotoxic effect was manifested in the pronounced somnolence and comatose state, which were reversible with theophylline therapy, a nonselective adenosine receptor antagonist. The neurotoxic effect of methotrexate may also be due to excitotoxic death of neurons, which can be caused by homocysteine metabolites: homocysteine acid and cysteine sulfonic acids.²⁶ Another possible mechanism may be impaired metabolism of bipterin, leading to a decrease in the synthesis of monoamine neurotransmitters.²⁷

Rarely, low doses of methotrexate cause osteopathies like bone pain, long bone fractures, and osteoporosis.

Methotrexate-induced osteopathy syndrome was first described as a stress fracture of the lower extremity bones, diffuse bone pain, and osteoporosis in children with acute lymphoblastic leukemia receiving long-term therapy with low-dose methotrexate. Several cases of methotrexate-induced osteopathy in patients with rheumatoid arthritis and psoriasis have been described. An animal study has found that long-term use of low-dose methotrexate causes pronounced osteopenia by reducing osteoblast activity and increasing osteoclast activity.²⁸

It should be considered that in some cases, even a single dose of methotrexate may lead to serious and complex ADR. The risk of fatal ADR with methotrexate therapy is small. The toxic effects of methotrexate on the hematopoietic system, respiratory system and liver are most life threatening. Therefore, careful identification of risk factors for increased toxicity of methotrexate and comprehensive monitoring of the patient's condition with regard to these ADR groups is necessary. Hepatologic and hematologic ADR of methotrexate may manifest as weakness, nausea, stomatitis, and syncope in patients. Similar symptoms that develop during methotrexate therapy should be alerted. Careful monitoring of the patient's condition will reduce the risk of ADR. Caution should be exercised in patients with hepatitis, hepatic cirrhosis, and other conditions associated with impaired hepatic function due to its potential hepatotoxicity. Liver parameters should be closely monitored in these patients.

Despite the lack of unambiguous data regarding the complete or partial prohibition on alcohol consumption in the period of methotrexate therapy, history of alcoholism and alcohol-induced liver diseases are relative contraindications to the drug administration. The use of methotrexate may be restricted by administration of other drugs that have toxic effects on the liver. Since the drug is primarily excreted by the kidneys, methotrexate should be used with caution in patients with renal impairment. With impaired renal excretion of methotrexate, plasma concentrations of the drug increase and therefore the risk of its toxicity increases. Close attention should be paid to the state of patients with

immunosuppression and chronic infections prone to exacerbation as a result of immunosuppressive effect of methotrexate. In exacerbation of the infectious process, the drug should be temporarily discontinued. Before prescribing methotrexate, it is necessary to assess whether the patient is able to fulfil all prescriptions responsibly, since the therapy success and patient's safety depend largely on careful selection of the dose regimen and duration of therapy, as well as on regular examination for potential ADR.

Often, a potential benefit of therapy may outweigh the possible risks for a patient with a disease or condition that limits the use of methotrexate. Treatment decisions should be made by the physician individually for each patient based on the risk-benefit assessment.

REFERENCES

1. Edmudson W. Treatment of Psoriasis with Folic Acid Antagonists. *Arch Dermatol.* 1958;78(2):200.
2. Shen S, O'Brien T, Yap LM, et al. The use of methotrexate in dermatology: a review. *Australas J Dermatol.* 2012;53(1):1-18.
3. West J, Ogston S, Foerster J. Safety and Efficacy of Methotrexate in Psoriasis: A Meta-Analysis of Published Trials. *PLoS One.* 2016;11(5):e0153740. <https://doi.org/10.1371/journal.pone.0153740>
4. Van Ede A, Laan R, Blom H, et al. Methotrexate in rheumatoid arthritis: An update with focus on mechanisms involved in toxicity. *Semin Arthritis Rheum.* 1998;27(5):277-92.
5. Bedoui Y, Guillot X, Sélambarom J, et al. Methotrexate an Old Drug with New Tricks. *Int J Mol Sci.* 2019;20(20):5023. <https://doi.org/10.3390/ijms20205023>
6. Conway R, Carey J. Risk of liver disease in methotrexate treated patients. *World J Hepatol.* 2017;9(26):1092. <https://doi.org/10.4254/wjh.v9.i26.1092>
7. Themido R, Loureiro M, Pecegueiro M, et al. Methotrexate hepatotoxicity in psoriatic patients submitted to long-term therapy. *Acta Derm Venereol (Stockh).* 1992;72:361-4.
8. Kremer J, Galivan J, Streckfuss A, Kamen B. Methotrexate metabolism analysis in blood and liver of rheumatoid arthritis patients: Association with hepatic folate deficiency and formation of polyglutamates. *Arthritis Rheum.* 1986;29(7):832-5.
9. Chan E, Montesinos M, Fernandez P, et al. Adenosine A2A receptors play a role in the

- pathogenesis of hepatic cirrhosis. *Br J Pharmacol*. 2006;148(8):1144–55.
<https://doi.org/10.1038/sj.bjp.0706812>
10. Paul M, Hemshekhar M, Thushara R, et al. Methotrexate Promotes Platelet Apoptosis via JNK-Mediated Mitochondrial Damage: Alleviation by N-Acetylcysteine and N-Acetylcysteine Amide. *PLoS One*. 2015;10(6):e0127558.
<https://doi.org/10.1371/journal.pone.0127558>
 11. Olsen E. The pharmacology of methotrexate. *J Am Acad Dermatol*. 1991;25(2):306–18.
 12. Kim Y, Song M, Ryu J. Inflammation in methotrexate-induced pulmonary toxicity occurs via the p38 MAPK pathway. *Toxicology*. 2009;256(3):183–90.
<https://doi.org/10.1016/j.tox.2008.11.016>
 13. Lateef O, Shakoob N, Balk R. Methotrexate pulmonary toxicity. *Expert Opin Drug Saf*. 2005;4(4):723–30.
<https://doi.org/10.1517/14740338.4.4.723>
 14. Ohbayashi M, Suzuki M, Yashiro Y, et al. Induction of pulmonary fibrosis by methotrexate treatment in mice lung in vivo and in vitro. *J Toxicol Sci*. 2010;35(5):653–61.
<https://doi.org/10.2131/jts.35.653>
 15. Grönroos M, Chen M, Jahnukainen T, Capitanio A, Aizman R, Celsi G. Methotrexate induces cell swelling and necrosis in renal tubular cells. *Pediatr Blood Cancer*. 2006;46(5):624–9.
<https://doi.org/10.1002/pbc.20471>
 16. Li X, Abe E, Yamakawa Y. Effect of Administration Duration of Low Dose Methotrexate on Development of Acute Kidney Injury in Rats. *J Kidney*. 2016;2(3):130. <https://doi.org/10.4172/2472-1220.1000130>
 17. Cronstein B. The mechanism of action of methotrexate. *Rheum Dis Clin North Am*. 1997;23(4):739–55.
 18. Genestier L, Paillot R, Fournel S, Ferraro C, et al. Immunosuppressive properties of methotrexate: apoptosis and clonal deletion of activated peripheral T cells. *J Clin Invest*. 1998;102(2):322–8.
 19. Lloyd M. The effects of methotrexate on pregnancy, fertility and lactation. *QJM*. 1999;92(10):551–63.
 20. Buckley L, Bullaboy C, Leichtman L, Marquez M. Multiple congenital anomalies associated with weekly low-dose methotrexate treatment of the mother. *Arthritis Rheum*. 1997;40(5):971–3.
 21. Stern R, Laird N. The carcinogenic risk of treatments for severe psoriasis. *Cancer*. 1994;73(11):2759–64.
 22. Kamel O, van de Rijn M, LeBrun D, et al. Lymphoid neoplasms in patients with rheumatoid arthritis and dermatomyositis: Frequency of Epstein-Barr virus and other features associated with immunosuppression. *Hum Pathol*. 1994;25(7):638–43.
 23. Kalantzis A, Marshman Z, Falconer D, et al. Oral effects of low-dose methotrexate treatment. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2005;100(1):52–62.
<https://doi.org/10.1016/j.tripleo.2004.08.020>
 24. Merrill J, Shen C, Schreiber D, et al. Adenosine A₁ receptor promotion of multinucleated giant cell formation by human monocytes. A mechanism for methotrexate-induced nodulosis in rheumatoid arthritis. *Arthritis Rheum*. 1997;40(7):1308–15.
 25. Thakkar M, Engemann S, Walsh K, Sahota P. Adenosine and the homeostatic control of sleep: Effects of A₁ receptor blockade in the perifornical lateral hypothalamus on sleep-wakefulness. *Neuroscience*. 2008;153(4):875–80.
 26. Quinn C, Griener J, Bottiglieri T, Hyland K, Farrow A, Kamen B. Elevation of homocysteine and excitatory amino acid neurotransmitters in the CSF of children who receive methotrexate for the treatment of cancer. *J Clin Oncol*. 1997;15(8):2800–6.
 27. Millot F, Dhondt J, Mazingue F, Mechinaud F, Ingrand P, Guilhot F. Changes of Cerebral Bioprotein and Biogenic Amine Metabolism in Leukemic Children Receiving 5 g/m² Intravenous Methotrexate. *Pediatr Res*. 1995;37(2):151–4.
 28. May K, West S, Mcdermott M, Huffer W. The Effect of Low-Dose Methotrexate on Bone Metabolism and Histomorphometry in Rats. *Arthritis Rheum*. 1994;37(2):201–6.

Source of support: Nil, **Conflict of interest:** None declared

Cite this article as:

Kaushal Y, Kaushal R, Sharma I. The Wonderful DMARD with Multiple Toxicities. Int Healthc Res J. 2021;5(7):RV5-RV10. <https://doi.org/10.26440/IHRJ/0507.10470>

AUTHOR AFFILIATIONS: (*Corresponding Author)

1. MBBS, Presently Clinical Observer, International Medical Graduate, Unit Number 322, Building Number 8068, 120 A Street, Surrey, British Columbia, Canada, Postal Code-V3W3P3
2. International Medical Graduate, British Columbia, Canada
3. Private Practitioner, Patiala

Contact Corresponding Author At: yashika394kaushal[at]gmail[dot]com



The Importance of Telemedicine in a Post COVID World

BHUPESH SHARMA¹, SANJANA MANOCHA^{*1}, NYAGAM YANGZOM²

A
B
S
T
R
A
C
T

Telemedicine has found immense popularity, especially in a COVID-19 affected world. Its application shall improve the quality of health care provided to patients and help in time management as it help facilitates optimized referral systems which are based on the immediate/follow up needs of the patient, decision-making, reduction in patient's waiting time as well as consultation time. This review is an effort to shed light on the main practical applications of teledentistry for emphasizing potentialities, problems, and applications of this relatively new branch in medicine. The paper also highlighted highlight the various aspects of telemedicine in relation to the healthcare sector, its advantages/disadvantages in a post COVID-19 world.

KEYWORDS: Telemedicine, Artificial Intelligence, Technology

INTRODUCTION

The healthcare sector in an ever-evolving branch. A particular advancement in this sector is the "telemedicine", which has help facilitate immediate/short-term and long-term care of the patient. An advantage of this is that health information is communicate between practitioners and the patient through e-mail and interactive chats or videoconferences, which increasing convenience for the patient and reduces the need to physically visit the doctor's clinic. This is especially helpful in remote areas where provision of immediate and urgent care would not be possible.¹

The use of telemedicine is believed to improve the quality of health care provided to patients and help in time management as it help facilitates optimized referral systems which are based on the immediate/follow up needs of the patient, decision-making, reduction in patient's waiting time as well as consultation time. Another added advantage is that telemedicine can be used for peer education and consultations, case discussions among their peers and colleagues.²

The entire process of networking, sharing digital information, distant consultations, workup, and analysis is dealt with by a segment of the science of telemedicine and this review paper aims to highlight

the various aspects of telemedicine in relation to the healthcare sector, its advantages/disadvantages in a post COVID-19 world.^{3,4}

HISTORY

The first published instance documenting the use of telemedicine occurred in the early 20th century when electrocardiograph data were transmitted through telephone wires.⁵ In its modern from, telemedicine started in the 1960s, primarily driven by the innovations in military and space sectors, coupled with the expertise of a few individuals who were using readily available commercial equipment.⁶ Examples of early technological milestones in telemedicine include the use of television to facilitate consultations between specialists at a psychiatric institute and general practitioners at a state mental hospital⁷, and the provision of expert medical advice from a major teaching hospital to an airport medical centre.⁸

The introduction and popularization of internet has further accelerated the pace of telemedicine, which, in turn expanded its scope and now includes various web-based applications (e.g. e-mail, teleconsultations and conferences applications) and multimedia approaches (e.g. digital imagery and video). In addition, in a post COVID world, the use of various teleconsultations is on the rise.



© Bhupesh Sharma et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY-NC 4.0, which permits unrestricted use, distribution and reproduction in any medium, provided the use is not commercial and the original author(s) and source are cited.
Submitted on: 26-Aug-2021; **Accepted on:** 26-Sep-2021

INTRUMENTS REQUIRED

In most cases, the primary requirement is of having a stable, high speed internet capable of uploading patient record files quickly. The second major requirement is of having an internet enabled device with camera which needs to be used for communication, modern smartphones and laptops are quite capable of doing so. It is desired that the conversation be encrypted and kept confidential. Also, the uploaded files of the patient need to be maintained on a secure and private server.

There is also a need for a person to be well-versed with operation of such devices. Among the illiterate and old aged people, at times, there might a need for an internet and app savvy person to connect the person with the server.

DEFINITION OF TELEMEDICINE

As per the WHO, telemedicine is defined as the following though this broad description:

*“The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities”.*⁹

TELEMEDICINE IN EMERGENCY CASES AND TRIAGE

In a post COVID-world, hospitals need to be ever-prepared to handle any emergency/ efficiently perform patient triage. This can be achieved only by improving the efficiency of emergency departments, without compromising on patient care; and telemedicine comes as a boon in such instances. It allows for remote and ambulatory monitoring of patients as well as help undergo remote triage and assessment of emergencies including, but not limited to MI, fractures bones, trauma, etc.¹⁰

The inclusion of automated forward triage systems that use algorithms to categorize patients into risk groups could also be utilized and same time of emergency respondents and physicians.

TELEMEDICINE AND ITS APPLICATION IN LONG-TERM CARE FACILITIES

As discussed above, the use of smartphones, tablets and other internet devices among seniors remains quite low. A recent study in the year 2019 revealed that only 21% of the residents in retirement homes used the internet and among those, 13% used a smartphone, and 5% used a tablet.¹¹ It has been reported that internet-based device adoption is associated with the living environment, individual characteristics, functional health, chronological age, education, and technology interest of a person and is directly related to technology adoption among the oldest age groups.¹²

ARTIFICIAL INTELLIGENCE ASSISTED TELEMEDICINE

The use of innovative data-driven Artificial Intelligence (AI) algorithms shall apply machine learning to large datasets of disease populations and provide accurate results. An important fact is that these models can learn directly from data without any prior statistical modelling, thus producing more objective results while focusing on prediction generalizability for diagnostic purposes on diverse populations. Ever since the COVID-19 pandemic outbreak, AI has been used for international efforts for COVID-19 forecasting, prevention and treatment by using data-driven tools and pooled datasets from across the globe.^{13,14}

An added advantage of the Machine Learning (ML) model is that it incorporates an important analysis that helps develop cost-effective protocols. Such data-driven computational approaches can test for synergistic variable combinations and elimination of redundancy enables more effective diagnosis of patients under the purview of telemedicine.¹⁵

LEGAL AND PRIVACY ISSUES/RESOLUTIONS

There are a few legal and privacy issues pertaining to telemedicine and they are as follows:¹⁶

a). Liability: Despite its numerous advantages, there is the possibility that a patient may perceive this method as inferior because the consulting professional does not perform a hands-on examination and hence would not be able to reach an accurate diagnosis. A major issue including liability is when information

provided over the telephone is misinterpreted by either the patient or the attending physician.¹⁷

b). Reimbursement and Licensure: Unfortunately, there have been incidents in which practitioners who were eligible for reimbursement were unhappy with either the payments made, or due to delayed payments made to them. In addition, healthcare professionals are only licensed to practice within certain jurisdictions, and telemedicine requires multiprovince licensure, which might lead to legal issues both for the service provider and the physician. For physicians, applying for applications for practising license in different provinces/states can be lengthy and expensive process.

c). Privacy and Confidentiality: Telemedicine should ensure that privacy, security, and confidentiality of data of patients must be maintained at all times and only authorized users—those who directly involved in the ongoing care and treatment of a patient—and only those having a legal right can approach the systems to servers.¹⁸ It is important that nurses and other healthcare professionals need to be mindful of these issues, especially when technicians not bound by professional codes of ethics are present at telemedicine sessions.¹

d). Quality: Internet speed; and access to information at any time, from any place, are essential to maintaining a high quality of service; slowdowns or outages in service are not acceptable; especially during emergency situations or where immediate triage is necessary. The scientific literature has reported inadequate funds among various establishments for maintenance of the technological infrastructure.¹⁹

CONCLUSION

In a post COVID world, there is no doubt that telemedicine will grow manifold and people will enjoy the benefits offered it. However, one needs to be cautious of its drawbacks provide evidence based guidelines on a timely basis for the efficient use of this technology.

REFERENCES

1. Alvandi M. Telemedicine and its Role in Revolutionizing Healthcare Delivery. *The American Journal of Accountable Care*. 2017;5(1):e1-e5.
2. Al-Khalifa KS, AlSheikh R. Teledentistry awareness among dental professionals in Saudi Arabia. *PLoS ONE*

- 2020;15(10): e0240825. <https://doi.org/10.1371/journal.pone.0240825>
3. Mihailovic B, Miladinovic M, Vujicic B. Telemedicine in Dentistry (Teledentistry). In: Grasczew G and Roelofs TA(editors). *Advances in Telemedicine: Applications in Various Medical Disciplines and Geographical Areas* 2011. Rijeka (Croatia): InTech, 2011. p. 215-30.
4. Jampani ND, Nutalapati R, Dontula B, Boyapati R. Applications of teledentistry: A literature review and update. *J Int Soc Prevent Communit Dent* 2011;1:37-44.
5. Craig J, Patterson V. Introduction to the practice of telemedicine. *Journal of Telemedicine and Telecare*, 2005, 11(1):3-9.
6. Currell R et al. Telemedicine versus face to face patient care: effects on professional practice and health care outcomes. *Cochrane Database of Systematic Reviews*, 2000, Issue 2. Art. No.: CD002098.
7. Benschoter RA, Eaton MT, Smith P. Use of videotape to provide individual instruction in techniques of psychotherapy. *Academic Medicine*, 1965, 40(12):1159-61.
8. Dwyer TF. Telepsychiatry: psychiatric consultation by interactive television. *American Journal of Psychiatry*, 1973, 130:865-9.
9. WHO. A health telematics policy in support of WHO's Health-For-All strategy for global health development: report of the WHO group consultation on health telematics, 11-16 December, Geneva, 1997. Geneva, World Health Organization, 1998.
10. Badawy SM, Radovic A. Digital approaches to remote pediatric health care delivery during the COVID-19 pandemic: existing evidence and a call for further research. *JMIR Pediatr Parent*. (2020) 3:e20049. <https://doi.org/10.2196/20049>
11. Seifert A, Cotten SR. In care and digitally savvy? Modern ICT use in long-term care institutions. *Educ Gerontol*. (2020). 46:473-85. <https://doi.org/10.1080/03601277.2020.1776911>
12. Schlomann A, Seifert A, Zank S, Rietz C. Assistive technology and mobile ICT usage among oldest-old cohorts: comparison of the oldest-old in private homes and in long-term care facilities. *Res Aging*. (2020) 42:163-73. <https://doi.org/10.1177/0164027520911286>
13. Huys QJM, Maia TV, Frank MJ. Computational psychiatry as a bridge from neuroscience to clinical applications. *Nat Neurosci*. (2016) 19:404-13. <https://doi.org/10.1038/nn.4238>
14. Kuziemy C, Maeder AJ, John O, Gogia SB, Basu A, Meher S, et al. Role of artificial intelligence within the telehealth domain. *Yearb Med Inform*. (2019) 28:35-40. <https://doi.org/10.1055/s-0039-1677897>

15. Pacis DMM, Subido EDC, Bugtai NT. Trends in telemedicine utilizing artificial intelligence. AIP Conf Proc. (2018) 1933:040009. <https://doi.org/10.1063/1.5023979>
16. Dickens BM, Cook RJ. Legal and ethical issues in telemedicine and robotics. Int J Gynaecol Obstet. 2006;94(1):73-8.
17. Hebda TL, Czar P. Handbook of Informatics for Nurses & Healthcare Professionals. 4th ed. Upper Saddle River, NJ: Pearson Prentice Hall; 2009.
18. McGonigle D, Mastrian KG. Nursing Informatics and the Foundation of Knowledge. 2nd ed. Burlington, MA: Jones and Bartlett Learning; 2011
19. Bond GE. Lessons learned from the implementation of a Webbased nursing intervention. Comput Inform Nurs. 2006;24(2):66-74.

Source of support: Nil, **Conflict of interest:** None declared

Cite this article as:

Sharma B, Manocha S, Yangzom N. The Importance of Telemedicine in a Post COVID World. Int Healthc Res J. 2021;5(7):RV11-RV14. <https://doi.org/10.26440/IHRJ/0507.10467>

AUTHOR AFFILIATIONS: (*Corresponding Author)

1. Bachelor of Physiotherapy, Registered and Consultant Physiotherapists, Nagpur, Maharashtra, India
2. M.Sc (Nursing), Consultant Registered Nurse, Guwahati, Assam, India

Contact Corresponding Author At: editor[dot]ihrj[at]gmail[dot]com



Assessment of Sleep Habits and Quality of Sleep among Elderly Residing in Rural Areas of Patiala: A Community-Based Cross-Sectional Survey

YASHIKA KAUSHAL^{*1}, RATIBHA KAUSHAL², ISHA SHARMA³, SHEENAB MITTAL⁴

A
B
S
T
R
A
C
T

INTRODUCTION: Among the elderly, sleep problems are quite prevalent and can lead to many adverse health consequences.
AIM: To assess the quality of sleep among the elderly residing in rural population and factors related to it, and provide necessary recommendations for its prevention.
MATERIALS AND METHOD: In this cross-sectional study, elderly aged above 60 years residing in Patiala were taken and were interviewed separately using the modified version of the Pittsburgh Sleep Quality Index (PSQI), which was pre-tested and pre-validated prior to commencement of the study. Data recorded was divided into seven components and each component had an individual range of 0 (no difficulty) to 3 (severe difficulty) points and added to obtain a combined score of the individual with a range of 0 (no difficulty)-21 (severe difficulty) points. Based on the combined score, elderly obtaining a total score of 5 or greater was classified as having “poor sleep quality”. Statistics were applied using SPSS version 22.0, using the student’s t- test, and multivariate analysis. A p value < 0.05 was considered as significant.
RESULTS: Out of 108 elderly people, most of the participants (62.9%) belonged to the age group of 60-75 years, out of which the majority (65.7%) were males. Most elderly reported having “fairly good” subjective sleep quality (53.7%, p=0.01) and was found to be significant with a global PQSI score of 7.22±4.31. Multivariate analysis revealed that significant “poor sleep quality” was observed in elderly aged above 75 years (OR:1.25, p=0.01) followed by elderly who were Immobilized (wheelchair/Bed ridden) (OR: 1.87, p=0.01).
CONCLUSION: Efforts should be directed towards proper education of not only the elderly, but their children as well as colleagues and guardians to improve the sleep score of the elderly population.

KEYWORDS: Sleep, Elderly, Insomnia

INTRODUCTION

In a human being’s life, sleep is an unavoidable daily-required activity and is a highly significant factor contributing to one’s overall health.¹ Sleep has a positive effect on quality of life, body functions and homeostasis.¹ Its deficiency can lead to the weakening of immunological functions, poor general well-being and psychiatric illnesses, especially among the elderly population.²

Statistics from a global study featuring the sleep profiles of 48 countries revealed that not even a single country manages an average of 8 hours of sleep/night among its residents with the worst sleepers being reported from Japan, Saudi Arabia, Sweden, India and Philippines.³

Sleep deprivation is defined as getting inadequate sleep, i.e. less than 7-9 hours per day.⁴ Apart from sleep deprivation, Poor sleep quality includes sleep latency, restless sleep and insomnia.⁵ Experiments in sleep deprivation among volunteers have shown that a sleep-deprived person is incapable of sustaining normal levels of efficiency, both physically and mentally.⁶

Among elderly, a good quality of sleep is essential for their health, as its deprivation is linked to various diseases. As the inability to sleep can result in a negative impact leading to attention problems, delayed response time, inability to concentrate, forgetfulness, increased risk of falls, decreased performance in daily life activities and increased risk to develop depression and anxiety.⁷

Since the elderly are at a greater risk of the consequences of poor sleep, the present study was an attempt to assess the quality of sleep among the elderly residing in rural population in Patiala, Punjab, India and factors related to it, and provide necessary recommendations for its prevention.

MATERIALS AND METHOD

The present study was designed to be cross-sectional in nature, and was conducted among the elderly (60 years and above) residing in Patiala, Punjab, India. Post ethical clearance and obtaining all necessary approvals, the study was conducted for a period of five months i.e. from 1st March, 2018 to 31st July, 2018. Since, elderly were



© Yashika Kausal et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY-NC 4.0, which permits unrestricted use, distribution and reproduction in any medium, provided the use is not commercial and the original author(s) and source are cited.

Submitted on: 30-Sep-2021; Accepted on: 28-Oct-2021

contacted by the researchers, the study adopted a convenience sampling. The elderly were recruited using a combination of house to house surveys, by visiting old age homes and referral by already recruited elders (Snowball sampling). All the elderly residing in one household were taken and were interviewed separately to preserve the confidentiality of data. Data was collected by primarily using the Pittsburgh Sleep Quality Index (PSQI) and adopting it as per the needs of the present study. The questionnaire was then pre-tested and pre-validated.⁸ The elderly were educated regarding the aims and objectives of the study and a written consent was taken from them prior to the conduct of the study.

Inclusion criteria: Elderly above 60 years; the data recorded was divided into seven components: subjective sleep quality (C₁), sleep latency (C₂), sleep duration (C₃), habitual sleep efficiency (C₄), sleep disturbances (C₅), use of sleeping medications (C₆) and daytime dysfunction (C₇) over the last month. Each component has an individual range of 0 (no difficulty) to 3 (severe difficulty) points. Responses of all seven components were added to obtain a combined score of the individual [range of 0(no difficulty)-21(severe difficulty) points]. Based on the combined score, elderly obtaining a total score of 5 or greater was classified as having a “poor sleep quality”.⁸

Exclusion criteria: Elderly not present during the day of the study (due to any reason) and those who did not provide consent.

Data was collected and entered into Microsoft excel and descriptive statistics were applied. Inferential statistics were applied using SPSS version 22.0,⁹ by using the student’s t- test, and multivariate analysis. A p value < 0.05 was considered as significant.

RESULTS

Table 1 depicts that out of 108 elderly people, most of the participants (62.9%) belonged to the age group of 60-75 years, out of which the majority (65.7%) were males. 81.4% of the elderly people were still married while 1.9% were never married. Unfortunately, 45.4% of the elderly reported irregular physical activity, and 8.3% were immobilized. 47.2% of the elderly were found to be smokers.

The classification of the elderly as per the components of the PSQI is depicted in table 2. Most elderly reported having “fairly good” subjective sleep quality (53.7%,

p=0.01) and was found to be significant. Another significant observation was that the habitual sleep

SOCIODEMOGRAPHIC VARIABLES	FREQUENCY (%)
AGE (in years)	
60-75	68 (62.9)
>76	40 (37.1)
GENDER	
Male	71 (65.7)
Female	37 (34.3)
MARITAL STATUS	
Still Married	88 (81.4)
Widowed/widower	18 (16.7)
Never Married	02 (1.9)
PHYSICAL ACTIVITY STATUS	
Regular	50 (46.3)
Irregular	49 (45.4)
Immobilized (wheelchair/Bed ridden)	9 (8.3)
SMOKING STATUS	
Smokers	51 (47.2)
Non-Smokers	57 (52.8)

Table 1. Sociodemographic and behavioural characteristics of study participants

efficiency of >85% was observed in 80.5% of the elderly (p=0.04). It was also observed that 88.8% did not take any sleep medication since the last month. Significant PQSI scores of >5 indicating poor sleep quality was observed in 63.9% of the elderly (p=0.02).

A multivariate analysis of sleep quality (PSQI) and associated factors among the elderly (Table 3), it was observed that significant “poor sleep quality” was observed in elderly aged above 75 years (OR:1.25, p=0.01) followed by elderly who were immobilized (wheelchair/bed ridden) (OR: 1.87, p=0.01).

DISCUSSION

The present study, although descriptive in design, has provided significant insights into the sleeping habits of the 63.9% elderly of Patiala, Punjab, India. These scores are similar to the findings of Chaudhary et al. (2020)³, but lower as compared to 72.4% reported by George et al.⁷ among elderly in rural Kerela India. These figures are quite alarming and demand immediate attention (Panda et al.)¹⁰, among healthy South Indian population aged 35.1±8.7 years who reported good-quality sleep with a global PSQI score of ≤5 among 93.8% of the population. Such discrepancies in the PQSI scores among adults and

COMPONENTS OF PSQI	FREQUENCY (N,%)	p-VALUE	
Subjective Sleep Quality			
Very Good	27 (25)	0.01*	
Fairly Good	58 (53.7)		
Fairly Bad	16 (14.8)		
Very Bad	7 (6.5)		
Sleep Latency (in minutes)			
<15 minutes	18 (16.7)	0.78	
16-30 minutes	39 (36.1)		
31-60 minutes	22 (20.4)		
>60 minutes	29 (26.8)		
Sleep Duration (in hours)			
>7 hours	28 (25.9)	0.065	
6-7 hours	49 (45.4)		
5-6 hours	12 (11.1)		
<5 hours	19 (17.6)		
Habitual Sleep Efficiency			
>85%	87 (80.5)	0.04*	
75-84%	14 (12.9)		
65-74%	6 (5.5)		
<65%	1 (1.1)		
Use of Sleep Medication			
Not during the past month	96 (88.8)	0.89	
Less than once a week	3 (2.8)		
Once or twice a week	6 (5.6)		
Three or more time a week	3 (2.8)		
Day Time Dysfunction			
Not difficult	69 (71.8)	0.06	
Little difficult	15 (15.6)		
Difficult	7 (7.2)		
Very difficult	5 (5.2)		
Sleep Disturbances			
Not in last month	2 (2)	0.77	
Once in a week	81 (75.0)		
1-2 times a week	13 (12.1)		
More than thrice a week	14 (12.9)		
Total PSQI score of Study Participants			
		GLOBAL PQSI SCORE (MEAN \pm SD)	0.02*
Less than 5	69 (63.9)	7.22 \pm 4.31	

Table 2. Distribution of respondents according to components of Pittsburgh Sleep Quality Index (PSQI)

elderly focus on the need for promoting good sleep habits among the elderly through proper screening for

ASSOCIATED FACTORS	OR (95% CI)	P-VALUE
Age (in years)		
60-75	1.32 (0.74-12.25)	0.90
>76	1.35 (0.55-15.58)	0.01*
Widow	0.22 (0.14-1.95)	0.55
Immobilized (wheelchair/Bed ridden)	1.87 (0.56-20.68)	0.01*
Smokers	1.88 (1.47-21.75)	0.06

Table 3. Multivariate analysis of sleep quality (PSQI) and associated factors

potential factors disturbing their sleep patterns. The global PQSI score of the elderly in the present study was found to be 7.22 \pm 4.31, which is lower as compared to George et al. (8.04 \pm 4.59)⁷ and lower in comparison to Das et al.¹¹ (Higher IQR of GPQSI scores in population aged >70 years). As reported by Farazdaq et al.,¹² a few factors associated with an increased risk of poor sleep quality among elderly included aging, divorce, being widowed, caffeine consumption, cigarette smoking 2 hours before bedtime coupled with co-morbidities such as GERD and depression to name a few.

As per results of Wu et al.¹³ higher level of physical activity was associated with better sleep quality among elderly population in Taipei while independently considering physical influence on sleep. As per results of the present study, 45.4% of the elderly had irregular physical activity while 8.3% were immobilized and hence, could not do any physical activity. This could be the reason for such poor sleep scores in the elderly studied in the present study. In addition, Razali et al.¹⁴ reported that sleep quality was associated with age the same can be seen with the results of the present study.

The limitations of the study include social desirability bias by the respondents or recall bias(in some instances). In addition, data as coded and the interviewers were duly standardized to eliminate interviewer's bias. Due to such measures, the authors conclude that the results of the present study can be generalized for the Indian population and can be used for comparison between global elderly population.

CONCLUSION

Based on the results of the present study, the sleep scores of the elderly were high and efforts should be directed towards proper education of not only the elderly, but their children as well as colleagues and guardians through proper community education programmes so

that efforts could be directed towards improving the sleep score of the elderly population.

DISCUSSION

1. Sexton-Radek K, Pichler-Mowry R. Daily activities and sleep quality in young adults. *Percept Mot Skills*. 2011;112:426-8.
<https://doi.org/10.2466/06.13.PMS.112.2.426-428>.
2. Chaudary J, Jain B, Bhadoria AS, Kishore S, Aggarwal P. Assessment of Sleep Habits and Quality of Sleep among Elderly Residing In Rural Area of Dehradun: A Community-Based Cross-Sectional Survey. *Natl J Community Med*. 2020;11(2):98-102
3. Dreams UK. This Data Shows A Shocking Worldwide Lack of Sleep. Available from <https://www.dreams.co.uk/sleep-mattersclub/data-shows-a-shocking-worldwide-lack-of-sleep/> [Last Accessed on April 10th, 2021]
4. Kumari R, Jain K, Nath B. Sleep quality assessment among college students using Pittsburgh Sleep Quality Index in a municipal corporation area of Uttarakhand, India. *Ceylon Medical Journal* 2020; 65: 86-94. <http://doi.org/10.4038/cmj.v65i4.9279>
5. Rodéhn M. The importance of sleep. *Nursing Standard (Royal College of Nursing (Great Britain))*. 1999; 13(24): 44-7.
6. Oswald I. Sleep. London: Penguin Books; 1980.
7. George S, Paul G, Paul N. Study on sleep quality and associated psychosocial factors among elderly in a rural population of Kerala, India. *Int J Community Med Public Health*. 2018;5:526-31.

8. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res*. 1989 May;28(2):193-213. [https://doi.org/10.1016/0165-1781\(89\)90047-4](https://doi.org/10.1016/0165-1781(89)90047-4).
9. IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.
10. Panda S, Taly AB, Sinha S, Gururaj G, Girish N, Nagaraja D. Sleep-related disorders among a healthy population in South India. *Neurol India* 2012;60:68-74. <https://doi.org/10.4103/0028-3886.93601>
11. Das S, Roy RN, Das DK, Chakraborty A, Mondal R. Sleep Quality and its various correlates: A community-based study among geriatric population in a community development block of Purba Bardhaman district, West Bengal. *J Family Med Prim Care*. 2020;9:1510-6. https://doi.org/10.4103/jfmpc.jfmpc_1021_19
12. Farazdaq H, Andrades M, Nanji K. Insomnia and its correlates among elderly patients presenting to family medicine clinics at an academic centre. *Malays Fam Physician*. 2018;13:12-9.
13. Wu CY, Su TP, Fang CL, Chang MY. Sleep quality among community-dwelling elderly people and its demographic, mental, and physical correlates. *J Chinese Med Assoc*. 2012;75:75-80. <https://doi.org/10.1016/j.jcma.2011>
14. Razali R, Ariffin J, Aziz A. Sleep quality and psychosocial correlates among elderly attendees of an urban primary care centre in Malaysia. *Neurology Asia* 2016;21:265-73.

Cite this article as:

Kaushal Y, Kaushal R, Sharma I Mittal S. Assessment of Sleep Habits and Quality of Sleep among Elderly Residing in Rural Areas of Patiala: A Community-Based Cross-Sectional Survey. *Int Healthc Res J*. 2021;5(7):OR1-OR4. <https://doi.org/10.26440/IHRJ/0507.10466>

AUTHOR AFFILIATIONS: (*Corresponding Author)

1. MBBS, Presently Clinical Observer, International Medical Graduate, Unit Number 322, Building Number 8068, 120 A Street, Surrey, British Columbia, Canada, Postal Code-V3W3P3
2. MBBS, International Medical Graduate, British Columbia, Canada
3. Private Practitioner, Patiala, Punjab, India
4. Third Year Junior Resident, Department of Pathology, Govt. Medical College and Rajendra Hospital, Patiala, Punjab, India

Source of support: Nil, Conflict of interest: None declared

Contact Corresponding Author At: yashika394kaushal[at]gmail[dot]com