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# Medical Technology Education — Current Trends and Future Perspectives

## Abdul Hafeez Kandhro

The scope of Medical Technology (MT) is vast and continually expanding. Medical Technology encompasses a wide range of products, devices, and services that contribute to the prevention, diagnosis, treatment, and management of various medical conditions.

As of today, there are more than 180 medical technology institutes in Pakistan offering four-year BSMT programme in various disciplines. With the rising number of medical technology institutions year by year, medical technology degree programmes are also facing various threats, among which, regulatory challenges are at the top.

The Government of Pakistan has recently enacted and passed the 'Allied Health Professionals Council (AHPC) Act, 2021.' This act acknowledges and classifies allied health professionals into twenty-five disciplines, which is a significant step towards recognizing the importance of these professionals in the healthcare system. The classification of these disciplines will help streamline the education, training, and practice of allied health professionals in Pakistan.

The AHPC has recognized twenty-five disciplines, which include Anaesthesia Technology (AT), Blood Banking Technology (BBT), Medical Laboratory Technology (MLT) / Clinical Laboratory Sciences (CLS); including major fields (like Haematology, Clinical Chemistry, Histopathology, Cytopathology, Microbiology, Molecular Biology, and Medical Virology), Cardiac Care Technology (CCT) including Cardiac surgery and Perfusion Technology, Surgical Technology (ST) including Operating Theatre Technology (OTT), Dental Technology (DT), Renal and Dialysis Technology (R&DT), Aesthetics and Skin Care Technology (A&SCT), Endoscopy Technology (ET), Medical Informatics (MI), Optometry and Refraction Technology (O&RT), Occupational and Speech Therapy (O&ST), Audiology and Speech Technology (A&ST), Public Health Technology (PHT), Radiography & Imaging Technology (R&IT), Radiotherapy Technology (RT), Respiratory Therapy (RT) including pulmonary function testing (PFT), Nuclear Medicine Technology (NMT), Electrocardiogram Technology (EKGT), Electroencephalogram Technology (EEGT), Podiatric Medicine, Nutrition, Physical Therapy (PT) including Orthotics and Prosthetics, Rehabilitation, Sports therapy (ST), and Psychology and Counseling (P&C)

The establishment of the AHPC in Pakistan serves several important purposes and objectives such as: Ensuring the quality of allied health services, enhancing professional standards, providing a framework for professional development, and formulating regulation for registration and licensing of AHPs. Over all, the establishment of the AHPC and the recognition of various disciplines within allied health professions provide a comprehensive framework for regulating and improving the quality of healthcare services in Pakistan. This contributes to public health by ensuring that allied health professionals are well-trained, competent, and adhere to professional standards in their practice.

COVID-19 pandemic, has highlighted the critical role of medical technology in diagnosing, treating, monitoring, and preventing the spread of infectious diseases. It also brought attention to the importance of different disciplines of medical technology in managing and responding to such global health crises including diagnostic testing both in-house and mobile services, radiological imaging, respiratory therapy and ventilator support, tele-health and remote monitoring, biosafety and biological hazards prevention, safe handling and use of personal protective equipment, vaccine development, data analytics and surveillance using artificial intelligence and machine learning tools,

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research and development, and biological contact tracing and monitoring. It underscores the need for continued innovation, investment, and collaboration in the field of medical technology to strengthen healthcare systems and effectively respond to future health crises.

The scope of Medical Technology is not limited to these fields. Ongoing advances and interdisciplinary collaborations are pushing the boundaries of medical technology, resulting in improved patient care, better health outcomes, and transformative changes in the healthcare industry. From my point of view, the future of medical technology education in Pakistan is expected to witness several trends that will shape the field and address the evolving needs of healthcare. Some potential future trends include:

1. Expansion of specialized Medical Technology Programmes
2. Integration of technology in education for learning
3. Interdisciplinary approach
4. Focus on research and innovation
5. Industry-academia collaboration
6. Emphasis on quality assurance and accreditation
7. Continuous professional development
8. Global perspective and collaboration

These future trends in Medical Technology education in Pakistan will aim to produce well-rounded professionals and medical technologists equipped with the knowledge, skills, and innovation mindset to contribute effectively to the healthcare industry, improve patient care, and address the evolving needs of society.

The institutes of Medical Technology need to modernize their curricula in order to engage students with the advancement of medical technology education which is vital to learn effectively and keep them motivated. Listed below are some strategies that can be useful to attract and engage students in this field:

1. Incorporate interactive teaching methods: Utilize interactive teaching methods to actively engage students including group discussions, case studies, problem-solving activities, and role-playing exercises.

2. Practical hands-on experience: Students can gain practical, hands-on experience with medical technology equipment, laboratory sessions, simulation exercises, and internships in clinical facilities, to allow them to apply theoretical knowledge in real-world settings.

3. Utilization of technology tools: Incorporate technology tools such as, use multimedia presentations, virtual labs, online simulations, and interactive educational platforms to enhance student engagement and provide a dynamic learning experience.

4. Connect with medical technology-related professionals: Interactions with medical technologists, researchers, and teaching professionals to share their experiences and insights can provide students with a real-world perspective, expose them to current trends and challenges in the field, and inspire them to pursue their career goals.

5. Adoptive research and innovation: Encouraging students to explore research opportunities; assigning projects that require critical thinking, problem-solving, and innovation. Students should be encouraged and supported to present their research findings at conferences or publish in relevant journals to enhance their engagement and sense of accomplishment.

6. Stay updated with the latest advancements in medical technology: Keeping abreast of the latest advancements and breakthroughs in medical technology and incorporate them into the curriculum, share recent research papers, news articles, and case studies with students to generate discussions and foster curiosity about the field.

7. Provide career guidance and mentorship: Offer career guidance and mentorship programme to help students understand the diverse career paths and opportunities in Medical Technology. Connect them with alumni or professionals who can serve as mentors, providing advice, guidance, and support throughout their educational journey.

8. Create collaborative learning environments: Encourage collaboration and teamwork among students, assign group projects, case studies, or problem-solving activities that require students to work together, and fostering communication, critical thinking, and peer learning.

9. Engage in practical and relevant assignments: Design assignments and assessments that are practical and relevant to the field of Medical Technology including analyzing real-life medical cases, conducting experiments, or designing innovative solutions to address current healthcare challenges.

10. Encourage professional development: Promote continuous professional development and lifelong learning, highlight the importance of attending conferences, workshops, and webinars, and provide information about professional certifications or advanced training opportunities in the field.

By implementing these strategies, institutes of Medical Technology can create an engaging learning environment that sparks curiosity, fosters critical thinking, and prepares Medical Technology students to effectively learn and contribute to the advancements in the field.

# Effects of COVID-19 Pandemic on Psychological Health

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## ABSTRACT

**Objective:** To understand the psychological impact of COVID-19 pandemic on the population of Karachi, Pakistan during the initial phases of the pandemic

**Methodology:** An online questionnaire-based survey was conducted; an online cross-sectional survey study design was used for this research. Study setting was Karachi from where the first case in Pakistan was reported. The study population included those living in Karachi during the pandemic. The number of participants in this study was 427. Assessment tools used to measure the psychological impact of COVID-19 pandemic were Impact of the Event Scale-Revised (IES-R) and DASS-21 scale using significance level of $p < 0.05$.

**Results:** Moderate level of depression, anxiety, and stress relating to COVID-19 pandemic was found in the population. Almost 62% respondents were suffering from mild to moderate levels of depression, 53% of the population were showing moderate levels of anxiety. Significant association was found between genders with: [depression (p-value, 0.007), anxiety (p-value, 0.02)]. Working in healthcare profession was association with anxiety (p-value, 0.05) and stress (p-value, <0.001). Testing for COVID-19 showed association with stress (p-value, 0.008). IES-R scale showed association with working in healthcare profession (p-value, <0.001), recently tested for COVID-19 (p-value, 0.001), having someone close testing positive (p-value, <0.001). Having COVID-19 like symptoms showed strong association to depression, anxiety, and stress as well with IES-R.

**Conclusion:** Majority of the population exhibited symptoms of depression, anxiety, and stress ranging from mild to moderate in severity. However, the stress levels and the overall psychological impact were found to be in normal ranges among majority of the study population.

**Key Words:** Anxiety, COVID-19, DASS, depression, IES-R, psychological effect, stress.

## INTRODUCTION

World Health Organization (WHO) first received reports of pneumonia-like illness from China in late December 2019[1]. This illness was officially named as COVID-19 by the WHO on 11th of February 2020. The first case of COVID-19 was reported in Pakistan on the 26th of February, 2020[2]. After the number of cases being reported in Pakistan started to escalate along with the mortality associate with COVID-19, the government enforced lockdown for the first time on 23rd March to control the spread of the infection. Since then, among the cities of Pakistan, Karachi has reported the highest number of cases[3]. Experts identified that global population was facing stresses on multiple fronts in the face of COVID-19 pandemic; a generalize state of fear among population due to the whole situation[4]; fear for the health and wellbeing of oneself and the loved ones; financial crisis due to lockdown as many people lost their jobs or were left without pay while offices and industries were shut down around the world[5]; panic due to shortage of food and protection supplies; and social isolation was forced on millions of people around the world. The pandemic also had a detrimental effect on healthcare facilities, social system, and economy[6]. People were facing job uncertainty; the incidence of domestic abuse also increased. Combine that with extensive news coverage on the pandemic and future uncertainty, it all culminated in adverse psychological health[7-9].

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Any health emergencies like a global pandemic are associated with significant consequences on the mental health of population[10]. Individuals suffer from psychological problems like fear, uncertainty, frustration, boredom, anger, and loneliness[11]. Mass quarantines, lockdowns and isolation measures imposed to control the spread of the disease tend to cause a generalize state of fear and anxiety in the community[12]. The studies conducted during the early phase of the pandemic relating to the effect on psychological health due to COVID-19 in China, showed moderate to severe psychological issues in more than half of the study population. Females and students were among those susceptible to mental health issues[13]. Higher levels of depression, anxiety, and stress were found to be associated with the presence of psycho-somatic symptoms[14].

Psychological and behavioral responses to COVID-19 had been dramatic during the rising phase of the outbreak. Prevalence of moderate or severe anxiety were 4-5 times its normal levels[15]. Confusion about information reliability significantly fueled the public anxiety levels[16]. The psychological health and wellbeing of individuals is a significant concern and scarce information was available regarding this issue. In this study, we aimed to investigate the psychological issues relating to the COVID-19 pandemic and to understand the psychological impact of COVID-19 pandemic on the population of Karachi, Pakistan during the initial phases of the pandemic.

## METHODOLOGY

An online cross-sectional survey study design was used for this research. Study was conducted in Karachi from where the first case in Pakistan was reported. The population study included those living in Karachi during the pandemic. As the government took precautionary measures and advised the public to isolate at home, this survey was conducted electronically. Informed consents from the participants were taken electronically. Ethics approval was obtained from the Baqai Medical University Ethical Committee. This cross sectional study was conducted at Baqai Medical University in July 2020. The Institutional Review Board of BMU approved this study by certifying it with IRB certificate No. Ref: BMU-EC/2020-04(OL).

Sample size was calculated using OpenEpi. A sample size of 384 participants was calculated with 50% anticipated percentage of psychological issues (not known), 95% confidence interval, and 5% margin of error. Sample size was increased to account for missing or incomplete responses. After that 427 participants were recruited in the study. Non-probability snowball sampling technique was used for sample selection, initially the survey was triggered through immediate contacts, and they were requested to pass it forward.

Healthy adults of age 18 years and above were included. Individuals with history of pre-existing psychological illness and individuals above the age of 65 years were excluded. Tools used to assess the psychological impact of COVID-19 pandemic in the study were the Impact of the Event Scale-Revised (IES-R) and DASS-21 scale[12]. The questionnaire was launched on the Internet using Google Forms platform and disseminated to the online contacts. Responses were submitted on the Google Forms from where it was used for analysis. SPSS version 22 was used for data analysis. Sociodemographic characteristics, COVID-19 symptoms, and responses for both scales (IES-R and DASS) were stated as percentages. Chi-square test of association was used to demonstrate associations between sociodemographic characteristics, COVID-19 symptom with the subscales of the DASS as well as the IES-R score, with a significance level of $p < 0.05$.

## RESULTS

The sociodemographic characteristics showed that the majority of respondents were female (65.8%), between the ages of 18 to 24 years (40%), and were married (57.6%). Majority of the respondents were employed (73.5%), of whom (41.5%) were healthcare professionals. Twenty-eight percent respondents had taken a COVID-19 test. In (18.5%) respondents, someone close had tested positive for COVID-19. The symptoms most commonly presented amongst respondents were headache (44.7%), body ache (39%), sore throat (37.7%), fever (29.3%), cough (37.5%), chills (7.7%), difficulty in breathing (9%) and (32.3%) had been tested for COVID-19.

While measuring for depression, 27.2% respondents were showing normal levels of depression, 31.1% had mild, 31.1%, had moderate, 3.3% had severe, and 7.3% had extremely severe levels of depression. Measuring for anxiety, 10.3% respondents showed normal levels of anxiety, 11.7% had mild, 52.9%, had moderate, 14.1% had severe, and 11% had extremely severe levels of anxiety. While measuring for stress, 70% respondents showed normal levels of stress, 19.7% had mild, 4.9%, had moderate, 2.3% had severe, and 4.2% had extremely severe levels of stress. On IES-R scale; 71.9% respondents had normal (0-23) psychological impact of COVID-19, while 14.5% had mild (24-32), 4.2%, had moderate (33-36), and 9.4% had severe (>37) psychological impact.

**Table 1: Association with Depression**

| Variable | | Normal (0-7) | | Mild (8-9) | | Moderate (10-14) | | Severe (15-19) | | Extremely Severe (+20) | | p-value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | |
| **Gender** | Male | 55 | 37.7 | 38 | 26 | 41 | 28.1 | 2 | 1.4 | 10 | 6.8 | 0.007** |
| | Female | 61 | 21.7 | 95 | 33.8 | 92 | 32.7 | 12 | 4.3 | 21 | 7.5 | |
| **Employment Status** | Employed | 24 | 7.7 | 38 | 12.1 | 163 | 52.1 | 49 | 15.7 | 39 | 12.5 | 0.01* |
| | Unemployed | 20 | 17.5 | 12 | 10.5 | 63 | 55.3 | 11 | 9.6 | 8 | 7 | |
| **Chills** | Yes | 3 | 9.1 | 9 | 27.3 | 13 | 39.4 | 1 | 3 | 7 | 21.2 | 0.05* |
| | No | 113 | 28.7 | 124 | 31.5 | 120 | 30.5 | 13 | 3.3 | 24 | 6.1 | |
| **Headache** | Yes | 40 | 20.9 | 63 | 33 | 62 | 32.5 | 7 | 3.7 | 19 | 9.9 | 0.05* |
| | No | 76 | 32.2 | 70 | 29.7 | 71 | 30.1 | 7 | 3 | 12 | 5.1 | |
| **Cough** | Yes | 37 | 23.1 | 48 | 30 | 47 | 29.4 | 5 | 3.1 | 23 | 14.4 | 0.001** |
| | No | 79 | 29.6 | 85 | 31.8 | 86 | 32.2 | 9 | 3.4 | 8 | 3 | |
| **Difficulty in Breathing** | Yes | 6 | 15.8 | 8 | 21.1 | 14 | 36.8 | 1 | 2.6 | 9 | 23.7 | 0.001** |
| | No | 110 | 28.3 | 125 | 32.1 | 119 | 30.6 | 13 | 3.3 | 22 | 5.7 | |

*Significant at p<0.05, **Highly Significant at p<0.01

**Table 2: Association with Anxiety**

| Variable | | Normal (0-7) | | Mild (8-9) | | Moderate (10-14) | | Severe (15-19) | | Extremely Severe (+20) | | p-value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | |
| **Gender** | Male | 24 | 16.4 | 20 | 13.7 | 71 | 48.6 | 18 | 12.3 | 13 | 8.9 | 0.02* |
| | Female | 20 | 7.1 | 30 | 10.7 | 155 | 55.2 | 42 | 14.9 | 34 | 12.1 | |
| **Employment Status** | Employed | 24 | 7.7 | 38 | 12.1 | 163 | 52.1 | 49 | 15.7 | 39 | 12.5 | 0.01* |
| | Unemployed | 20 | 17.5 | 12 | 10.5 | 63 | 55.3 | 11 | 9.6 | 8 | 7 | |
| **Healthcare Professional** | Yes | 12 | 6.8 | 26 | 14.7 | 88 | 49.7 | 26 | 1.7 | 25 | 14.1 | 0.05* |
| | No | 32 | 12.8 | 24 | 9.6 | 138 | 55.2 | 34 | 13.6 | 22 | 8.8 | |
| **Someone close tested positive for COVID-19** | Yes | 4 | 5.1 | 7 | 8.9 | 40 | 50.6 | 19 | 24.1 | 9 | 11.4 | 0.03* |
| | No | 40 | 11.5 | 43 | 12.4 | 186 | 53.4 | 41 | 11.8 | 38 | 10.9 | |
| **Chills** | Yes | 1 | 3 | 5 | 15.2 | 12 | 36.4 | 7 | 21.2 | 8 | 24.2 | 0.02* |
| | No | 43 | 10.9 | 45 | 11.4 | 214 | 54.3 | 53 | 13.5 | 39 | 9.9 | |
| **Cough** | Yes | 12 | 7.5 | 17 | 10.6 | 81 | 50.6 | 24 | 15 | 26 | 16.3 | 0.06 |
| | No | 32 | 12 | 33 | 12.4 | 145 | 54.3 | 36 | 13.5 | 21 | 7.9 | |
| **Difficulty in Breathing** | Yes | 3 | 7.6 | 4 | 10.5 | 16 | 42.1 | 4 | 10.5 | 11 | 28.9 | 0.008** |
| | No | 41 | 10.5 | 46 | 11.8 | 210 | 54 | 56 | 14.4 | 36 | 9.3 | |

*Significant at p<0.05, **Highly Significant at p<0.01

Table 1 shows the association of DASS subscale 'Depression' with the demographic and health related variables. Here, depression showed strong association with gender (p-value 0.007), and employment (p-value 0.04). The Depression subscale was strongly associated with COVID-19 symptom; cough (p-value <0.001), headache (p-value 0.05), fever (p-value <0.001), chills (p-value 0.005), and difficulty in breathing (p-value 0.001).

Table 2 shows the association of DASS subscale 'Anxiety' with the demographic and health related variables. Here, anxiety showed strong association with demographic variables of gender (p-value 0.02), employment (p-value 0.03), healthcare profession (p-value 0.05), and having someone close testing positive (p-value 0.03). Anxiety was found to be strongly associated with COVID-19 symptoms like cough (p-value 0.06), chills (p-value 0.02), and difficulty in breathing (p-value 0.008).

**Table 3: Association with Stress**

| Variable | | Normal (0-7) | | Mild (8-9) | | Moderate (10-14) | | Severe (15-19) | | Extremely Severe (+20) | | p-value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | N | % | |
| Employment Status | Employed | 197 | 62.9 | 77 | 24.6 | 17 | 5.4 | 7 | 2.2 | 15 | 4.8 | 0.001** |
| | Unemployed | 97 | 85.1 | 7 | 6.1 | 4 | 3.5 | 3 | 2.6 | 3 | 2.6 | |
| Healthcare Professional | Yes | 90 | 50.8 | 62 | 35 | 7 | 4 | 8 | 4.5 | 10 | 5.6 | 0.001** |
| | No | 204 | 81.6 | 22 | 8.8 | 14 | 5.6 | 2 | 0.8 | 8 | 3.2 | |
| Recently Been Tested for COVID-19 | Yes | 68 | 56.7 | 35 | 29.2 | 7 | 5.8 | 5 | 4.2 | 5 | 4.2 | 0.008** |
| | No | 226 | 73.6 | 49 | 16 | 14 | 4.6 | 5 | 1.6 | 13 | 4.2 | |
| Someone Close Tested Positive for COVID-19 | Yes | 40 | 50.6 | 28 | 35.4 | 4 | 5.1 | 2 | 2.5 | 5 | 6.3 | 0.001** |
| | No | 254 | 73 | 56 | 16.1 | 17 | 4.9 | 8 | 2.3 | 13 | 3.6 | |
| Fever | Yes | 71 | 56.8 | 38 | 30.4 | 5 | 4 | 4 | 3.2 | 7 | 5.6 | 0.003** |
| | No | 223 | 73.8 | 46 | 15.2 | 16 | 5.3 | 6 | 2 | 11 | 3.6 | |
| Chills | Yes | 10 | 30.3 | 14 | 42.4 | 3 | 9.1 | 4 | 12.1 | 2 | 6.1 | 0.001** |
| | No | 284 | 72.1 | 70 | 17.8 | 18 | 4.6 | 6 | 1.5 | 16 | 4.1 | |
| Headache | Yes | 117 | 61.3 | 45 | 23.6 | 12 | 6.3 | 6 | 3.1 | 11 | 5.8 | 0.04* |
| | No | 177 | 75 | 39 | 45 | 9 | 3.8 | 4 | 1.7 | 7 | 3 | |
| Body Ache | Yes | 99 | 59.6 | 46 | 27.7 | 7 | 4.2 | 7 | 4.2 | 7 | 4.2 | 0.002** |
| | No | 195 | 74.7 | 38 | 14.6 | 14 | 5.4 | 3 | 1.1 | 11 | 4.2 | |
| Sore Throat | Yes | 102 | 63.4 | 42 | 26.1 | 5 | 3.1 | 5 | 3.1 | 7 | 4.3 | 0.06 |
| | No | 192 | 72.2 | 42 | 15.8 | 16 | 6 | 5 | 1.9 | 11 | 4.1 | |
| Cough | Yes | 85 | 53.1 | 44 | 27.5 | 11 | 6.9 | 6 | 3.8 | 14 | 8.8 | 0.001** |
| | No | 209 | 78.3 | 40 | 15 | 10 | 3.7 | 4 | 1.5 | 4 | 1.5 | |
| Difficulty in Breathing | Yes | 20 | 52.6 | 5 | 13.2 | 6 | 15.8 | 2 | 5.3 | 5 | 13.2 | 0.001** |
| | No | 274 | 70.4 | 79 | 20.3 | 15 | 3.9 | 8 | 2.1 | 13 | 3.3 | |

*Significant at p<0.05, **Highly Significant at p<0.01

Table 3 shows the association of DASS subscales 'Stress' with the demographic and health related variables. Here, stress showed strong association with demographic variables of employment (p-value 0.02), healthcare profession (p-value <0.001), recently tested for COVID-19 (p-value 0.008), and having someone close testing positive (p-value 0.01). Depression subscale was strongly associated with COVID-19 symptoms of cough (p-value <0.001), headache (p-value 0.04), body ache (p-value 0.002), sore throat (p-value 0.06), fever (p-value 0.003), chills (p-value <0.001), and difficulty in breathing (p-value <0.001).

Table 4 shows the association of IES-R scale with demographic and health related variables. No association was found between demographic variables and IES-R scale except with those working in healthcare profession (p-value <0.001). In health-related variables, recently tested for COVID-19 (p-value 0.001) and having someone close testing positive (p-value <0.001) were significantly associated. IES-R scale was strongly associated with COVID-19 symptom of cough (p-value 0.04), headache (p-value 0.03), body ache (p-value

<0.001), sore throat (p-value <0.001), fever (p-value 0.001), and chills (p-value 0.03).

## DISCUSSION

This study aimed to investigate the psychological health status of the public during the COVID-19 pandemic. In spite of the overall result showing stable psychological impact due to the event (pandemic), a significant amount of depression and anxiety was still observed among the study population. Study findings suggest that with respect to immediate psychological impact of COVID-19 pandemic, the population of Karachi showed mild to moderate levels of psychological problems during the first month of the pandemic. Majority of the population was exhibiting symptoms of depression, anxiety, and stress ranging from mild to moderate in severity[12]. Almost 62% respondents were suffering from mild to moderate levels of depression, while 53% of the population were showing moderate levels of anxiety. However, the stress level and the overall psychological impact were found to be in normal ranges among the majority of

**Table 4: Association with IES-R**

| Variable | | Normal (0-23) | | Mild (24-32) | | Moderate (33-36) | | Severe (37) | | p-value |
|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % | |
| Healthcare Professional | Yes | 117 | 66.1 | 28 | 15.8 | 4 | 2.3 | 28 | 15.8 | 0.001** |
| | No | 190 | 76 | 34 | 13.6 | 14 | 5.6 | 12 | 4.8 | |
| Recently Been Tested for COVID-19 | Yes | 70 | 58.3 | 23 | 19.2 | 8 | 6.7 | 19 | 15.8 | 0.001** |
| | No | 237 | 77.2 | 39 | 12.7 | 10 | 3.3 | 21 | 6.8 | |
| Someone Close Tested Positive for COVID-19 | Yes | 41 | 51.9 | 13 | 16.5 | 5 | 6.3 | 20 | 25.3 | 0.001** |
| | No | 266 | 76.4 | 49 | 14.1 | 13 | 3.7 | 20 | 5.7 | |
| Fever | Yes | 75 | 60 | 22 | 17.6 | 11 | 8.8 | 17 | 13.6 | 0.001** |
| | No | 232 | 76.8 | 40 | 13.2 | 7 | 2.3 | 23 | 7.6 | |
| Chills | Yes | 17 | 51.5 | 7 | 21.2 | 2 | 6.1 | 7 | 21.2 | 0.03* |
| | No | 290 | 73.6 | 55 | 14 | 16 | 4.1 | 33 | 8.4 | |
| Headache | Yes | 124 | 64.9 | 35 | 18.3 | 10 | 5.2 | 22 | 11.5 | 0.04* |
| | No | 183 | 77.5 | 27 | 11.4 | 8 | 3.4 | 18 | 7.6 | |
| Body Ache | Yes | 99 | 59.6 | 29 | 17.5 | 11 | 6.6 | 27 | 16.3 | 0.001** |
| | No | 208 | 79.7 | 33 | 12.6 | 7 | 2.7 | 13 | 5 | |
| Sore Throat | Yes | 86 | 53.4 | 31 | 19.3 | 11 | 6.8 | 33 | 20.5 | 0.001** |
| | No | 221 | 83.1 | 31 | 11.7 | 7 | 2.6 | 7 | 2.6 | |
| Cough | Yes | 104 | 65 | 28 | 17.5 | 11 | 6.9 | 17 | 10.6 | 0.04* |
| | No | 203 | 76 | 34 | 12.7 | 7 | 2.6 | 23 | 8.6 | |

*Significant at p<0.05, **Highly Significant at p<0.01

the study population. The depression and anxiety levels measured by DASS-21 were higher than the stress levels measured by DASS-21 and the impact of the pandemic measured by IES-R. Nevertheless, it should be noted that almost 10% of the population reported psychological effects at pathological levels.

It is well known that medical emergencies like pandemics affect mental health negatively[16,17]. Evidence suggests that females are more prone to negative impact of pandemics, similarly psychological problems were found to be more prevalent among females[12,18,19]. In line with prior findings, in our study also, we found that psychological symptoms were more prevalent in females. However, in the higher ranges of stress levels, males were in higher percentage as compared to females. It is suggested that this increase in stress and anxiety symptoms in females may be due to being overburdened by round the clock childcare during lockdown and isolation[18]. Evidence from prior studies suggests that psychological impact and symptoms are more frequently observed in young ages[12,20,21]. However in present study, our findings revealed that psychological symptoms were prevalent indiscriminately among all age groups. Studies have reported that married people and those with children were more prone to psychological effects of pandemic[22].

However, in our study, marital status or having children did not appear to be affecting the level of stress as almost equal percentage of respondents was distributed across the different levels of stress.

Similarly, healthcare professionals expressed higher levels of stress than non-healthcare professionals[23,24]. In line with the previous studies, findings suggested that people who exhibited higher levels of psychological issues, were those who had been tested for COVID-19, or whose relative or family member had been infected by COVID-19[25]. People showed higher psychological issues if they experienced COVID-19 like symptoms.

This study provided insight regarding the COVID-19 related psychopathology. Few limitations were faced during the research process. Firstly, the sample might not be representative as the survey was conducted online. The data might have been collected during a very stressful period owing to the marked change in circumstances with isolation and lockdown. Regardless of all these limitations, the current study improved our understanding of the impact of COVID-19 on mental health. Even though majority of respondents showed no significant impact of COVID-19 pandemic, our result revealed that a low percentage of population is at a high

risk of developing psychopathologies. More studies are needed to further investigate the psychological consequences of the pandemic on general public including a broader range of sociodemographic factors. There is a need for longitudinal and nationwide understanding of the psychological effects of COVID-19.

# CONCLUSION

Majority of the population exhibited symptoms of depression, anxiety, and stress ranging from mild to moderate in severity. However, the stress levels and the overall psychological impact were found to be in normal ranges among the majority of the study population. The significant feature identified here is that individuals are more likely to experience psychological effects if they had a close encounter with COVID-19 disease, whether being suspected of having the disease themselves or having a loved one getting infected.

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**Authors' Contribution:** RTA: Conceived idea, designed study, collected data, and drafted manuscript; ZM: Contributed to data collection, analysis, interpretation, and result compilation; SS: Assisted in data collection and critically revised the manuscript; AJ: Helped in data collection; STH: Contributed to result interpretation and critically revised the manuscript; JA: Assisted in manuscript writing and proofreading.

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# ORIGINAL ARTICLE

# Frequency of Caesarean Section in Patients with Oligohydramnios at Tertiary Care Hospital

Shahinda[1], Bushra Ajmal[1], Romana Bibi[2], Ayesha Nawaz[3], Nayyab Qayyum[2], and Ambareen Zaman[1]

## ABSTRACT

**Objective:** To determine the frequency of Caesarean Section in pregnant women with oligohydramnios

**Methodology:** This descriptive cross-sectional study was carried out in the Department of Obs & Gynae, MTI-HMC, Peshawar from February 2021 to August 2021. Glandin E2 gel was used to induce all of the patients. Patients were evaluated for caesarean delivery if induction with two doses of Glandin E2 gel given vaginally six hours apart failed.

**Results:** As per frequencies and percentages for caesarean section in pregnant women with oligohydramnios, 42 (18.5%) patients were recorded with caesarean section.

**Conclusion:** Pregnant women at term with oligohydramnios are at increased risk of caesarean section, therefore, adequate measure should be taken in such patients in order to minimize the risk of a caesarean section associated with oligohydramnios.

**Key Words:** Amniotic Fluid Index (AFI), caesarean section, morbidity, oligohydramnios.

## INTRODUCTION

A caesarean section is a foetus delivery that takes place through an open abdominal incision (laparotomy) and a uterine incision (hysterotomy). The first reported caesarean section occurred in 1020 AD. It is presently the most prevalent surgery in the United States, with over 1 million women giving birth by caesarean section each year[1]. Caesarean birth rates increased from 5% in 1970 to 31.9% in 2016. Despite ongoing efforts to minimize the number of caesarean sections, experts do not expect a major reduction for at least another decade or two. Caesarean delivery can be the safest or even the only way for some women to deliver a healthy infant, despite the dangers of both immediate and long-term consequences[2].

Reduced amniotic fluid volume (AFV) for gestational age is referred to as oligohydramnios. The volume of amniotic fluid changes throughout pregnancy, increasing linearly until 34 to 36 weeks when it plateaus (about 400ml) and remains steady until the baby is born[3]. After 40 weeks of pregnancy, the AFV begins to gradually decline, resulting in a lower volume in post-term pregnancies. Using fundal height measurements and ultrasound inspection, this pattern enables for clinical assessment of AFV during pregnancy[4].

Whenever there is a mismatch between the fundal height measurement and gestational age, the differential diagnosis should consider amniotic fluid abnormalities. If there are any discrepancies, an ultrasound of the amniotic fluid should be performed[5].

In one study, 27 individuals with oligohydramnios had caesarean sections after failing to induce labour (18.0%)[6].

This study will determine the importance of obtaining routine prenatal care throughout pregnancy because regular prenatal care allows the healthcare team to notice and diagnose gestational problems such as oligohydramnios. In our local population, this study will aid in the formulation of an adequate follow-up plan to reduce the risk of both foetal and maternal problems related with oligohydramnios.

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## METHODOLOGY

This descriptive cross-sectional study was done in the Department of Obs & Gynae, MTI-HMC, Peshawar from February to August, 2021. The Institutional Review Board of HMCP approved this study by certifying it with IRB certificate No. Ref: 621/HEC/B&PSC/2022. Patients presenting to Gynaecology OPD of the hospital were included in our study, subject to fulfillment of our inclusion criteria. All female patients with ages between 18 to 40 years and having singleton pregnancy who presented at term with an AFI (5–8 cm) were included in this study, while patients having perinatal loss in the past, recurrent missed abortions, and intrauterine growth retarded infants were excluded. Following that, informed consent was obtained from all patients prior to the study's conduct. AFI was measured using ultrasound by a consultant sonologist and labeled if it was between 5–8 cm. The glandin E2 gel was used to induce all of the patients. Patients, in whom induction with two doses of glandin E2 gel given vaginally 6 hours apart failed, were considered for caesarean section. All information such as age, gestational age, AFI index, socioeconomic status, residence, and caesarean section was recorded on a separate pro forma attached to this pro forma.

## RESULTS

The mean age was 27.50±4.27 years. The mean AFI was 3.07±0.734 cm. The mean gestational age was 38.39±0.804 weeks. As many as 182 (80.2%) patients were in the 20-30 years age group while 45 (19.8%) patients were in the 31-40 years age group. A total of 113 (49.8%) patients were from urban areas while 114 (50.2%) were from rural areas. Forty-two (18.5%) patients were recorded to have required caesarean section in pregnant women with oligohydramnios (Table 1). Caesarean sections were stratified with age (p=0.154), (Table 2), and gestational age (p=0.221), (Table 3).

**Table 1: Frequency of Caesarean Section**

| Caesarean Section | Frequency | Percent (%) |
|---|---|---|
| Yes | 42 | 18.5 |
| No | 185 | 81.5 |
| Total | 227 | 100 |

**Table 2: Frequency of Caesarean Section Related to Age Group**

| C-Section | Age Group | | Total | P-value |
|---|---|---|---|---|
| | 20-30 Years | 31-40 Years | | |
| Yes | 37 | 5 | 42 | |
| | 20.3% | 11.1% | 18.5% | |
| No | 145 | 40 | 185 | 0.154 |
| | 79.7% | 88.9% | 81.5% | |
| Total | 182 | 45 | 227 | |
| | 100% | 100% | 100% | |

**Table 3: Frequency of Caesarean Section Related to Period of Gestation**

| C-Section | Gestational Age | | Total | P-value |
|---|---|---|---|---|
| | < 38 Weeks | > 38 Weeks | | |
| Yes | 19 | 23 | 42 | |
| | 15.6% | 21.9% | 18.5% | |
| No | 103 | 82 | 185 | 0.221 |
| | 84.4% | 78.1% | 81.5% | |
| Total | 122 | 105 | 227 | |
| | 100% | 100% | 100% | |

In the current study, the mean and SDs for age were 27.50+4.27 years. The mean and SDs for AFI were 3.07+0.734 cm. The mean and SDs gestational age was 38.39+0.804 weeks, which was comparable to the findings of Berghella V which recorded almost similar parameters[1].

## DISCUSSION

Reduced amniotic fluid volume (AFV) for gestational age is referred to as oligohydramnios. The volume of amniotic fluid changes throughout pregnancy, increasing linearly until 34 to 36 weeks when it plateaus (about 400ml) and remains steady until the baby is born[3]. After 40 weeks of pregnancy, the AFV begins to gradually decline, resulting in a lower volume in post-term pregnancies. Using fundal height measurements and ultrasound inspection, this pattern enables for clinical assessment of AFV during pregnancy[4].

Total 182 (80.2%) patients were in the 20-30 years age group while 45 (19.8%) were in the 31-40 years age group. These findings were consistent with the results of Magann EF[5] which also recorded almost the same number of patients in the aforementioned groups.

As per the main variable of our study, 42 (18.5%) patients were recorded with caesarean section (Table 5). This was inconsistent with the findings of Clapp MA[3].

When there is a discrepancy between the fundal height measurement and gestational age, amniotic fluid disorders should be considered in the differential diagnosis. Any discrepancies should prompt an ultrasound examination of the amniotic fluid[5].

In a study, caesarean section due to failed induction with oligohydramnios, was performed in 27 patients (18.0%)[6] which was consistent with the findings of this study as almost the same i.e. 42 (18.5%) patients were recorded with caesarean section (Table 1).

Oligohydramnios complicates about 0.5–5 percent of all pregnancies, with the prevalence varying according to the definition used and the population studied. Though the cause of oligohydramnios is largely unknown, common causes include ruptured membranes, genetic and chromosomal abnormalities that result in congenital anomalies and placental insufficiency.

Increased maternal and foetal morbidity is linked to oligohydramnios. Foetal discomfort, low APGAR scores, and meconium aspiration syndrome in the foetus, all contribute to perinatal morbidity and mortality[3-5]. This occurs as a result of umbilical cord compression and uteroplacental insufficiency[4,5]. As a result, even in generally uncomplicated pregnancies with oligohydramnios, termination of pregnancy is recommended[6]. However, several recent studies have found no negative effects of isolated oligohydramnios on the neonatal outcome, recommending that the pregnancy be carried to term[7,8]. Amnioinfusion has also been recommended in several studies[9]. The purpose of this study was to see how isolated oligohydramnios during the second trimester affected the mode and timing of delivery, as well as its link to perinatal morbidity and mortality in our hospital. The effects of isolated oligohydramnios on pregnancy outcomes during the second trimester were investigated in this study. The majority of the patients in our study were primigravidas with a singleton pregnancy. In these circumstances, isolated oligohydramnios may be the result of constitutional, dietary, or a higher proportion of unexpected births in primigravida.

Because of foetal distress caused by cord compression, caesarean section (LSCS) was the most prevalent mode of delivery in our study. Locatelli A discovered that decreased amniotic fluid content was linked to an increased incidence of caesarean section due to foetal heart rate anomalies[8].

The average gestational age at delivery was 29–40 weeks, and the average birth weight of newborns was 1.5–2 kg. In our research, we discovered a significantly increased incidence of babies with low birth weight, which could be related to premature termination due to foetal distress or cord compression. In a similar study, Locatelli A found that isolated oligohydramnios is linked to a higher risk of iatrogenic premature delivery and lower birth weights[2,8]. Another study looked at the best way to define oligohydramnios in relation to adverse neonatal outcomes and found that an AFI of less than 5 cm, better predicts foetuses at risk for adverse perinatal outcomes than an AFI of more than 5 cm[10]. However, this has to be confirmed.

In this study, we discovered that pregnancies complicated by isolated oligohydramnios were not associated with substantial unfavourable perinatal outcomes, with the exception of the common complications that can occur in any pregnancy (e.g., hypoglycaemia, hypocalcaemia, and low birth-weight). Despite the fact that caesarean sections were performed due to foetal discomfort and/or cord compression, no baby suffered from birth asphyxia. These findings are also consistent with research by Rabie N and Magann EF[4,5]. They used data from multicenter clinical trials to establish that isolated oligohydramnios is not linked to poor foetal growth or a higher risk of perinatal complications[7,10].

A greater frequency of primary caesarean section was found in the group with low amniotic fluid (30.6% with p=0.001), according to a study done in Thailand[12], while in our study it accounted for 18.5%. Caesarean section was performed 48% (336) of the time in patients with oligohydramnios in a study conducted in Bahawalpur, Pakistan, whereas it was performed 18.5% of the time in our study[13]. According to another study conducted in Punjab, Pakistan, caesarean section was performed in 10.7% of patients with oligohydramnios[14].

In an Ethiopian study[15], caesarean section was performed in 237 (80.2%) cases, with severe oligohydramnios being the most common reason. (C/S can be decided in cases of the sole presence of severe oligohydramnios, while on induction for oligohydramnios, or for the presence of previous c/s scar or malpresentation that prevents induction of oligohydramnios cases in our set up). In our study, it accounted for 18.5% of the total. Caesarean delivery was 84.4% (p=0.001) more common in pregnancies with oligohydramnios in China[16].

## CONCLUSION

This study demonstrated that pregnant women at term pregnancy presenting with oligohydramnios were more prone to caesarean section, therefore, adequate measures should be taken in such patients to minimize the risk of a caesarean section associated with oligohydramnios. However, more cross-sectional multi-centered studies should be conducted to generalize the results for our local population.

**Conflict of interest:** The authors declare no conflict of interest.

**Authors' Contribution:** SH: Worked on study design and manuscript writing; BA: Contributed in data collection and data analysis; RB: Contributed in study

design, manuscript writing, data analysis, and critical review of the manuscript; AN: Data collection and manuscript writing; NQ: Writing and article review; AZ: Data collection and article review.

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## ORIGINAL ARTICLE

# Age Related Changes in Normal Corneal Endothelium Using Specular Microscope

Madiha Waseem[1], Mahtab Mengal[2], Ummalqura Parekh[1], and Chakar Tajwidi[3]

## ABSTRACT

**Objective:** To evaluate the changes in corneal endothelium with age in normal Pakistani population

**Methodology: A** descriptive cross sectional study was conducted in the Ophthalmology Department of the Helpers Eye Hospital, Quetta, Pakistan from March 12 to July 12, 2021. Two hundred eyes of 200 healthy subjects of both sexes between the ages of 20 to 70 years were recruited. Complete eye examination was done on each patient. Exclusion criteria included refractive error of $>\pm 2.00$ dioptres, corneal pathologies, glaucoma, uveitis, history of trauma, contact lens use, intraocular surgery, and diabetes mellitus. Corneal endothelial cell density (CED), mean cell area (MCA), coefficient of variation of cell size (CV) and hexagonality were analyzed by specular microscope (Shin-Nippon SPM-700; Rexxam Co.Ltd, Takamatsu, Japan). Pearson's correlation coefficient (r) demonstrated correlation between age and CED, CV, hexagonality and mean cell area.

**Results:** Mean age was $43.00\pm12.32$ years. A total of 136 (68%) participants were male and 64 (32%) were female. Mean CED, average cell area, CV in cell size and hexagonality were $2705.91\pm235.70$, $368.81\pm26.58$, $41.97\pm10.77$, and $47.37\pm6.67$ respectively. Corneal endothelium parameters among age groups were statistically significant ($p< 0.01$). Pearson's correlation coefficient (r) revealed that CED (r= -0.755) and hexagonality (r= -0.709) decline while average cell area (r= 0.694) and CV of size (r=0.548) increase with age.

**Conclusion:** Our current study confirms the previous reports on relation of MCD, hexagonality, MCA, and CV with advancing age. The results of our study on endothelial cell in Pakistani population are beneficial for future researches.

**Key Words:** Corneal endothelium, corneal endothelial density, specular microscope.

## INTRODUCTION

The corneal endothelium plays a vital role in the maintenance of corneal hydration, transparency and homeostasis and is an important part of the structure and function of the cornea[1]. The cornea is covered on its posterior surface by endothelium having hexagonal shape[2]. Any damage to corneal endothelium is irreversible as corneal endothelial cells (CECs) have limited proliferative capacity in vivo[3]. Cell density of 4000–5000 (cells/mm$^2$) is present at birth which declines with age by 0.3–0.6% per annum, with 2000–3000 cells/mm$^2$ in adults[4]. With aging, endothelial pump efficiency decreases, and the results of refractive surgery are not satisfactory[5]. Clinically, it is observed that cornea starts to decompensate when cell density is 400 to 600 cells/mm$^{2,6}$. The variation in cell area is described by polymegathism. It is the coefficient of Variation (CV) determined by standard deviation cell area mean/cell area ìm$^2$. With rise in polymegathism, there is a decline in the precision of the average cell area[7]. The specular microscope allows a detailed examination of corneal endothelium, using a magnification which is many times greater than the slit lamp biomicroscopy[8]. It uses light beam on the corneal endothelium and reflected light rays are focused onto film plane on a monitor[9]. The noncontact nature of specular microscope is more tolerable for wider range of people[10].

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The objective of this study is to analyze morphological changes in corneal endothelium in normal subjects of Pakistani population. The rationale of the study is to generate evidence based data to help the practitioners in planning safest technique for intra-ocular surgeries and lasers and also to provide data for future researches.

The main aspect of the study is to analyze corneal endothelium in our population as it is crucial to assess endothelial health before surgeries, for impact of lasers during refractive procedures and assessment of donor cornea before corneal transplantation. Normative data regarding different aspects of eye is missing for Pakistani population, so it is the need of time to generate data that would be helpful in future researches.

## METHODOLOGY

This descriptive cross sectional study was conducted at the Ophthalmology Department, Helpers Eye Hospital, Quetta from March 12 to July 12, 2021 after approval from the Hospital Ethics Committee with reference No. HEHQ/246. The study was done according to the Declaration of Helsinki and using nonprobability consecutive sampling technique. Two hundred eyes from 200 subjects aged 20–70 years of either gender, either eye, refractive error of=$\pm$ 2.00 dioptres, intraocular pressure of <$\pm$ 21 mm hg, and normal cornea and fundus were enrolled in our study after taking written informed consent. All the participants had complete assessment of visual acuity, slit lamp bio microscopy for anterior segment examination with measurement of intraocular pressure, and fundoscopy. Subjects with refractive error of <$\pm$ 2.00 dioptres, anterior segment disease such as corneal pathologies, glaucoma and uveitis, history of trauma, contact lens use, intraocular surgery, and diabetes

Takamatsu, Japan) that included corneal endothelial cell density (CED), mean cell area, hexagonality, and coefficient of variation of cell size (CV). Specular microscopy was performed by single examiner between 9:00 AM and 1:00 PM. All subjects were asked to fixate after head positioning and three images from cornea were obtained. The mean of three readings was taken for analysis: technique with 95 percent confidence interval; margin of error 10 percent.

Data was analyzed using SPSS version 23. Frequency and percentage for qualitative data such as gender was calculated. Mean and standard deviation for variables including age and corneal endothelial cell density (CED), average cell area, coefficient of variation of cell size (CV) and hexagonality was calculated. Correlation of corneal endothelial parameters (CED, hexagonality, CV, mean cell area) with age was evaluated by Pearson's correlation coefficient (r). Strong correlation was indicated by r > 0.7. A p value of <0.05 was considered significant.

## RESULTS

Two hundred healthy subjects aged 20–70 years (mean age 43.00$\pm$12.32 years) were enrolled in the study. Total 136 (68%) were male and 64 (32%) were female. Mean corneal endothelial cell density was 2705.91$\pm$235.70. The mean cell area was 368.81$\pm$26.58. Mean coefficient of variation in cell size and hexagonality was 41.97$\pm$10.77 and 47.37$\pm$6.67 respectively. Corneal endothelial characteristics among different age groups are given in Table 1. Positive relationship of age was found with cell area (r =$\pm$ 0.694, p<0.01) and coefficient of variation of size (r=0.548, p<0.01), while CED (r= -0.755, p<0.01) and hexagonality (r= -0.709, p<0.01) decreased significantly with age (Table 1).

**Table I: Corneal Endothelium Parameters According to Age (p <0.01)**

| Age group (years) | Age (years) | CED (cells/mm$^2$) | Average Cell Area ($\mu m^2$) | CV in Size (%) | Hexagonality (%) |
|---|---|---|---|---|---|
| 20–30 | 23.00 ± 1.01 | 3063.50 ± 198.31 | 327.75 ± 21.24 | 32.00 ± 3.04 | 54.75 ± 2.20 |
| 31–40 | 37.75 ± 2.29 | 2714.88 ± 159.92 | 369.62 ± 25.59 | 41.00 ± 10.37 | 48.37 ± 5.78 |
| 41–50 | 47.25 ± 1.93 | 2681.25 ± 105.71 | 373.63 ± 14.77 | 41.75 ± 10.20 | 47.25 ± 5.39 |
| 51–60 | 54.41 ± 2.80 | 2506.29 ± 106.87 | 390.47 ± 3.50 | 48.12 ± 9.94 | 44.71 ± 1.57 |
| 61–70 | 65.22 ± 3.26 | 2399.57 ± 129.06 | 394.26 ± 9.84 | 54.65 ± 3.77 | 36.57 ± 2.39 |
| Mean | 43.00 ±12.32 | 2705.91 ± 235.70 | 368.81 ± 26.58 | 41.97 ± 10.77 | 47.37 ± 6.67 |
| Pearson Correlation | – | -0.755 | 0.694 | 0.548 | -0.709 |

mellitus were excluded. All subjects were stratified into five age groups (21–30 years, 31–40 years, 41–50 years, 51–60 years, and 61–70 years). Corneal endothelial parameters were assessed using specular microscope (Shin-Nippon SPM–700; Rexxam Co.Ltd,

## DISCUSSION

Morphology of single layer of hexagonal cells of corneal endothelium is very important to maintain the clarity and transparency of cornea, by its ionic pumping

and barrier function to help the stroma to be in a partially dehydrated state. Studies have shown that genetical, racial, environmental factors, and age affect endothelial integrity[11,12]. According to literature, a decrease in ECD was observed in Portugal's population at a rate of 5-6% per year[13]. Other risk factors related to endothelial loss were studied by different researchers who stated that Fuchs endothelial dystrophy is one of the leading causes of nonfunctioning corneal endothelium in the West, while in Asian countries endothelial dysfunctions are commonly iatrogenic injuries or other factors such as pseudoexfoliation syndrome[14,15].

Reduced corneal endothelial density can lead to corneal decompensation, if that is below 500 cells/mm[2,6,15]. Several studies show the interrelation of corneal cell density with age, ethnicity, gender, and race, and provide research based evidence that endothelial morphologic changes do exist among different racial, ethnic, and age groups[6, 8,16,17]. Therefore, it is highly valuable to build up the normative data on endothelial function for different races and ages, based on which future researches and plans can be made.

We have conducted this study to collect data about endothelial cell properties in Pakistani population because very limited data is available of our local population's corneal endothelium characteristics. In our study, we observed that with increasing age there is a decrease in mean corneal endothelial density, and hexagonality of endothelial cells, increase in MCA, increased CV in cell size. In our study, we observed mean corneal endothelial density 2705.91±235.70 in our healthy population, and same trend is reported in Turkish population[5]. The reason of cell loss with age is not clear; it is assumed that it may be due to high metabolic destruction of endothelial cells with increasing age[6].

MCA, CV, and hexagonality are also related with MCED. The mean cell area in our study was 368.81±26.58. Mean coefficient of variation of cell size and hexagonality was 41.97±10.77 and 47.37±6.67 respectively. Such variations were also noticed by Nigerian researchers and they mentioned the MCD of 2610.26±371.87 cells/mm² with reducing hexagonality of 46.52±8.83%, MCA 392.22±68.03µm, CV 43.95±9.50%[18]. Similar variations in corneal endothelial cells properties have been observed by many international researchers that endorse our results[18,19]. It was noted that American and Japanese populations have a decline in MCD but at a lower rate than Turkish population, while Iranian and Indian populations have a higher rate of MCD decline with advancing age[6,16,17]. So, there is a general trend towards low cell count with increasing age[18].

## CONCLUSION

Our study confirms the previous reports that MCD declines with advancing age and it correlates with the decrease in the percentage of hexagonal cells, and increase in CV in cell size and MCA with advancing age. The results of our study on endothelial cell are beneficial in Pakistani population for future researches. Normal corneal endothelium is required for good visual outcome in refractive and other intraocular surgery and to understand corneal pathologies. Knowing the normal endothelial cell count and changes related to age within local Pakistani population would help to plan the safe surgical approaches and techniques to prevent further loss, as its function decreases with age due to metabolic destruction of endothelial cells and reduced pump function.

**Conflict of interest:** The authors declare no conflict of interest.

**Authors' Contribution:** MW and MM: Conceived the idea, worked on data interpretation, manuscript writing and final approval; UP and CT: Worked on data analysis, drafting of manuscript and critical review.

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# ORIGINAL ARTICLE

# Association of Dementia in Metformin Users With Type 2 Diabetes (T2DM) at Tertiary Care Hospital in Karachi

Rozina Fazal[1], Hikmat Ali[2], Syed Mahboob Alam[3], Saeeda Naseer[1], and Syed Saqib Khalid[1]

## ABSTRACT

**Objective:** To determine the association of dementia in metformin users with Type 2 Diabetes presenting at Tertiary Care Hospital in Karachi

**Methodology:** This cross-sectional study was carried out using non-probability purposive sampling technique in the outpatient department of Diabetes clinic at JPMC, within a period of 6 months after approval from Institutional Review Board (IRB) of JPMC. A total of 83 out of 350 patients of both genders with type 2 diabetes mellitus (T2DM), using metformin, between the ages of 18 and 75, and selected by Mini Mental State Examination (MMSE), were included in the study and were evaluated for association.

**Results:** Total 350 patients were evaluated by MMSE in which 83 patients were found to have dementia. More women (50) 62.2 % had dementia compared to males (33) 39.8% with a significant p-value of 0.015. Our study showed the risk of mild to moderate dementia rising with the increase in the mean age 47.29±7.63 years to 52.50±8.85 years respectively with significant p-value of 0.006. The risk of dementia increased with the duration of diabetes as patients with mean 3.74±2.32 years of diabetes had mild dementia whereas patients with mean 9.20±3.91 years of diabetes had moderate dementia with a significant p-value of 0.001.

**Conclusion:** Finding of this study concludes that more females suffer from dementia in metformin users with T2DM and the risk of dementia increases with age and with the duration of diabetes.

**Key Words:** Age, dementia, gender, metformin, type 2 diabetes mellitus (T2DM)

## INTRODUCTION

Dementia is a disorder in which there is a decay in memory, thinking, conduct and the capacity to do regular performance and activities[1]. Roughly 47 million people are living with dementia globally and this number could triple by 2050[2,3]. Dementia has become a global health concern[4]. Despite the fact that it is a major health issue, the response (treatment and slowing its progression) is slower in developing countries like Pakistan. Previous studies in our country show lack of knowledge about the disease which makes people consider dementia to be age related changes[5]. The over

all expenses of dementia were assessed to be US$818 billion in 2015, about 35% increase from 2010, in which 86% of total expenses happened in developed nations. The limit of US$1 trillion was expected to be crossed by 2018[6]. Expenses of casual consideration and immediate expenses of social consideration still contribute comparable extents of absolute expenses, though the expenses in the medicinal area are much lower[7].

Individuals who develop dementia before the age of 65 years are said to have early-development (or working age) dementia and those influenced after that age to have late-development dementia[7]. Changes in the progression of dementia can be decreased with lifestyle modifications like regular exercise, controlling diabetes, maintaining a healthy BMI, controlling smoking and hypertension[2]. Additionally, initially treatable dementia might become untreatable after a delay in analysis[8]. Some studies show that patients of diabetes mellitus (DM) with mild cognitive problems are prone to developing dementia in comparison to individuals that do not have diabetes with mild cognitive impairment[9]. In addition to other complications in T2DM, either microvascular or macrovascular, changes cause 1.5

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to 2.5 fold increase in risk for dementia[10]. T2DM can cause early onset of dementia[11].

DM is considered as a centennial pandemic[12]. Diabetes prevalence for all age groups was estimated to be 2.8 percent by 2000 and is anticipated to rise 4.4 percent by 2030[13]. DM is a disorder of metabolism which presents as higher blood glucose levels and abnormality in the release of insulin, its effect on target tissues, or these two combinations[14]. DM is categorized into Type 1 DM, T2DM, and Gestational Diabetes. The lack of secretion of insulin causes Type 1 diabetes. People who are at risk of developing this type of diabetes can frequently be distinguished by serology of a pathologic immune system activity in the pancreatic islets, as well as genetic indicators.

In the other, considerably more prevalent class T2DM, the cause is a combination of resistance in insulin activity and insufficient insulin secretion[15,16]. Insufficient glycemic control is an important, modifiable risk factor for complications of diabetes, and the target for glycemic control should be achieved for prevention of complications[17]. Type-3-DM name has been given to dementia because of the similarity of features and association of both cognitive decline and DM[18]. Physicians believe that dementia is a contingency and ramification of DM[19]. Despite the fact that the relationship between diabetes and these mild changes in perception is currently recognized, the connection between diabetes and dementia is an area of debate.[19] Diabetes is a risk factor for dementia, yet whether anti diabetic medicine diminishes the hazard is not clear. Metformin, FDA-accepted in 1994, is an anti-diabetic drug used in T2DM. Metformin comes in both prompt release and extended release and is utilized as single or in combination with other anti-diabetic drugs[20]. Metformin has turned into the main line treatment for patients with T2DM[21]. Metformin is the anti-diabetic drug which could decreased macro-vascular complications as well as ability to control blood glucose level. Metformin is used to treat T2DM and also appears to target age related mechanisms. A few mechanisms are significant to glucose digestion, yet for aging, these may not be the most significant ones[22]. Metformin use was related with impaired cognition[23]. Some studies show decrease in the progression of dementia in metformin users of T2DM[24]. Some studies are there for targeting aging with metformin[25].

Dementia can be diagnosed by clinical findings and lab or imaging tests can give supportive evidence.[26] MMSE is the recommended analytical tool for the screening of cognition and dementia[27]. This is a relatively easy and quick to perform 30-point test and does not require additional equipment to assess the concentration, orientation, attention, naming, verbal memory, and visuospatial skills of the respondents. In our country, developing dementia is a big reason for concern. In Pakistan, insufficient data exists on the analyses and frequency of dementia in metformin users with T2DM, and their relationship to age, gender, and diabetes duration. The objective of this study is to determine association of dementia in metformin users with T2DM at JPMC Karachi. This study could help T2DM patients to identify their risk factors for dementia and seek information on how to avoid dementia or slow its progression.

## METHODOLOGY

This was a cross-sectional study in which patients were recruited from the Diabetes Clinic JPMC, Karachi's outpatient department after IRB (Institutional Review Board) approval (Ref N0.f.2-81/2O2O-GENI/393228/JPMC). The study lasted six months, from February 2020 to August 2020.

Taken from previous studies, the prevalence of Dementia is 5% in most world regions[28]. The sample size was determined on the open EPI 21 version as a reference using online tools. The sample was computed as 73 patients with a margin of error of 5% and a confidence level of 95%, however, we found 83 patients with dementia out of 350 patients of T2DM.

Patients on metformin were included and all other insulin users or other hypoglycemic users were excluded. Out of 350, total 83 patients having dementia were selected by MMSE and categorized as mild dementia, moderate dementia, and sever dementia by scoring. The score of 30 is the highest in MMSE. Mild dementia is indicated by a score of 20 to 24, moderate dementia by a score of 13 to 20, and severe dementia by a score of less than 12. Patients were advised not to take any other medications except medicine of diabetic disease at least for two weeks to provide drug free interval after recruitment by MMSE. Patients were categorized as mild and moderate dementia as we did not find severe dementia. The patients were evaluated by self-generated questionnaire for association with age, gender, and duration of diabetes.

## RESULTS

Table I presents that patients with mean age of 47.29±7.63 had mild dementia, whereas patients having mean age of 52.50±8.85 had moderate dementia with a p-value of 0.006 that was statistically significant. It shows that there was a strong correlation among age and the onset of dementia in T2DM. Mean duration of the years of diabetes mellitus was 3.74±2.32 in mild

**Table I: Mean Demographic Characteristics Among Mild and Moderate Dementia (n=83)**

| Variables | Mild Dementia Mean ± SD | Moderate Dementia Mean ± SD | p value |
|---|---|---|---|
| Age in Years | 47. 29 ± 7.630 | 52.50 ± 8.850 | 0.006 |
| Duration of DM in Years | 3.74 ± 02.32 | 09.20 ± 3.9100 | <0.0010 |

*Significant at p<0.05, **Highly Significant at p<0.01

**Table II: Frequency of Mild and Moderate Dementia in Males and Females (n=83)**

| Variables Gender | Mild Dementia n (%) | Moderate Dementia n (%) | Total Dementia n (%) | p value |
|---|---|---|---|---|
| Male | 15.(29.4%) | 18.(56.2%) | 33.(39.8%) | 0.015 |
| Female | 36.(70.6%) | 14.(43.8%) | 50.(62.2%) | 0.015 |

*Significant at p<0.05, **Highly Significant at p<0.01

dementia, while patients of moderate dementia had mean duration of diabetes 9.20±3.91 years, with a statistically significant p-value (<0.001) that showed there was strong association between dementia and the years of duration of diabetes.

Table II and Fig I show that there was a statistically significant link between gender and dementia (p-value = 0.015). Out of 83 dementia patients, men with mild dementia were 15 (29.4%), whereas 18 (56.2%) men had moderate dementia. Mild dementia affected 36 women (70.6%), while moderate dementia affected 14 (43.8%) out of 83 dementia patients. Out of 83 patients, more women (50) 62.2 % had dementia compared to men (33) 39.8%.
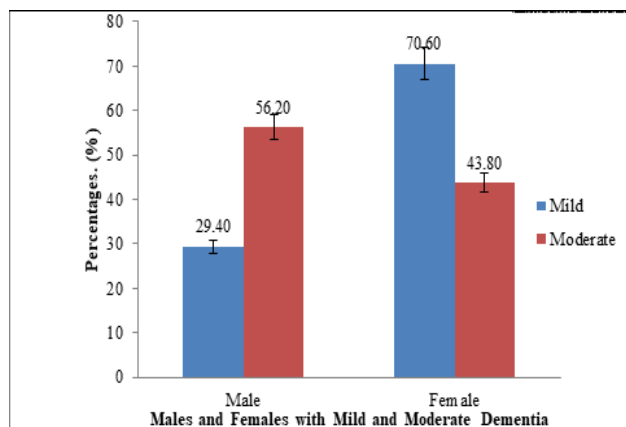


Fig. I: Frequency of Mild and Moderate Dementia Among Genders

## DISCUSSION

Both dementia and diabetes are on the rise and may soon become global epidemics[28]. Diabetes and its consequences are known to raise the risk of dementia and cognitive impairment[29]. The current exploratory study aimed to look into the predisposing variables for dementia and to describe the link between T2DM and dementia in the Pakistani community.

Total 350 patients were evaluated by MMSE in which 83 dementia-affected T2DM patients were chosen for investigation, with 60.2 percent females and 39.8% males. Female patients had a greater rate of dementia among patients of T2DM than male patients with significant p-value of 0.015, which is in line with prior research[29,30]. In Pakistan, women have little awareness about the condition. Females have a greater obesity incidence and are less physically active than males, which can lead to diabetes, which can cause cognitive impairment and dementia[31].

Current study showed that the patients of mild dementia had a mean age of 47.29±7.63 while those who had moderate dementia had the mean age of 52.50±8.85 with a statistically significant p-value of 0.006 that shows strong relation among age advancement and progression from mild dementia to moderate form of dementia.

Insulin resistance in prediabetes stage has been linked to an increased risk of cognitive decline, followed by an increased risk of brain atrophic injury, which may be the cause of development of dementia[32]. Our study results show that the duration of diabetes mellitus is strongly related with the progression of level of dementia, as there was mild dementia if the duration was 3.74±2.32 years, and progress to moderate dementia when duration of diabetes in mean years was 9.20±3.91 with a highly significant value p-value (<0.001).

# CONCLUSION

Findings of this study conclude that dementia in metformin users of T2DM is more in females and the risk of dementia increases with age and with the duration of diabetes.

**Conflict of interest:** The authors declare no conflict of interest.

**Authors' Contributions:** RF: Conceived the idea and reviewed the article; HA: Drafted the article and reviewed literature; SMA: Supervised and critically revised; SN: Performed analysis and editing; SSK: Reviewed and edited the draft.

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# ORIGINAL ARTICLE

# Prevalence of Gingivitis and its Severity in β-thalassemia Major (TM-β) Patients at a Thalassemia Center in Karachi, Pakistan

Ayesha Hanif[1], and Komal Khan[2]

## ABSTRACT

**Objective:** To determine the prevalence of gingivitis and categorize the severity of the disease in β-thalassemia major (TM-β) patients according to gender at a thalassemia center in Karachi, Pakistan.

**Methodology:** In this cross-sectional observational study, patients were screened via consecutive sampling over a duration of three months from November 2021 to February 2022. A total of 36 patients (18 males and 18 females) fulfilling the selection criteria were assessed. Clinical examination for gingivitis was carried out with a periodontal probe (UNC-15) according to Loe & Silness Gingival Index (GI). The results were analyzed using Microsoft Excel 2019 and IBM SPSS statistics version 23.0. Categorical data (gender, severity of gingivitis) was expressed as percentages and frequencies. Age, GI score was presented as mean and standard deviation.

**Results:** 86% of the assessed individuals had gingivitis, out of whom 6% had mild gingivitis, 44% had moderate and 36% had severe gingivitis. However, there was no gender predilection observed for the distribution of severity of disease.

**Conclusion:** Thalassemia patients present with increased prevalence of gingivitis due to compromised immune function. The need to manage the disease burden and identifying the apprehensions of a general dentist in treating these patients is required. Moreover, awareness about neglected oral health is needed for all the stake holders involved in the preventive and therapeutic management for this cohort.

**Key Words:** β-Thalassemia major, gingivitis, oral health

## INTRODUCTION

Globally, thalassemia is the most commonly prevalent, yet preventable genetic disorder, in which the impaired haemoglobin synthesis results in life threatening anaemia and mandates regular blood transfusion for survival[1]. Along with gene drifts and founder effects, consanguineous marriages are cited as reasons for increased prevalence of thalassemia in the Sub-continent, Middle East, Mediterranean countries and North and Central Africa[2]. The World Health Organization (WHO) has proposed priority in the control of blood disorders, particularly β-thalassemia, in the third world countries[3]. Pakistan represents one of the highest thalassemia burdened countries in the world[4]. Despite the overwhelming disease burden, there is unfortunately no baseline registry available, but a figure of 100,000 transfusion dependent thalassemia patients is a commonly quoted statistic[4]. The estimated carrier rate is 5–7% with approximately 9.8m carriers, with around 5000 children diagnosed with TM-β every year in Pakistan[5].

β Thalassemia major (TM-β) exhibits distinctive oral and facial features alongwith their systemic manifestations. Protruded maxilla, severe crowding, open bite, protruded upper lip, flattened nose bridge and glossitis are some of the observed oral features in these patients[6-8]. TM-β patients have reduced number of T-cells which negatively affects the activity of B-cells, thus rendering the immune system compromised against the infectious agents. Due to reduced haemoglobin, compromised immune activity and higher

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susceptibility to infection, special considerations are warranted for dental patients[9]. Along with these factors, xerostomia in these patients further reduces salivary defense mechanism and hence they demonstrate significantly high periodontal and gingival inflammation[10].

Due to regular transfusions, iron accumulation and surplus amounts of iron in systemic tissues of the thalassemia patients is well documented[11]. Iron deposits have also been found in the gingival tissues of TM-β patients[12]. Breakdown of haemoglobin leads to accumulation of bilirubin in the dentinal tubules of these patients leading to characteristic yellow discoloration of their teeth[13] [fig 1].



Figure 1: Intra oral picture of a thalassemia patient showing Pre (A) and post (B) scaling appearance. The blue arrows point at the characteristic yellow discoloration of the teeth

Despite Pakistan being one of the heaviest burdened countries with TM-β, no registered surveys are available about any aspect of thalassemia in the country, including treatment needs (specially focusing on dental health), treatment facilities and their access and resources to control and prevent the disease.

The aim of this cross-sectional study was to identify gingival health status in TM-β patients and prompt attention to the possible neglected oral care in these individuals alongwith highlighting the need for nationwide registry that reports baseline data for gingival diseases in these patients. Without the basic information, it is difficult to direct the attention of health policy makers to allocate necessary resources in providing oral healthcare to this cohort of the community.

## METHODOLOGY

This cross-sectional observational study was a joint collaboration of Ziauddin College of Dentistry (ZCD), Karachi and Afzaal Memorial Thalassemia Foundation (AMTF), Karachi. The ethical approval for the research was obtained from the Ethical Research Committee

(ERC) at the Ziauddin University, bearing the reference code (0780119AHOM). A signed informed consent and minor assent form was filled by all study participants and their guardians.

Sample size was calculated with Open Epi version 3, where confidence interval (Z) was 95%, margin of error (E) at 5% (0.05) and expected prevalence (P) of 50%, resulting in a total sample size of 32[6]. Accounting for non-participation, Four participants were included additional to the original sample size. Participants were screened via consecutive sampling technique. A total of 36 patients (18 males, 18 females) between the age range of 10 and 20 years, fulfilled the selection criteria and were included in the study. All patients diagnosed with TM-β, age >10 years, patients who received or were currently receiving iron chelation therapy with deferasirox, calcium, vitamin D, and regular erythrocyte transfusion were selected. All patients with any systemic comorbidities, history of antibiotic use during the past three months, history of dental prophylaxis during the past six months, history of active infection with HIV, Hepatitis B and Hepatitis C, were excluded.

The study followed the Strengthening The Reporting of Observational Studies in Epidemiology (STROBE) guidelines[14]. Every selected participant and their guardian were briefed about the study protocol and objectives. They were assured that the gathered information was to remain confidential and will only be reproduced for educational and research purposes. The participation was fully voluntary and the participants were allowed to withdraw from the study at any time they wanted with no negative consequences. Upon understanding and agreement, an informed consent form and a minor assent form was signed by the guardian and the participant <18 years of age, in the presence of the chief investigator and verified by the research assistant. All the patients who presented with gingivitis were provided with cost free, appropriate Non-Surgical Periodontal Therapy (NSPT) and relevant adjuncts (at AMTF), which is the continuing arm of this research.

The primary clinical parameter to assess the prevalence and severity of gingivitis was Bleeding on Probing (BoP) and was recorded with the Gingival Index Score (GI) by Silness and Löe[15][Table 1].

Table 1 Gingival Index Score (GI) by Silness and Löe

| Scores | Interpretation |
|--------|----------------|
| 0 | Normal gingiva |
| 1 | Mild inflammation — slight change in colour, slight edema. No bleeding on probing |
| 2 | Moderate inflammation — redness, edema, glazing, bleeding on probing |
| 3 | Severe inflammation — marked redness and edema, ulceration, tendency towards spontaneous bleeding |

This index provides high sensitivity and reproducibility, given the examiner has adequate knowledge of periodontal tissues. The bleeding was assessed by conducting periodontal probing using UNC-15 probe (Hu-Freidy, Chicago, USA) lightly along the gingival wall of the sulcus of all non-restored teeth except the third molars. The scores of four areas per tooth (mesio-buccal, disto-buccal, mesio-lingual and disto-lingual) were summed and divided by 4 to give the GI of the particular tooth. A sum of all the values and dividing it by the total number of teeth examined provides the GI of the individual. The score was interpreted as follows:

0.1 – 1 = mild inflammation
1.1 – 2.0 = moderate inflammation
2.1 – 3.0 = severe inflammation

The recordings were noted on the periodontal chart produced for the research. The results were expressed in percentages and frequencies for all the categorical data.

## RESULTS

To check for the intra-examiner reliability, kappa statistical analysis was performed on 5 readings with research assistant being the rater and chief investigator being the examiner. At kappa agreement value of 1.000, there was almost perfect level of agreement achieved. The overall prevalence of the gingival diseases in the assessed individuals was 86% with 14% healthy individuals. Among the 86%, 6% cases had mild gingivitis, 44% had moderate gingivitis as illustrated in Fig 2.
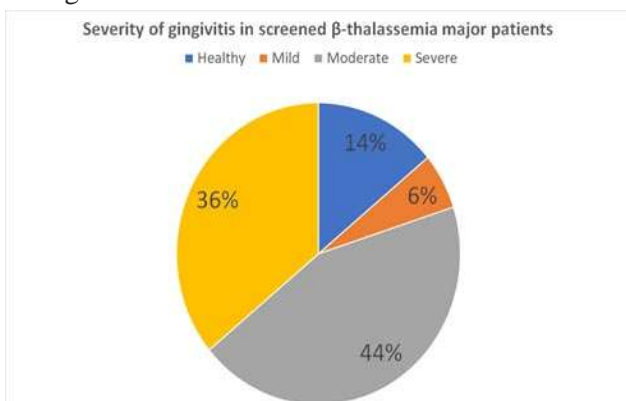


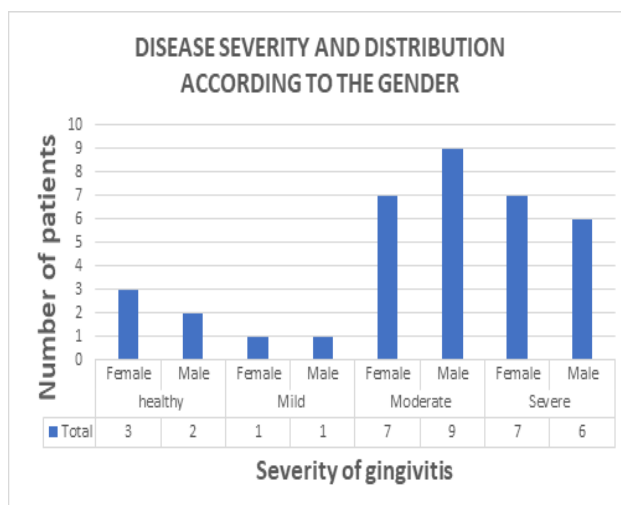Figure 2: Overall distribution of healthy and diseased individuals



Figure 3 Distribution and severity of gingival disease according to gender

The prevalent severity of gingivitis in the study population and disease distribution according to the gender, as measured by GI score is shown in Table 2 and illustrated in Figure 3. No gender predilection was observed for the distribution of disease severity.

## DISCUSSION

Despite extensive study on the pathophysiology of thalassemia, there is little information about the association between periodontal diseases and thalassemia. The available researches provide conflicting results, where some studies have found positive correlation between thalassemia and higher prevalence of gingival diseases while others negate the effect. Our study has shown that 86% of the participants presented with gingivitis which is in accordance with the results of a study by Nuraini et al. Who reported 100% prevalence of gingivitis, among their study population in comparison with healthy controls[12]. Akcalý et al. In their systematic review, reported the results from 14 studies showed higher GI in the thalassemia major patients, with significantly higher values (P < .001) than were seen in the control group[6]. Another study in Iran which is yet another highly affected country with TM- β, reports increased prevalence of periodontal diseases in these patients[16]. However, Gümüs et al. Reported no significant differences in the clinical parameters for gingival

Table 2: Gingival Condition Status of the Study Participants Based on GI Score Interpretation

| Gingival Condition No. of patients (n) | Healthy n=5 | Mild Gingivitis n=2 | Moderate Gingivitis n=16 | Severe Gingivitis n=13 |
|---|---|---|---|---|
| GI score (Mean ± SD) (male:female) | 0 (3:2) | 0.85 ± 0.21 (1:1) | 1.47 ± 0.31 (7:9) | 2.33 ± 0.29 (7:6) |
| Confidence Interval | -- | (1.15-0.55) | (1.63-1.32) | (2.49-2.16) |

diseases among the test (Thalassemic) and control (healthy) group, while Al-Raeesi et al. In their cross-sectional study report significantly less prevalence of gingivitis in TM-β[17,18]. And yet, in a very recent study, increased prevalence of gingivitis in thalassemic children was reported[19].

The literature suggests that there is increased prevalence of gingival and periodontal diseases in TM-β patients, as observed in the current study as well. However, the severity of disease distribution in TM-β patients has not been reported. This study reports the overall prevalence of gingivitis in TM-β patients in a Pakistani population and also stratifies the severity of gingivitis according to gender. It was interesting to note that the severity of gingivitis in TM-β patients shows no gender predilection [Fig 3]. With the majority of the study participants presenting with moderate (44%) and severe (36%) forms of gingivitis, it is essential that attention should be directed to oral healthcare protocols in this group.

Despite the disease burden, unfortunately there are no reported studies in the country regarding any aspect of thalassemia, specially catering to oral health. During literature search, we found one study which was conducted in Karachi which reported higher prevalence of gingival diseases in the thalassemia patients[20].

Although there are thalassemia prevention legislations in Sindh and Balochistan, there exists regulatory oversight in their planning since the legislations did not take into account any public and professional dialogue with the thalassemia community[21,22]. Management of thalassemia in countries like Pakistan pose a major challenge. It is a disease that is easily preventable but keeps increasing the burden because of lack of preventive measures and protocols. There are more than 40 thalassemia centers currently operating across the country yet majority of them are just focusing on transfusional support[23]. These centers lack the multi-specialty treatment facilities mostly because of the lack of government support and unawareness about other systemic health challenges, including oral health. There is a dire need to establish facilities for thalassemia patients where dental care is met for these patients by expert dental practitioners in liaison with the healthcare professionals.

Although poor oral hygiene and general unawareness and disregard towards oral health by the individuals and their families is a contributing factor towards concerning oral health condition in this cohort, it has been observed that dentists lack expertise in treating patients with thalassemia[6,8,24,25]. Consequently, seeking help and access to appropriate care becomes problematic. Thalassemia requires multi-specialty approach in the treatment of dental disorders and a general dentist may not be well-versed with the implications of the disorder[9,23,26]. Therefore, they might fail to liaise with the haematology experts where required. Moreover, fear of the unknown leads to reluctant behavior in the dentists where there is a need to provide more than just the basic dental care to these individuals[8].

Within the limits of the study, the results demonstrate increased prevalence of gingivitis in thalassemia patients. The aim is to highlight the prevalence of increased gingival diseases and prompt attention of the dentists, the thalassemia centers and the governing bodies to devise appropriate steps and expedite the measures to cater to the oral health of this cohort.

**Limitation and future recommendation:** A small sample size might not accurately represent the entire target population, leading to potential selection bias and reduced generalizability of findings. It can also limit the statistical power of the study to detect significant associations or differences. Collaborating with multiple centers and using stratified sampling techniques can enhance diversity and increase the robustness of the study.

# CONCLUSION

The current study shows high prevalence of gingivitis among TM-β patients as is reported in several other studies. There has been adequate commentary about the pathophysiology of the disease but the actual burden of the disease remains unreported, especially in Pakistan. As no clinical and epidemiological statistics for the oral health conditions of thalassemia patients exist, it is difficult to direct resources for the prevention and management of periodontal condition in these patients. These surveys will help provide recommendations in improved management of the thalassemia situation and will gradually ease the burden on an already resource-constrained healthcare system. Additionally, these endeavors are expected to provide patients with improved avenues for accessing appropriate dental care.

**Conflict of interest:** The authors declare no conflict of interest.

**Authors' Contribution:** AH: Primary author, conducted the research, wrote the manuscript, and collected data; KK: Assisted in data collection, patient screening, and clinical therapy and management.

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# CASE REPORT

# Situs Inversus with Sigmoid and Transverse Colon Volvulus: A Case Report

Tashaba Qaiser Faizi

## ABSTRACT

Situs inversus can be defined as the interchanging of right and left symmetry of organs in thorax and abdomen. It is among the infrequent embryological disorders that a surgeon encounters in surgical practice. In this case report, an old male with apparent diagnosis of sigmoid volvulus was found to have situs inversus when he underwent explorative laparotomy.

## BACKGROUND

Situs inversus is an embryological disorder that is found infrequently. It can be defined as the interchanging of right and left symmetry of organs in thorax and abdomen. Multiple theories exist regarding its cause pertaining to genetic changes in early foetal life. Because of its rarity, it presents as a diagnostic dilemma to surgeons in clinical practice[1].

## CASE REPORT

A 70 years old male with no known co-morbidity presents to the Accidents and Emergency Department of Jinnah Postgraduate Medical Centre complaining of abdominal pain for seven days. The pain had started in the peri-umbilical region and later on became diffused and constantly associated with multiple vomiting episodes which were not connected with taking food. He had a history of appendectomy at the age of 16, but the record was not available.

On clinical examination, pulse was 110 beats per minute, blood pressure 110/70 mm of HG, respiratory rate 32 breaths per minute, abdomen was distended with generalized tenderness all over the abdomen with absent gut sounds. Findings were suggestive of peritonitis. On digital rectal examination, finger stocking had fecal staining positive. Laboratory investigation showed haemoglobin of 13gm/dl and total leukocyte count of $10 \times 10^6$. The rest of the investigations were unremarkable. Abdominal X ray (Fig 1.1) shows coffee bean appearance raising the suspicion of sigmoid volvulus. All of the points in the history, examination, and on radiological imaging, were suggestive of peritonitis secondary to sigmoid volvulus. Patient underwent explorative laparotomy which showed situs inversus total with spleen on the right, liver on the left, caecum on the left, and feculent contamination of abdominal cavity due to transverse colon perforation. The whole large gut was massively dilated with volvulus of transverse and sigmoid colon along with necrotic extending from hepatic flexure till sigmoid colon (Fig 1.2, 1.3, 1.4). Colectomy was done, alongwith end colostomy and distal rectal stump closure. On third post-operative day, the patient developed burst abdomen, with massive edema of whole gut with purulent flakes all over the gut shown in Fig 1.5, which was treated with abdominal washout and bagota bag dressing (sterile plastic bag covering the whole gut). Patient developed pneumonia for which he was treated. From the second post-operative day, the gut edema started resolving as shown in Fig 1.6. The patient managed with daily dressing and symptomatic treatment. On day seven, he developed productive cough which showed pseudomonos. On the basis of sputum culture and sensitivity, antibiotics were given. Daily chest X-rays and complete blood picture were done to monitor the response. Initially, the patient showed improvement, but later on he developed sepsis secondary to pulmonary infection and died due to pulmonary complications on the 30th post-operative day.

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Fig 1.1: Coffee bean sign


Fig 1.2: thinned out gut


Fig 1.3: Liver on left side


Fig 1.4: Spleen on right side


Fig 1.5: Burst abdomen


Fig 1.6: Edema resolution

## DISCUSSION

Situs anomalies refer to a group of disorders which range from situs solitus which means normal symmetry of organs, solitus ambigus which refers to the contradictory relationship of cardiac atria to viscera, and situs inversus totalis which is a rare entity with different frequency in different regions[2,3]. The frequency is 1 in 25,000 patients with no difference in age or race[4]. This patient presented with the history of abdominal pain in periumbilical region, which later on became diffused. No clue about anatomical rarity was evident from history.

SIT is not a separate entity. It is associated with multiple diseases affecting cardiovascular and hepatobiliary systems[5]. It can be associated with either dextrocardia or levocardia, while situs inversus with dextrocardia is more common[6]. Situ inversus can be associated with midgut malrotation but the conditions do not necessarily accompany each other, as abnormality in malrotation is the inability of the gut to undergo counterclockwise rotation. Management per operatively changes when these are encountered together. Gut has to be derotated and large gut has to be fixed on the left and small on

the right[7]. In a study done to calculate post-op pulmonary complications risk for elective and emergency laparotomies, it was found that emergency laparotomies carry higher risk for pulmonary complications than elective[8].

**Consent:** Consent related to the pictures and history was taken from the family.

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## LETTER TO EDITOR

# False Negative (FN) Results Challenging the Reliability of Medical Research in Cases of COVID-19 Variant

Zeeshan Asim[1], Shahryar Sorooshian[2], and Surriyya Sarwat[3]

## ABSTRACT

Coronavirus variant turned out to be the top preference and the leading subject in medical sciences journals in the recent years. However, the rapid propagation of initial healthcare information created issues with some false negative results (FN) in cases of genetic variants of COVID-19. This letter discusses the implications of false negative results (FN) as these are included in research findings due to the rapid propagation of early healthcare information.

**Key Words**: Coronavirus variant, False negative results (FN), SARS-CoV-2

**Dear Editor,**

Since January 2021, coronavirus variant (SARS-CoV-2 VOC 202012/01: Variant of Concern, year 2020, month 12, variant 01) has turned out to be the top preference and the leading subject among medical sciences journals[1]. At present, 100 % reactive anti-viral agent against the coronavirus (COVID-19) does not seem to be on offer. Healthcare professionals and governments are the frontline stakeholders striving for breakthroughs against corona-variant. Research journals have played a pivotal part by encouraging and promoting research on coronavirus variant to ensure all the stakeholders have instant access to adequate insight on SARS-CoV-2 VOC 202012/01. Some publishers have expedited publication processes in order to encourage papers on COVID-19 variant, while other journals have waived publication charges in order to promote the sharing of knowledge with the developing countries[2]. Rapid publications have been vital in informing the lay press and allowing healthcare professionals to get early insights into the epidemiology of the COVID-19 variant. However, the rapid propagation of early healthcare information created issues with some false negative results (FN) in case of the genetic variant of COVID-19.

The potential threats to the patient of a false negative result (FN) include delayed supportive treatment and lack of regular monitoring of people in close contact for symptoms resulting in high risk situations[3]. This could have severe implications as it is challenging the reliability and validity of medical findings. The false negative result (FN) may transpire at any stage of the molecular testing during the exploration of COVID-19 if any alteration is visible in the part of the genome analyzed during the test. One of the outcomes of testing is to facilitate researchers in analyzing the data swiftly[4]. This process, however, has its limitations like rapid propagation of premature studies with hastily-acquired data due to false negative results (FN). These studies yield decisive recommendations based on inadequate conclusions resulting in distortions with adverse implications.

This is opening a new Pandora's Box in the realm of research related to the epidemiology of COVID-19 variant, as more manuscripts with similar scope would continue to be submitted. Publishers could be vigilant to decrease the distortion especially for studies related to clinical trials by using the following practices. The manuscript must narrow the scope of study related to genetic variants of SARS-CoV-2 and highlight false negative results with thorough review process.

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Manuscripts must highlight tests that practice multiple genetic targets to limit the final results, which are less likely to be affected by the occurrance of genetic variant. Also, these include the indications of false negative results in blend with clinical observations. These steps allow the journals to reduce distortion especially for studies related to clinical trials while highlighting the trend on genetic variants of SARS-CoV-2 research.

**Authors' Contribution:** ZA: The main author conceived the idea, conducted the research, and drafted the letter. SS: Assisted in the findings of facts and provided valuable insights. SS: Validated the content and ensured its accuracy.

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