Karaelmas İş Sağlığı ve Güvenliği Dergisi
Karaelmas Journal of Occupational Health and Safety
e-ISSN: 2636-7602

ÖZGÜN ARAŞTIRMA / ORIGINAL ARTICLE
10(1), 1-9, 2026
DOI: 10.33720/kisgd.1803023

Occupational Accidents Experienced by Pathology Laboratory Employees in Türkiye

Türkiye'de Patoloji Laboratuvarı Çalışanlarının Yaşadığı İş Kazaları

Hanife Gülnihal ÖZDEMİR **Mikail ÖZDEMİR** **Merve BASAR** **Makbule Nur DOĞRUYOL AKIN**

ABSTRACT

Pathology laboratory professionals are frequently exposed to diverse occupational hazards including chemical and physical risks. This study aimed to determine the prevalence of occupational accidents and identify determinants influencing their occurrence in pathology laboratories. A structured, self-reported online survey was administered to 486 laboratory personnel—comprising consultant pathologists, residents, and laboratory technicians—working in secondary and tertiary care centers across Türkiye. Of the 486 participants, 364 (74.9%) reported having experienced at least one occupational incident. However, fewer than half of these incidents were recognized as occupational accidents ($p < 0.001$) and only 27.5% were officially reported. The pathologists had a significantly higher accident rate (78.6%) than assistant health personnels (69.9%) ($p = 0.029$). Multivariate analysis revealed that the odds of experiencing an accident were 1.73 times higher among pathologists compared to allied health personnel ($p = 0.029$). Furthermore, the risk of occupational accidents was inversely correlated with professional tenure. It has been determined that all laboratory workers, especially pathologists, are at risk of occupational accidents. Clear definitions of occupational accidents and increased awareness of preventive strategies are essential. The education of laboratory staff on safety protocols should be prioritized and the importance of timely reporting to occupational health and safety units should be emphasized in interventions.

Keywords: Laboratory, Occupational Accident, Occupational Safety, Pathology Department.

ÖZET

Patoloji laboratuvar çalışanları, kimyasal ve fiziksel riskler de dahil olmak üzere çeşitli mesleki tehlikelere sıklıkla maruz kalmaktadır. Bu çalışmanın amacı, patoloji laboratuvarlarında mesleki kazaların yaygınlığını ve bu kazaların oluşumunu etkileyen faktörleri belirlemektir. Türkiye genelindeki ikinci ve üçüncü basamak hastanelerde çalışan 486 patoloji laboratuvarı çalışanına yapılandırılmış, öz bildirime dayalı çevrimiçi bir anket uygulandı. Ankette iş kazalarının sıklığı ve özellikleri değerlendirildi. 486 katılımcının 364'ü (%74,9) en az bir iş kazası geçirdiğini bildirdi. Ancak, bu olayların yarısından azı iş kazası olarak tanımlandı ($p < 0,001$) ve yalnızca %27,5'i resmi olarak bildirildi. Patologların kaza oranı (%78,6), yardımcı sağlık personeline (%69,9) göre anlamlı derecede daha yüksekti ($p = 0,029$). İş kazası riski, patologlar arasında yardımcı sağlık personeline göre 1,73 kat, üçüncü basamak kurumlarda çalışanlar arasında ise 1,83 kat daha yüksekti. Ayrıca, mesleki deneyim arttıkça iş kazası riski azalıyordu. Tüm laboratuvar çalışanlarının, özellikle de patologların iş kazası riski altında olduğu belirlenmiştir. İş kazalarının net bir şekilde tanımlanması ve önleyici stratejiler konusunda farkındalığın artırılması esastır. Müdahalelerde, laboratuvar çalışanlarının güvenlik protokolleri konusunda eğitimine öncelik verilmeli ve iş sağlığı ve güvenliği birimlerine zamanında bildirim yapılmasının önemi vurgulanmalıdır.

Anahtar Kelimeler: Laboratuvar, İş Kazası, İş Güvenliği, Patoloji Bölümü.

Hanife Gülnihal ÖZDEMİR | dr.gulnihalzdmr@gmail.com | Corresponding Author
Gaziantep Şehir Hastanesi, Tıbbi Patoloji Bölümü, Gaziantep, Türkiye
Gaziantep City Hospital, Department of Pathology, Gaziantep, Türkiye

Mikail ÖZDEMİR | mikailozdemir@gantep.edu.tr
Gaziantep Üniversitesi Tıp Fakültesi Halk Sağlığı AD, Gaziantep, Türkiye
Gaziantep University Faculty of Medicine, Department of Public Health, Gaziantep, Türkiye

Merve BASAR | mervebasar@hotmail.com
Memorial Sloan Kettering Kanser Merkezi, Tıbbi Patoloji Bölümü, New York, ABD
Memorial Sloan Kettering Cancer Center, Department of Pathology, New York, USA

Makbule Nur DOĞRUYOL AKIN | nurdogruyol@yahoo.com
Muş Devlet Hastanesi, Tıbbi Patoloji Bölümü, Muş, Türkiye
Mus State Hospital, Department of Pathology, Mus, Türkiye

Received/Geliş Tarihi : 25.10.2025
Accepted/Kabul Tarihi: 03.04.2026

I. INTRODUCTION

Occupational accidents defined by the World Health Organization (WHO) as "unplanned incidents that often lead to injury and disruption of work" are a significant concern in healthcare setting. Among healthcare professionals, pathology laboratory workers are particularly at risk due to their frequent exposure to a range of hazards such as chemical (e.g., dust, gases, vapors), physical (e.g., noise, ionizing radiation, adverse environmental conditions) and psychosocial-ergonomic (e.g., stress, excessive mental workload). Common incidents include percutaneous injuries (e.g., needlestick or sharp instrument injuries), mucocutaneous exposures (e.g., splashes of blood or bodily fluids to the eyes, mouth or nose) and accidents caused by physical factors in these high-risk environments.

Given the wide array of biological materials and the inherent nature of pathogen exposure in pathology laboratories, the workers face continuous risks [1]. A notable example is formaldehyde, a chemical widely used in pathology laboratories. Even low concentrations (0.1 ppm) can cause eye irritation and upper respiratory tract symptoms. Higher concentrations (10–20 ppm) may lead to coughing, shortness of breath, elevated heart rate and increased intracranial pressure while exposure to levels of 50–100 ppm can result in pulmonary edema, pneumonia and even death [2].

Despite these risks, the prevalence and reporting of occupational accidents in pathology laboratories remain poorly documented, especially in developing countries [3]. In Türkiye, the official statistics suggest a low rate of reported occupational accidents. However, the anecdotal evidence and field observations indicate that many incidents particularly in specialized areas such as pathology go unreported. According to the Social Security Institution of Türkiye (SGK), the national occupational accident frequency rate is reported as 0.01 per 100 workers, but this figure does not accurately reflect the specific risks encountered by pathology laboratory personnel [4].

Globally, data from the International Labour Organization (ILO) indicate that approximately 374 million non-fatal work-related injuries occur annually, each resulting in a temporary loss of at least four working days [5]. In pathology laboratories, health hazards are encountered daily during routine diagnostic procedures [6]. Identifying vulnerable groups within this workforce is essential for promoting sustainable work environments and reducing the incidence of occupational accidents [7].

This study aims to address these gaps by analyzing the frequency and nature of occupational accidents experienced by pathology laboratory workers in Türkiye. While occupational health risks have been explored across various medical fields, the unique challenges faced by pathology staff regarding especially hazardous substances and specialized equipment remain under-researched in the Turkish context [8,9]. This study also investigates the prevalence of occupational accidents, the contributing factors and potential strategies to enhance safety protocols within these high-risk settings.

II. MATERIALS AND METHODS

A. Study Design and Setting

This study employed a cross-sectional survey design to examine the frequency and determinants of occupational accidents among pathology laboratory employees in Türkiye. The target population included employees working in pathology laboratories at secondary (2nd level) and tertiary (3rd level) healthcare institutions across various regions of the country.

B. Study Population and Sampling

The initial study population consisted of 494 pathology laboratory employees. After excluding eight participants due to incomplete responses, the final sample comprised 486 individuals recruited via convenience sampling. The cohort was designed to reflect a broad spectrum of pathology-specific roles, including faculty pathologists, residents, and medical laboratory technologists.

C. Survey Instrument

Data were collected through a custom-designed questionnaire consisting of 22 items. The survey addressed participants' sociodemographic characteristics, job-related information, attitudes toward occupational accident prevention and personal experiences with occupational accidents. It incorporated a mix of multiple-choice, Likert-scale and open-ended questions. The questionnaire was developed in accordance with international occupational health standards, particularly the definitions and classifications provided by the ILO. The key items focused on identifying incidents such as needlestick injuries, chemical exposures and environment-related accidents aligned with ILO definitions.

D. Data Collection Procedure

Due to COVID-19-related restrictions, data were collected online between December 2020 and February 2021 using Google Forms and SurveyMonkey. The participants were asked to report occupational accidents that occurred during the 2019 calendar year to capture pre-pandemic working conditions. Before completing the questionnaire, participants were required to review and accept an online informed consent form. The participation was voluntary and anonymous.

E. Statistical Analysis

The data analysis was performed using IBM SPSS Statistics version 20.0 (IBM Corp., Armonk, NY, USA). The descriptive statistics were used to summarize the data including means, standard deviations, medians, frequencies (n) and percentages. The Kolmogorov-Smirnov test was applied to assess the normality of continuous variables. The group comparisons were conducted using the Chi-square test for categorical variables and the Mann-Whitney U test for non-normally distributed continuous variables. To identify factors associated with occupational accidents, the binary logistic regression analysis was performed with results presented as odds ratios (ORs) and 95% confidence intervals (CIs). A p-value of <0.05 was considered statistically significant.

F. Data Collection Procedure

Prior to data collection, a power analysis was conducted to determine the minimum required sample size. Assuming a 50% prevalence of occupational accidents, a margin of error (effect size) of 5%, and a confidence level of 95%, the minimum sample size was calculated to be 384 participants; after adjusting for a potential non-response rate, a target of 420 was set. The final sample size of 486 exceeded this threshold.

III. RESULTS

The average age of the participants working in the pathology laboratory between the ages of 20 and 63 was 34.5 ± 9.6 years and their professional experience was 9.0 ± 8.5 years. Of the participants, 366 (75.3%) were female, 280 (58.7%) were physicians, and 34% worked in a tertiary teaching and research hospital. The demographic characteristics of the participants are presented in detail in Table 1. In addition, the average number of daily materials coming

to the laboratories is 108.9 ± 95.7 (median = 100) and the total time spent in macroscopy per month is 32.2 ± 33.9 (median = 20) hours.

In our study, the most common protective equipment (98.6%) used by pathology laboratory employees during tissue sampling was gloves and the second (76.5%) surgical gown. During tissue sampling, the rate of using a mask was 62.5% and the rate of using protective glasses was 32%.11.7% of the participants who used lenses stated that they removed their lenses before starting sampling in macroscopy. Moreover, 6 participants stated that there was no ventilation system in the macroscopy room of their laboratory (1.2%).

The most common occupational accident reported in pathology laboratories was hand incision during tissue sampling or taking a sample with a microtome device (53.7%) while the second most frequent work accident was splashing the body fluid (cyst content etc.) of macroscopic or cytological material or formaldehyde into their eye (conjunctiva and cornea) at work (52.5%). Plus, 19.3% of the participants declared that they had an accident (like slipping and falling on wet floor, hitting the ground etc.) caused by the conditions of laboratory environment in which they worked. Whereas 63.1% of those who cut their hand had been vaccinated if ten years had passed since their immunization with the tetanus vaccine, 78.4% checked the information of the case regarding the risky infectious agents at the time they cut their hands. While 70.1% of those who splashed body fluid in their eyes washed their eyes with an 'emergency eyewash,' 67.2% checked the information of the case in terms of risky infectious agents due to the contact of body fluid with the eye (conjunctiva and cornea). Besides, an infectious agent was found in 9.2% of them in the microbiological analysis.

Less than half of the participants (48.6%) who stated that 364 (74.9%) of the pathology laboratory employees experienced an occupational accident (according to ILO definition) in the laboratory declared this incident as an occupational accident (self-definition) ($p<0.001$). In addition, only 100 (27.5%) of these people reported an occupational accident. When occupational groups were separated, the rate of occupational accident among pathologists (78.6%) was found to be significantly higher than that of assistant health personnel (69.9%) ($p=0.029$). However, it should be noted that these groups have distinct job descriptions and exposure profiles. Pathologists in this study were primarily involved in macroscopic examination and frozen section processing, while assistant health personnel-including technicians-were directly involved in high-risk specimen preparation tasks such as microtome sectioning and chemical handling.

Regarding manually performed procedures, 67.3% of 245 participants utilized Personal Protective Equipment (PPE) during manual immunohistochemical (IHC) staining. While formaldehyde is not directly used during the IHC phase—which occurs post-embedding—it is a critical hazard during initial tissue fixation. In this study, 96.5% of 261 participants who manually prepared 10% neutral buffered formalin reported using PPE.

Furthermore, 86.3% of 301 participants used PPE during the manual preparation of acidic decalcifying solutions. For routine staining and slide mounting (sealing)—where organic solvents such as xylene and synthetic mounting media (e.g., Entellan) are typically utilized rather than acids—77.3% of 265 participants utilized protective gear. Additionally, PPE compliance was recorded during cytological specimen processing (centrifugation/smearing) (56.5%), cassette loading into automated tissue processors (57.4%), and reagent replenishment for the

processors (57.8%) (Figure 1).

In our study, when the factors that may affect the occupational accident were analyzed as multivariate, it was found that the risk was 1.73 times (95% C.I. 1.08-2.77) for the pathologists compared to the assistant health personnel and the risk was 1.83 times (95% C.I. 1.16-2.87) higher for the workers in the 3rd level health institutions than the others. In addition, as the professional experience increases, the risk of work accidents decreases [OR. 0.97 (%95 C.I. 0.94 -0.99)] while it increases with time spent on macroscopy. [OR. 1.01 (%95 C.I. 1.01-1.02) (Table 2).

IV. DISCUSSION

This study aimed to assess the frequency and risk factors of occupational accidents among pathology laboratory employees in Türkiye with particular emphasis on exposure to chemical and physical hazards. To our knowledge, this is the first study to specifically examine occupational accidents within pathology laboratories across Türkiye.

The findings revealed that approximately three-quarters (74.9%) of participants reported that they experienced at least one occupational accident. However, only 48% of these incidents were personally recognized as occupational accidents by the respondents and this suggested a significant gap in awareness regarding Occupational Health and Safety (OHS) definitions and procedures. Moreover, only 27.5% of these incidents were formally reported to administrative authorities and this reflected substantial underreporting, which is an issue consistently noted in developing countries. In contrast, notification rates tend to be significantly higher in developed countries [10]. Previous data from microbiology laboratories in Türkiye similarly reported occupational accident rates between 30% and 40% [11] underscoring the elevated risk in laboratory settings.

The pathology laboratory professionals routinely work with hazardous materials such as formalin and xylene and handle potentially infectious tissues. In our study, 98.6% of participants reported wearing gloves and 76.5% used aprons during tissue sampling. However, only 32% reported using protective eyewear and 52.5% experienced splashes of body fluids or formalin into their eyes. These findings highlight an alarming lack of awareness regarding eye protection and the risk of conjunctival contamination. Compared with a study conducted in China, in which only 21.3% of pathology staff used protective equipment [12], the compliance in Türkiye appears higher but remains suboptimal in critical areas.

The most common occupational accident reported was hand injuries caused by sharp instruments (53.7%). This is consistent with findings from other healthcare settings, where needlestick and sharp object injuries are the most frequent ones [13,14]. In our study, 78.4% of participants investigated the infection status of the patient post-injury and 9.2% confirmed the presence of infectious agents. These injuries are particularly concerning in pathology settings due to dual exposure risks: infectious agents and carcinogenic or irritant chemicals. Previous studies have recommended using cut-resistant gloves and other safety practices to minimize such injuries [15].

In our study, a significant finding was the higher reported accident rate among pathologists compared to assistant health personnel (OR=1.73; 95% CI: 1.08–2.77). However, this comparison should be interpreted with caution, as job descriptions and exposure levels differ significantly between these occupational groups. While pathology technicians and assistant health personnel are primarily responsible for high-volume routine processing, such as microtomy and chemical reagent preparation, pathologists face acute risks during gross examination (macroscopy) and

intraoperative consultations (frozen sections), where time pressure and sharp instrument handling are prevalent. Therefore, the observed differences likely reflect distinct task-specific exposure intensities and reporting behaviors rather than a general disparity in safety practices.

Chemical exposure remains a significant concern. Formaldehyde, a widely used fixative in pathology, is known for its irritant and carcinogenic properties. In our study, 96.5% of participants used protective equipment during formaldehyde preparation that can be interpreted as a commendable finding compared with earlier studies. For example, Jalali et al. reported inhalation exposure levels of 0.64 mg/m³ in pathology laboratories [16] while the inhalation exposure levels were recorded as 2–4 ppm in a Turkish study conducted in 2008 [17]. These data reinforce the need for robust protective measures and adequate ventilation systems. Additionally, 63.1% of pathologists in one study reported intolerance reactions to formaldehyde, further supporting the call for improved safety infrastructure [18].

Despite regulatory requirements in Türkiye mandating environmental exposure measurements for substances like xylene and formaldehyde, there is no standardization in biomonitoring (e.g., blood, urine or respiratory exposure levels). In metropolitan areas, occupational disease specialists may perform some assessments but coverage is insufficient in peripheral regions. Durur et al. demonstrated that the implementation of 5S methodology can significantly reduce occupational accidents in pathology labs [19].

Our findings also indicated a negative correlation between professional experience and accident prevalence. This is consistent with international data. For example, studies from Yemen and Kenya showed that less experienced or younger workers were more likely to experience injuries [20,21]. In our study, this trend likely reflects increased risk awareness and preventive behavior developed through years of professional exposure.

The burden of occupational injuries extends beyond sharp injuries and chemical exposure. For instance, musculoskeletal disorders are highly prevalent among pathology personnel. Sarwar et al. reported that 93.2% of pathology staff experienced such conditions, with female workers being disproportionately affected [22]. Similarly, Kadivar et al. found musculoskeletal pain in 87.4% of Iranian pathologists particularly among younger workers [23]. These findings call for the integration of ergonomic practices and gender-sensitive occupational health policies in laboratory environments.

V. LIMITATIONS

This study has several limitations. First, the cross-sectional design relies on self-reported data subject to recall bias. Second, the online recruitment may have introduced selection bias, favoring those with higher digital literacy.

Crucially, as the data represent pre-pandemic (2019) conditions, they do not reflect the recent acceleration of digital pathology and enhanced biosecurity protocols. Post-pandemic shifts, such as increased remote digital consultation, may reduce physical specimen handling and alter current accident frequency rates. Future longitudinal studies are required to evaluate the impact of these evolving technological integrations on laboratory safety.

VI. CONCLUSIONS

This study demonstrates that occupational accidents are highly prevalent among pathology laboratory workers in Türkiye, however awareness, reporting and preventive practices remain inadequate. Although most participants utilized basic protective equipment, critical gaps such as

eye protection and comprehensive incident reporting persist. These findings underscore the urgent need for structured occupational safety education, standardization of exposure monitoring and institutional commitment to improve workplace safety. Before beginning active duty in pathology laboratories, the staff should receive training on not only protective measures but also post-incident procedures such as emergency eyewash usage and appropriate reporting protocols. When the high-risk nature of pathology work is considered, a systematic, multi-level approach to occupational health and safety is essential to protect laboratory personnel and improve long-term workforce sustainability.

Author Contributions: Conceptualization is made by HGO, MO; data curation by HGO, MO; formal analysis by MO; investigation by HGO, MB, MNDA; methodology by HGO, MO; project administration by HGO; resources by HGO, MB, MNDA; writing – original draft preparation by HGO, MO, MB, MNDA; writing – review & editing by HGO, MO, MB, MNDA. All authors approve the final manuscript.

Conflict Of Interest: The authors declare that there is no conflict of interest and that the article complies with research and publication ethics.

Financial Support: There is no person/organization that financially supports the study and the authors have no conflict of interest.

Ethics Committee Approval: Ethical approval for the study was obtained from the Karabük University Non-Interventional Clinical Research Ethics Committee (Protocol No: 2021/461). Participant anonymity and data confidentiality were strictly maintained. No personally identifiable information was collected, and participants were informed of their right to withdraw from the study at any point without consequences. All data were securely stored on password-protected servers accessible only to the research team.

REFERENCES

[1] P. Carneiro, A. C. Braga, and R. Cabuço, "Professionals working in operating rooms: A characterization of biological and chemical risks," *Work*, vol. 64, no. 4, pp. 869–876, 2019, doi: 10.3233/WOR-193027.

[2] G. D. Nielsen, S. T. Larsen, and P. Wolkoff, "Re-evaluation of the WHO (2010) formaldehyde indoor air quality guideline for cancer risk assessment," *Archives of Toxicology*, vol. 91, no. 1, pp. 35–61, 2017, doi: 10.1007/s00204-016-1733-8.

[3] Republic of Türkiye Social Security Institution, "About occupational exposure," Jun. 25, 2021.

[4] C.-M. Hsieh, C.-J. Chen, T.-T. Peng, S. Chen, and P.-H. Chen, "The relationship between workplace justice and self-reported occupational accidents in construction employees of Taiwan," *Industrial Health*, vol. 58, no. 3, pp. 282–286, 2020, doi: 10.2486/indhealth.2019-0131.

[5] F. R. Fritzsche et al., "Occupational health risks of pathologists—results from a nationwide online questionnaire in Switzerland," *BMC Public Health*, vol. 12, no. 1, pp. 1–12, 2012, doi: 10.1186/1471-2458-12-1054.

[6] T. N. Hanvold et al., "Occupational safety and health among young workers in the Nordic countries: A systematic literature review," *Safety and Health at Work*, vol. 10, no. 1, pp. 3–20, 2019, doi: 10.1016/j.shaw.2018.12.003.

[7] A. Turkkan and K. Pala, "Trends in occupational injuries and fatality in Turkey," *International Journal of Occupational Safety and Ergonomics*, vol. 22, no. 4, pp. 457–462, 2016, doi: 10.1080/10803548.2016.1153224.

[8] F. Ç. U. Küçük and A. Ilgaz, "Causes of coal mine accidents in the world and Turkey," *Turkish Tho-*

racic Journal, vol. 16, suppl. 1, p. S9, 2015, doi: 10.5152/ttd.2015.003.

[9] K. Celik et al., "Occupational injury patterns of Turkey," *World Journal of Emergency Surgery*, vol. 8, no. 1, pp. 1–6, 2013, doi: 10.1186/1749-7922-8-57.

[10] C. Sagoe-Moses, R. D. Pearson, J. Perry, and J. Jagger, "Risks to health care workers in developing countries," *New England Journal of Medicine*, vol. 345, no. 7, pp. 538–541, 2001, doi: 10.1056/nejm200108163450711.

[11] M. Köroğlu et al., "Employee safety and biosafety applications in microbiology laboratories: A multicenter evaluation in Turkey," *Mikrobiyoloji Bulteni*, vol. 54, no. 3, pp. 347–367, 2020, doi: 10.5578/mb.69634.

[12] R. Sun et al., "Analysis on occupational hazard cognition of medical personnel in department of pathology and occupational health management situation of 13 hospitals in a city," *Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi*, vol. 37, no. 8, pp. 632–635, 2019, doi: 10.3760/cma.j.issn.1001-9391.2019.08.019.

[13] U. Ochmann and S. Wicker, "Needlestick injuries of healthcare workers," *Anaesthesist*, vol. 68, no. 8, pp. 569–580, 2019, doi: 10.1007/s00101-019-0603-1.

[14] A. R. Deipolyi, A. M. Prabhakar, S. Naidu, and R. Oklu, "Needlestick injuries in interventional radiology are common and underreported," *Radiology*, vol. 285, no. 3, pp. 870–875, 2017, doi: 10.1148/radiol.2017170103.

[15] F. R. Fritzsche, M. Dietel, W. Weichert, and A. C. Buckendahl, "Cut-resistant protective gloves in pathology—effective and cost-effective," *Virchows Archiv*, vol. 452, no. 3, pp. 313–318, 2008, doi: 10.1007/s00428-008-0576-y.

[16] M. Jalali et al., "Occupational exposure to formaldehyde, lifetime cancer probability, and hazard quotient in pathology lab employees in Iran: A quantitative risk assessment," *Environmental Science and Pollution Research International*, vol. 28, no. 2, pp. 1878–1888, 2021, doi: 10.1007/s11356-020-10627-0.

[17] S. Burgaz et al., "Cytogenetic analysis of buccal cells from shoe-workers and pathology and anatomy laboratory workers exposed to n-hexane, toluene, methyl ethyl ketone and formaldehyde," *Biomarkers*, vol. 7, no. 2, pp. 151–161, 2002, doi: 10.1080/13547500110113242.

[18] S. Khan, "The dark side of being a pathologist: Unravelling the health hazards," *Indian Journal of Pathology and Microbiology*, vol. 67, no. 1, pp. 46–50, 2024, doi: 10.4103/ijpm.ijpm_1148_21.

[19] F. Durur, M. Alper, and I. Aydın, "5S yönteminin bir kamu hastanesi patoloji laboratuvarında uygulanması," *Turkiye Klinikleri Journal of Health Sciences*, vol. 5, no. 1, pp. 122–127, 2020, doi: 10.5336/healthsci.2019-70371.

[20] Y. M. Al Eryani et al., "Unintentional injuries in the three reference laboratories: Sana'a, Yemen," *International Journal of Preventive Medicine*, vol. 10, p. 174, 2019, doi: 10.4103/ijpvm.IJPVM_160_17.

[21] E. M. Mbaisi, Z. Ng'ang'a, P. Wanzala, and J. Omolo, "Prevalence and factors associated with percutaneous injuries and splash exposures among health-care workers in a provincial hospital, Kenya, 2010," *Pan African Medical Journal*, vol. 14, p. 10, 2013, doi: 10.11604/pamj.2013.14.10.1373.

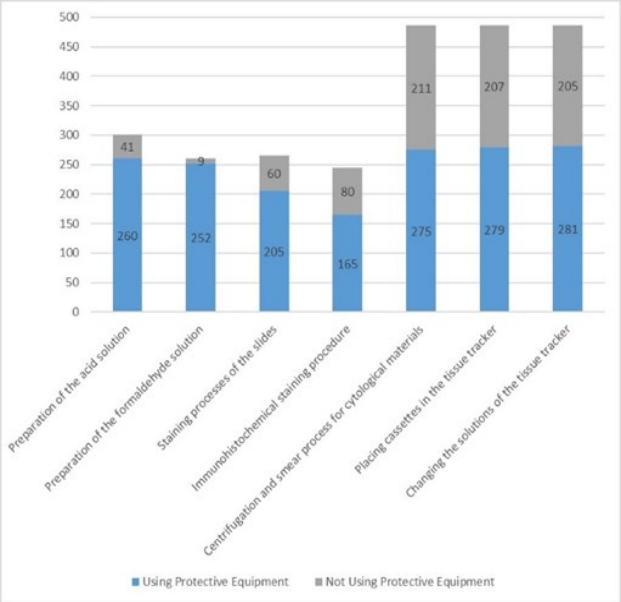
[22] A. Sarwar, A. Begum, K. Cheema, and M. Rauf, "Occupational health risks among pathologists and pathology trainees: An analysis of prevalence and factors," *Esculapio*, vol. 19, no. 2, pp. 193–198, 2023, doi: 10.51273/esc2513.

[23] M. Kadivar, E. Kabir-Mokamelkhah, and Z. Habibi-Shams, "Work-related hazards among pathologists and residents of pathology: Results of a cross-sectional study in Iran," *Iranian Journal of Pathology*, vol. 16, no. 3, p. 274, 2021, doi: 10.30699/IJP.2021.132380.2473.

Table 1: Demographic characteristics of employees working in pathology laboratories

		N	%
Sex	Female	366	75.3
	Male	120	24.7
Age (year)		34.5±9.6*	32 (20-63)**
Occupational Role	Consultant Pathologist	130	26.8
	Resident	99	20.4
	Academic Pathologist	51	10.5
	Laboratory Technician	181	37.3
	Biologist	13	2.7
	Student / Trainee	3	0.6
	Nurse / Midwife	2	0.4
	Secretary	2	0.4
	Others	4	0.8
Years of clinical experience in the pathology		9.0±8.5*	6 (1-42)**
Healthcare Facility Type	Tertiary Teaching & Research	165	34
	University Affiliated Hospital	155	31.9
	Public Secondary Hospital	114	23.5
	Private hospital	26	5.3
	Private laboratory	26	5.3

Figure 1: Use of protective equipment in manually prepared pathological procedures



* mean ± S.D, ** median (25-75 percentile)

*Binary Logistic Regression

Table 2: Multivariate analysis of occupational accident in the pathology laboratory

	B	S.E.	p*	O.R.	95% C.I.	
					Lower	Upper
Male	0.19	0.25	0.44	1.21	0.73	1.99
Consultant pathologist	0.54	0.24	**0.02**	1.72	1.07	2.77
3rd level health institution	0.6	0.23	**0.009**	1.83	1.16	2.87
Years of clinical experience	-0.03	0.01	**0.008**	0.96	0.94	0.99
Spent-time in macroscopy room (hour/ month)	0.01	0.004	**0.006**	1.01	1.003	1.01