

Occupational Health Risks among Pathologists and Pathology Trainees: An Analysis of Prevalence and Factors

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Abstract

Objective: To assess the prevalence of work-related hazards faced by Pathologists and residents in the Pathology laboratory in Pakistan.

Method: This cross-sectional study was conducted over a period of one month from January 2023 to February 2023. The research questionnaire was shared online amongst the Pathologists and Pathology residents. The collected data was analyzed using SPSS version 28. The qualitative data was described in terms of percentages or frequencies and analyzed using the Chi-square test. A P-value < 0.05 was considered statistically significant.

Results: Out of 172 participants, the majority (74.5%) were females. 51.6% of the participants had 31 to 45 hours working, with 26.7% spending 2-4 hours daily on the microscope. Musculoskeletal disorders were seen in 93.2% of the study population followed by visual strain (90.6%) and anxiety and stress in 90.1%. 35.4% reported that the pain was severe enough to take off from work, which involved a greater percentage of females (38%) than males (26%). Males were found to exercise more as compared to females (p-value= 0.044). A significant finding in our study was that psychological disturbances were experienced more in females as compared to males (p-value=0.00,0.00 & 0.00).

Conclusion: This study highlights the importance of workplace-based hazards faced by pathologists. Postural support, monitoring work hours, and taking small stretch breaks can play an important part in their professional well-being.

Keywords: Occupational hazards, safety, pathologists

How to cite: Sarwar A, Begum A, Cheema KH, Rauf M. Occupational Health Risks among Pathologists and Pathology Trainees: An Analysis of Prevalence and Factors. *Esculapio - JSIMS* 2023;19(02):193-198

DOI: <https://doi.org/10.51273/esc23.2519212>

Introduction

Healthcare workers have always been at risk of exposure to hazardous substances, sometimes, the damage is acute even life-threatening like in the COVID pandemic while in other instances their sufferings are subtle, slowly compromising their health.^{1,2}

Pathologists working in the background and helping the clinicians in proper treatment of their patients, through the precise diagnosis of diseases are constantly exposed to infectious agents and hazardous chemicals in the laboratory.³ In most low- and middle-income countries, the safety measures and standards to protect healthcare workers are not up to the mark.⁴ Insufficient resources, poor data collection and ineffective enforcement of regulations all contribute to increasing occupational health hazards. Risk management is an important but neglected aspect of the medical field. This should be incorporated into everyday practices and people concerned must be aware of the risks and the remedies.⁵ The prevalence of work-related hazards faced by Pathologists and residents working in pathology laboratories

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Submission Date: 05-04-2023
1st Revision Date: 29-04-2023
Acceptance Date: 01-06-2023

varies worldwide but is consistently present throughout.⁶ To the best of our knowledge, not much work has been done in the past to find out sufficient data from the Pathologist population of Pakistan. We find it important to do so, also making them aware of the potential risks and find out a solution in the form of safe conditions and a healthy working environment where they can practice their profession in better health. The association or prolonged use of a microscope and the development of chronic pain syndromes is a long-known problem however most pathologists are not very well informed about this hazard. They first realize it when they experience it. Musculoskeletal disorders are the most common work-related injuries noticed by pathologists worldwide followed by stress, burnout, depression, neuropathies, and respiratory problems.^{6,7} Musculoskeletal disorders are strongly associated with continuous and long hours of using microscopes and computers. In the majority of cases, the damage and severity of symptoms are directly proportional to the time spent on these devices. Without conscious awareness, these professionals are attaining awkward postures which are very damaging for their neck, shoulder, and lower back leading to variable symptoms the most important indeed is the pain, which becomes responsible for their days off from work.⁸ Multiple studies have highlighted that the microscopes commonly used are not optimized and do not provide a neutral sitting position, requiring the pathologist to bend forward giving them a posture called the so-called pathologist's hump.

The importance of following postural guidelines, monitoring work hours, taking small stretch breaks, and creating awareness about ergonomics can't be underestimated. More than 60% of pathologists reported relief of their musculoskeletal problems using an ergonomically optimized microscope.⁸ Visual impairment is another common work-related problem in this occupational group.⁶ Although, most pathologists have ametropia, even before joining this field many have noticed aggravation of symptoms in the form of deterioration of refractive errors during their work years in Pathology.

Formaldehyde is a hazardous chemical which is widely used in pathology laboratories worldwide. Its ability to penetrate the tissues deeply and its low cost makes it a preferred selection for tissue fixation and processing. This ability of the chemical, on the other hand, is a source of chronic health problems for the pathologists dealing with it.⁷

Studies have shown that exposure to formaldehyde leads to wheezing, (24%), (%), burning eyes (25%), and cough (21.7%).⁹⁻¹¹ Certain malignancies including brain tumors, lympho-hemopoietic neoplasms, and nasopharyngeal and pancreatic cancers are being linked to formaldehyde exposure, although the relationship between cancer and formaldehyde is still not well established.⁹⁻¹¹ Its use in floor and equipment disinfection is another application in pathology laboratories. It is somewhat difficult to remove this chemical from the labs. But the concerning fact is that exposure level to this chemical is usually not monitored in our laboratories. It is much beyond the acceptable occupational exposure limits. This is found to be maximum amongst the residents and the technologist involved in the histopathology section of the Pathology lab, involved in tissue grossing and processing.⁹⁻¹¹

Most of the above-mentioned problems can be mitigated by preventive measures and initiatives to reorganize the lab space, reposition gross stations and employ protective gear.

The chronic stress observed by Pathologists is itself a risk factor for multiple mental and physical health issues. A local study revealed that the anxiety score was the second highest among pathologists.¹² Many international studies document the increased risk of exposure to tuberculosis and transmission of blood-borne infections like HIV and HCV in healthcare workers of lower-middle-income countries.^{2,13} Working close to infectious aerosols put the pathologist at high risk of getting these infections. Needle puncture and cutting injuries are other possible sources of infection. The prevalence of latex allergy symptoms is also quite high ranging from 16 to 18% reported in three different studies. The risk of developing allergic symptoms increases with an increased period of contact while wearing latex gloves for an extended duration. Two studies reported a prevalence of 4.2% and 4.4% of the latex-specific IgE antibody levels. Pathologists and pathology residents working for long hours on the grossing stations are continuously exposed to the effects of latex. It is reported that the use of powder-free latex and nitrile gloves in labs significantly reduces the risk of these allergic symptoms.¹⁴⁻¹⁶ This study aimed to assess the prevalence of work-related hazards faced by Pathologists and residents in the Pathology laboratory in Pakistan, due to the lack of available data on the subject. The goal was to gather information on the types of hazards and their frequency to better understand the working conditions in the patho-

logy laboratory.

Materials and Methods

This was a cross-sectional study conducted over a period of one month from January 2023 to February 2023 after getting approval from the Ethical review board of CMH Lahore Medical College (IRB No: 737/ERC/CMHLMC). The research questionnaire constructed on Google Forms was disseminated via online social media platforms amongst the Pathologists and residents of Pathology working in any Pathology laboratory. Residents who have recently joined this field or spent less than two years in the environment of the Pathology laboratory were excluded. Informed consent was taken from the participating Pathologists and only those who show their willingness were included in the study. The sample size was calculated to be 161 using the formula $n = Z^2 P (1-P) / E^2$. This questionnaire was adapted from previous literature (Fritzsche et al)⁶, with some modifications taking into account the local conditions. It was reevaluated, and its validity and reliability were confirmed. Data was collected on a pre-designed, self-reported questionnaire with 6 sections comprising 43 questions related to demographics, occupational circumstances, working hours, and health issues like musculoskeletal disorders, visual problems, behaviour abnormalities, psychological disturbances, mental ailments, and other medical conditions. The collected data was analyzed using SPSS version 28. The qualitative data was described in terms of percentages or frequencies and analyzed using the Chi-square test. A P-value < 0.05 was considered statistically significant.

Results

The largest study population (38.5%) belonged to the 31 to 40 years age group followed by the group of 41 to 50 years (23.6). The majority (74.5%) of the participants were females. Consultants including both male and female pathologists constituted 62.7% of participants. Microbiologists constituted the largest group making 34.2% followed by histopathologists making 29.8% of the study population. 38.5% of the participants had been in their professional field for more than 10 years. 51.6% have 31 to 45 hours per week working hours. 26.7% reported that they spend 2-4 hours per day on the microscope and 41.6% spend two to four hours on computer screens. As most of the pathologists were working in institutions, they were following an individual signed out, however, 77.6% had a shared burden of responsibility regarding sign-outs in their department.

Regarding physical issues, musculoskeletal disorders were the most common seen in 93.2% of the study population followed by visual strain experienced by 90.6% and anxiety and stress in 90.1%. The frequency distribution of these disorders is shown in Table 1.

35.4% reported that the pain was severe enough to take off from work, which involved a greater percentage of females (38%) than males (26%). 47.2% required some medicine or physiotherapy to get pain relief. The work habits of participants are summarized in Table 2. Results show that those who follow recommended posture suffer less frequently from musculoskeletal problems (29.7%) as compared to 48.5% of those who

Table 1: Health issues faced by Pathologists

	Occasional %	Frequent %	Never %	Total
Neck/ shoulder pain	55.3	37.9	6.8	100
Wrist pain	36.6	16.1	47.2	100
Lumbosacral pain	55.3	24.8	19.9	100
Eye fatigue	24.8	65.8	9.3	100
Work related anxiety/Stress	67.1	23	9.9	100
Sleep disturbances	59.6	18.6	21.7	100
Latex skin allergy	20.5	5	74.5	100
Splashes on mucous membranes	32.9		67.1	
Any type of cutting injury during work	37.9		62.1	
Needle stick injury	49.7		50.3	

did not follow the recommended posture. Regarding the practice of taking stretch breaks, more males were in a habit of taking stretch breaks during their work hours, however, the p-value was not found to be significant (p-value=0.11). However, males were found to exercise more as compared to females (p-value=0.044). Stress and anxiety were the second most common complaint experienced by 90.1% of pathologists, some feeling occasionally (67.1%) and others frequently (23%). Feeling depressed at various times in their professional life was admitted by 66.5%. Reasons for feeling stressed out are shown in Fig.2. A significant finding in our study was that psychological disturbances including stress/anxiety, depression and feeling of burnout were experienced more in females as compared to males (p-value=0.00,0.00 & 0.00).

Regarding visual problems, 60.9% suffered from visual acuity problems before joining their specialty however 55.3% noticed deterioration in their vision after joining

seen in a study conducted in India where they found 37.8% of participants belonging to the age group of 36–45.³ Female pathologists and residents constituted 74.5% of participants. Similarly, females were in major proportion in other similar study groups making 62.2% and 54%.^{3,6} Consultants including both male and female pathologists constituted 62.7% of participants in comparison to 74.2% in another study.⁶ Musculoskeletal disorders were found to be the most common problems seen in 93.2% of the study population. Similar disorders were documented in more than three-quarters of Swiss pathologists, 85% and 67% of pathologists in different studies.^{6,8,3} Since pathologists frequently combine microscope and computer work, this can pose an additional musculoskeletal hazard. Musculoskeletal Pain remains the most common physical problem faced by pathologists worldwide. 57.8% of the pathologists mostly men (68%) were in the habit of taking small stretch breaks during working hours. However, most of them were not accustomed to any kind of exercise or regular walking to stay fit. Only 33.5 % were doing exercises regularly which is in agreement with an Indian study group (37.8%), however, 73.6% of the Swiss Pathologists were into regular sports/ exercise to help their wellbeing.^{3,6}

49.1 % admitted that they follow the recommended posture (sometimes or always), while 50.9% didn't bother to follow instructed postures while working on the microscope and computers. There was strong evidence that high levels of static contraction, prolonged static loads, and awkward postures involving the neck and shoulder muscles were associated with an increased risk for musculoskeletal disorders.⁸ Therefore, it is strongly encouraged to adopt preventive measures before the symptoms appear and to seek prompt medical advice if the symptoms appear. Although 67.1% of subjects were aware of the term ergonomics, the ergonomically designed workplace was available to only 23% as compared to 40.5% of pathologists in developed countries.⁶ This fact supports the international studies saying that, in low- and middle-income countries (LMICs), occupational health is often neglected due to limited resources.⁴ Stress/anxiety and feeling of burnout were the second most common health problem experienced by 90.1% of pathologists, with some having the feeling occasionally (67.1%) and others frequently (23%). Unfortunately, this is in sheer contrast to the results seen in the Swiss pathologist population, where less than 10% ever experience this feeling.⁶ 65.8% of the subjects in this study complained of eye fatigue, which is

much higher than in other study populations.^{3,6} Formalin exposure was reported by 23% and 52% of them were Histopathologists. 76.4% of exposed ones suffered from some degree of discomfort but specific allergies to formalin and latex were not common. Although 62.7% of pathologists have been exposed to chemical and infectious materials, less than 5% of the pathologists have been diagnosed with hepatitis B, C, Tuberculosis or HIV during their profession. This contrasts with the results produced by Roy who has reported the high rate of transmission of bloodborne infections in health care workers of LMIC and increased risk of tuberculosis.⁴ However, the possibility of latent tuberculosis in our subjects cannot be ruled out. Needle prick injury has been experienced by 50.3% while cutting injuries were reported by 37.9% of the study population which is even lower than seen in a Swiss study.⁶ PPE was available to 62.1% (sometimes or always), however, cut-resistant gloves were never available to the large majority (69.6%). This again supports the fact highlighted in some studies that safety measures and risk reduction strategies in Low-income countries are suboptimal, mainly due to resource limitations.

Conclusion

Pathologists face numerous problems, both mental and physical, which affect their overall well-being. We have emphasized the workplace-based problems faced by pathologists in our society can be reached by ----- the importance of postural support, monitoring work hours, taking small stretch breaks and creating awareness about ergonomics which can play an important part in their professional well-being.

Conflict of Interest *None*

Funding source *None*

References

1. <https://www.who.int/news/item/20-10-2021-health-and-care-worker-deaths-during-covid-19>
2. <https://www.who.int/news-room/fact-sheets/detail/occupational-health--health-workers>
3. Kumar DS, Kulkarni P, Nayana S, Murthy MR. Public health concern on occupational hazards among pathologists and microbiologists in Mysuru district, India". Int J Community Med Public Health. International Journal of Community Medicine and Public Health,2019;6(2):768–773

4. Rai R, El-Zaemey S, Dorji N, Rai BD, Fritschi L. Exposure to occupational hazards among health care workers in low- and middle-income countries: A scoping review. *Int J Environ Res Public Health*. International Journal of Environmental Research and Public Health, 2021;18(5).
5. Teare EL, Masterton RG. Risk management in pathology. *J Clin Pathol*. Journal of Clinical Pathology, 2003;56(3):161–3.
6. Fritzsche FR, Ramach C, Soldini D, Caduff R, Tinguely M, Cassoly E, et al. Occupational Health Risks of Pathologists - results from a nationwide online questionnaire in Switzerland. *BMC Public Health*. 2012;12(1). doi:10.1186/1471-2458-12-1054
7. Siow I, Yee CC, Ng K, Vijayan J, Ng A, Ong J, et al. Toxic exposure in a clinical pathology laboratory as a potential occupational hazard causing small fiber neuropathy *Int J Occup Med Environ Health*. International Journal of Occupational and Environmental Safety, 2022;6(1):9-13.
8. George E. Exposure and Management of the Health Risk for the Use of Formaldehyde and Xylene in a Large Pathology Laboratory. *Am. J. Pathol*. 2010; 133:805–18. Available from: <http://dx.doi.org/10.1309/AJCPUXDS5KJKRFVW9>
9. Fustinoni S, Campo L, Spinazzè A, Cribiù FM, Chiappa L, Sapino A, et al. Exposure and management of the health risk for the use of formaldehyde and xylene in a large pathology laboratory. *Ann Work Expo Health*. Annals of Work Exposures and Health. 2021;65(7):805–18
10. Jalali M, Moghadam SR, Baziar M, Hesam G, Moradpour Z, Zakeri HR. Occupational exposure to formaldehyde, lifetime cancer probability, and hazard quotient in pathology lab employees in Iran: a quantitative risk assessment. *Environ Sci Pollut Res Int*. Environmental Science and Pollution Research, 2021;28(2):1878–88.
11. Roy DR. Histology and pathology laboratories: Chemical Hazard Prevention and Medical/Health Surveillance. *AAOHN Journal*. American Association of Occupational Health Nurses, 1999;47(5):199–205.
12. Nisar K, Khan KH, Shah M. Anxiety and depression in doctors undergoing postgraduate training courses at Armed Forces Postgraduate Medical Institute Rawalpindi. *J Ayub Med Coll Abbottabad*. Journal of Ayyub Medical College Abbotabad, 2012;24(3–4):171–3.
13. Mossburg S, Agore A, Nkimbeng M, Commodore-Mensah Y. Occupational hazards among healthcare workers in Africa: A systematic review. *Ann Glob Health*. Annals of Global Health. 2019;85(1).
14. Kadivar M, Kabir-Mokamelkhah E, Habibi-Shams Z. Work-related hazards among pathologists and residents of pathology: Results of a cross-sectional study in Iran. *Iran J Pathol*. Iranian Journal of Pathology, 2021;16(3):274-83.
15. Mohanty A, Kabi A, Mohanty A. Health problems in healthcare workers: A review. *J Family Med Prim Care*. Journal of Family Medicine and Primary Care, 2019;8(8):2568.
16. Parisi CAS, Kelly KJ, Ansotegui IJ, Gonzalez-Díaz SN, Bilò MB, Cardona V, et al. Update on latex allergy: New insights into an old problem. *World Allergy Organ J*. World Allergy Organization Journal, 2021;14(8):100569.

Authors Contribution

AS, AB: Conceptualization of Project

AS, KHC: Data Collection

AS: Literature Search

AB, KHC: Statistical Analysis

AS: Drafting, Revision

MRA: Writing of Manuscript