

Occupational Injuries among Surgeons in Lahore, Pakistan

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Submitted: 15-05-2022

Revised: 20-05-2022

Accepted: 25-05-2022

ABSTRACT:

The medical field, like other fields, is also associated with occupational injuries. Surgeons are also included in this because of their nature of work. Every day workers face serious injuries both physical and mental. Accidental injuries are possible during surgery for all surgeons. It could be the transmission of diseases such as hepatitis B, AIDS, viral fever or it could be an inefficient use of equipment tools or machinery, etc. The objective of this study is to point out the frequency, characteristics, and risk factors for occupational injuries experienced by surgeons of Lahore, Pakistan. This article reported occupational injuries related to surgical cases in Lahore, Pakistan. The methods applied here are descriptive and logistic regression to determine the risk factor for injury. 105 people participated and were interviewed using a structured questionnaire. The results showed that more working days, hours, less sleep causes more accidental injuries, and also when you have an employee count of fewer than 10 workers with more departments in the hospital and more injuries are faced by cardiac and general surgeons. English proficiency, provision of PPE, number of jobs performed in the hospital had no significant association with injury.

Keywords: Occupational injuries, Surgeons, Pakistan

I. INTRODUCTION:

Occupational injury is an injury, disease, or death caused by accidents or incidents during work. Workplace injuries are different from a work-related illness, which is a result of prolonged exposure to harmful substances in the workplace.

The medical field, like other fields, is also associated with occupational injuries (Jimenez Paneque R, 2015). Surgeons are also included in this because of their nature of work (Green A et al, 1999). Every day workers face serious injuries both physical and mental (Taylor C et al, 2007). Accidental injuries are possible during surgery for all surgeons. It could be the transmission of

diseases such as hepatitis B, AIDS, viral fever or it could be an inefficient use of equipment tools or machinery, etc. Percutaneous blood pressure is a health issue we often see among healthcare workers. This situation occurs often while handling sharp objects such as needles, scalpels, lancets, and broken glass and is at risk to blood-borne pathogens hepatitis HCV and human immunodeficiency viruses, etc which can easily be prevented by safety measures (AMJ, 2005).

Cardiac surgery, eye surgery, plastic surgery, oral surgery, general surgery, orthopedicsurgery etc are all different types of surgeries. A general surgeon is concerned with handling several surgical operations that affect almost every body part. The surgeon does diagnosis and provides pre-surgical care to patients, usually responsible for complete management of the injured patient and critically ill patient. Thoracic surgery involves functional management, pre-surgical care, and care for patients with affected conditions within the chest. It includes surgical care for coronary artery disease, cancer of lungs, heart valves, chest, esophagus, and vascular malformation, birth problems, and diaphragm diseases. An obstetrician and gynecology specialist is a physician trained to provide medical and surgical care for a pregnant patient, to deliver babies, and to provide medical and surgical care to treat conditions affecting women reproductive system. An ophthalmologist is concerned with complete eye and vision care and is the only physician trained to diagnose and treat all eye problems. Orthopedic surgery is a special surgeon operation dedicated specifically to the care of the musculoskeletal system. It involves hand surgery, sports medicine, spine surgery, foot and ankle orthopedics, joint replacement surgery, and trauma surgery. Plastic surgeons deal with the repair, replacement of deficiencies of the form and functions of underneath musculoskeletal system. A urologist is a doctor who controls dangerous diseases of adrenal gland surgery and the genitourinary system. Vascular surgeons care for

patients who have diseases that affect arteries and veins throughout the body. A pediatric surgeon is concerned with the diagnosis, surgical, and postoperative management of pediatric surgical complications and operates on children in their development. During surgery, different people are involved which includes a surgeon, anesthesiologist, certified nurse anesthetist, operating room nurse, surgical tech, medical students, physician assistant, and medical device company representative.

In Pakistan, recent estimates have shown that 2.7 million employees received workplace injuries in 2017-2018 with a 3.7% injury rate. Pakistan has a high rate of common hepatitis types C and B (Pakistan Medical Research Council, 2009) but it is slowly increasing in rural Pakistan (Mujeeb SA & Pearce MS, 2008). In 2007-2008, the department of Health Pakistan under its control of reducing the spread of hepatitis began testing the health care workers in the southern province of Sindh. A total of 11,670 workers were tested across the province, during this operation a

standard laboratory procedure was implemented in which the blood of health care workers are drawn from the work area, placed in the center, and returned to a central laboratory for pathogens caught in cold chains. The study results identified the group of health care workers in Jamshoro district of Sindh province with antibodies against HCV and the presence of HBsAg. Backache is also one of the main problems faced by surgeons including many causative factors that cannot be easily treated. (McREA R & Keats LB, 2005). About 70-80% population of Pakistan has this common problem that can also lead to chronic illness (Anderrson GB, 1999). Occupational back injury is considered the most ignored thing and it is the reason cause of major work. (Hagggar- Guenette C & Proulx J, 1990).

Healthcare employees are more likely to face chemical hazards and their associated agents which have harmful health effects. Chemicals used in healthcare facilities such as ethylene oxide, formaldehyde, and antineoplastic drugs have been linked to cancer and other death-causing effects. Latex and cleaning and disinfection exposure is associated with occupational asthma among health workers. Osteoporosis and musculoskeletal injuries, as well as various psychological risks such as workplaces violence, depression, and fatigue, are some of the well-known health risks. Identifying these risks, safety measures, and safety standards for health care workers established in high-income

countries and highly effective in reducing these risks. However, in most low and middle-income countries occupational safety and health is often overlooked. This is a lack of health at work caused by a lack of political commitment, inadequate resources, poor data, inefficient training, collection systems, and non-compliance with regulations. Occupational health research is available it has been shown that providing a safe working environment increases organizational commitment as well staff retention. The objective of this study is to point out the frequency, characteristics, and risk factors for occupational injuries experienced by surgeons of Lahore, Pakistan.

Literature:

Risk and consequences are based on different operating conditions. The surgeon community has certain different features that set them apart from their fellow doctors and others in general. Surgeons face many unique environmental hazards, so much so that we can hardly imagine them as likely to be "nosocomial disease". There are people at risk of causative symptoms, signs, and side effects for that they take precautionary measures and go for treatment (Patz JA & Jodrey D, 1995). (Schwartz et al, 1994) studied a team of doctors to explain the personality of the surgeon. He compared surgeons with primary care physicians using three checklists: the Krug adult list, the Strelau temperament list, and the Barclay annotation checklist. These checklists found that surgeons form a distinct, comparative group based on psychological factors and personality traits. It is the promotion and maintenance of a high standard of physical, mental, and emotional well-being among employees in all occupations through the prevention of health consequences, risk management, and work habits. As we discussed earlier that surgeons' occupational hazards are of different types which include musculoskeletal disorders, stress, radiation exposure, serious injuries and chances of the spread of blood-borne diseases. Accident hazards, physical hazards, chemical hazards, biological hazards, ergonomic issues, social psychology, and organization are all contributing factors that we will study here. Accidental hazards are caused by stings and cuts from sharp objects, especially needle sticks and razor cuts, heat and boiling water and steam used in disinfection, electric shock to improper support systems, and severe back pain caused by poor posture during surgery are potential risks, and also hearing loss caused by noise (Abebe B et al, 2008).

Physical hazards include the dangers of exposure to ionizing radiations (Vano E et al, 1998). During x-ray, fluoroscopy, and exposure to ionizing and non-ionizing radiation using laser-based instruments, surgeons are more likely to have effects of radiation. The frequency of exposure was reported by the surgeon was 2.66% (Harstall R, 2005) (Maricalco MW et al, 2011). In orthopedic surgeons hands are exposed to very high radiations (Hafez MA, 2005). Although the surgeon's hands are very close to the mainline, the amount of radiation detected during a given operation is unknown and little information on long-term effects of radiation is available on highly sensitive tissue such as of eyes or thyroid gland (Kesavachandran CN, 2012). Unluckily, hands are sensitive to radiation with a limit of 150 mSv for non-radiation workers (Muller LP, 1996). Musculoskeletal pain can be an occupational health problem for medical professionals, especially surgeons and dentists, who maintain posture using hand movements and precision. In one cross-sectional study, the highest occurrence of musculoskeletal pain was found between teeth 61%, followed by surgeons 37% and at least physicians 20%. Chemical hazards include inhalation of anesthetics (ethyl- ether, ethyl-bromide, ethyl-chloride, etc) as well as inhalation of disinfectants e.g. iodine, isopropyl alcohol. Surgeons are at high risk for exposure to iodine, isopropyl alcohol, and phosphate causing skin irritation and paralysis. Formal exposure to formaldehyde is also associated with nasopharyngeal malformations. Another reason is skin leaning and irritation due to frequent use of soaps, cleansers, disinfectants, etc (Turner S, 2007). Types of biological hazards are sharp injuries that can cause infections, infections that can be caused by body fluids or tissue samples that may lead to blood-borne diseases like Hepatitis C, Hepatitis B, and HIV (Scardino Pt, 2007) and surgeons using carbon dioxide laser may be infected with HPV (human papillomavirus). In ergonomic hazards, surgeons are often exposed to depression and fatigue caused by a feeling of considering patients' death as well as the responsibility of their health. Depression, workload, and less sleep could also be the reason for accidents of surgeons and other healthcare workers. Physical stress is also a part of ergonomic hazard due to poor posture during surgery and when surgeons face extreme traumatic conditions like traumatized patients that have suffered from violence could lead to post-traumatic stress disorder (Brown R, 2007). If they face more

stress or traumatic situation then most of the surgeons get addicted to drugs and this thing increases as they face more situations like these to reduce their stress or depression for the workload (Tyssen R, 2007). They often do this by consuming more coffee and tea and also using sleeping pills or other drugs. This is thought to be the result of the availability of limited resources, high patient rates, and unexpected workload based on incomplete information. Aging is also a factor of mental and emotional stress and can be a cause of problems (McManus et al, 2002).. In operating rooms, surgical fumes generated by laser during surgery emit a large number of particles and gases into the surrounding air. (Bruske- Hohlfield et al,2008).

Materials:

This article reported occupational injuries related to surgical cases in Lahore, Pakistan. This study is done to identify risk factors, frequencies, and characteristics of injuries among surgeons of Pakistan. This study was conducted on the 15th of February, 2021-10th March, 2021.

Participants:

Participants eligible for this study analysis had to be of 30 or 30+ age group of surgeons. Data were collected from different surgeons of Lahore considering their injury risk and that individuals should be currently employed. Given the total employment of doctors according to a study were 29709 in Punjab out of which our population will be Lahore surgeons and sample will be around 150 surgeons of Lahore. Surgeons include dental surgeons, general surgeons, eye surgeons, cardiac surgeons, etc. A total of 150 surgeons were invited to participate in the study and all those who were not willing were excluded from the study.

Procedure:

This survey was conducted using questions related to injuries that surgeons face during their work. This shows us what health preventive measures we can take to overcome this situation. All questions are in English and there are different sections questions first they were asked about their personal information then injuries they have faced and then work-related questions. The sample survey was conducted only in Lahore, Pakistan.

Measures:

The current analysis is based on questions within terms of occupation, control opportunities, and demographic categories of the questionnaire. To identify injury individuals were asked if they have faced injuries? If they say no a questionnaire

you sure you have never cut or bruised? If they say yes then further questions were asked from them like the description of the task you were doing at the time of injury Date of injury, cause of injury, and body part injured? The severity of injury? Pain and ache from injury? First aid was used or medical treatment was sought? Lost time related to an injury? If injuries were reported to an employer? In addition, respondents may report any occurrence of injuries they faced twice or thrice with the same questions. In other cases, if you do not visit your doctor then it is also considered an injury.

Potential Contributing Factors to injury:

Potential factors to injury were also found in occupational conditions, prevention, and demographic part of the survey. Injury predictors are described as gender was recorded as male or female, English proficiency was estimated and the participants were given an option to describe themselves. Workers' age was estimated in years and given an option to be 30 or 30+ to participate in the study and recorded as a continuous variable.

They were asked about the type of work they do at the hospital, and also which size of surgery they can perform (small, big, or medium-sized surgery). They were asked about the number of patients they treat daily and several surgeries they perform on daily basis in the hospital and the type of surgery they do like general surgery, cardiac surgery, dental surgery, eye surgery, plastic surgery, etc. Participants were asked about their training regarding work, what type of training was provided to them was that in-person training, video training, or through any written document. Have they been provided with PPE then what type of PPE was that (e.g. skin protection (protective

clothing), eye protection (goggles), ear protection (earplugs), hands and arms (gloves), foot protection (steel toe cap boots), or respiratory protective equipment. Finally, they were asked about workers in the hospital. This was also recorded as a continuous variable.

Demographic characteristics:

The demographic section includes country, origin, and time living in Pakistan, qualification, and current location, time in hospital, time being a surgeon, and time with their employees.

Data analysis:

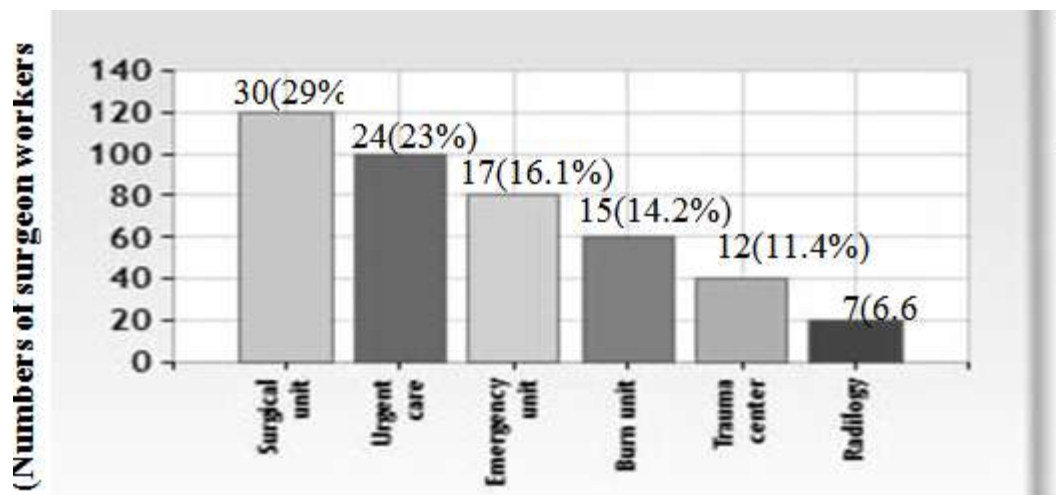
Data was analyzed using SPSS version 26. Demographic characteristics were calculated using multinomial logistic regression. In analysis model descriptive analysis is used for measuring the frequency of injuries. All the data were classified and tabulated. Potential predictor variable were distributed and tabulated for participants reporting 1, 2 and 3 etc for injuries. Multiple category variables were dichotomized for risk factor calculation. 95% confidence interval was calculated using regression logistic operation. Predictors significant at $p > 0.05$ were calculated in multivariable analysis, and final model was constructed using stepwise process.

II. RESULTS:

Among 150 participants which were invited, 105 people responded to the survey. The ratio of females who participated was 75(71.43%) and males were 30 (28.57%). Most of the people who participated were 28 general surgeons, 57 cardiothoracic surgeons, and 20 orthopedic surgeons.

Classification of surgeons:

Observed	Predicted			Percent Correct
	cardiac surgeon	orthopedic surgeon	general surgeons	
cardiac surgeon	56	0	1	98.2%
orthopedic surgeon	0	20	0	100.0%
general surgeons	1	1	26	92.9%
Overall Percentage	54.3%	20.0%	25.7%	97.1%



Graph 1:
 (Number of departments in hospital)

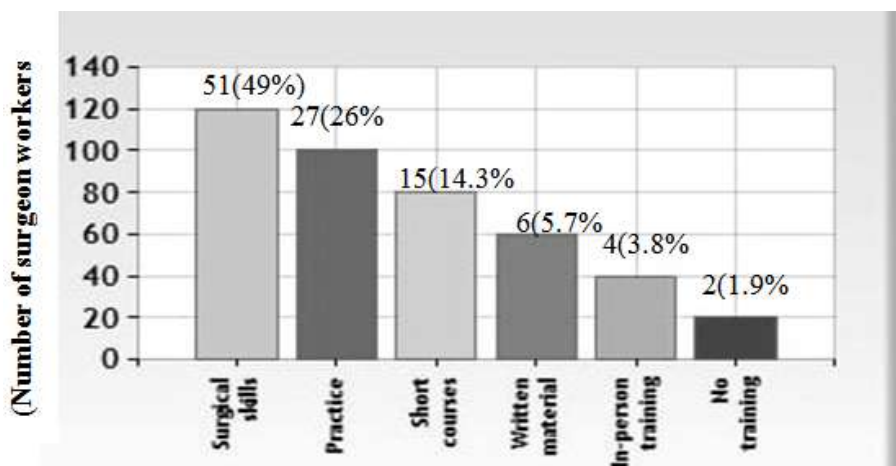
“Distribution of surgeons by the number of different departments they work”

Graph 1: Most participants worked in more than one hospital. 29% worked in surgical units, 23% worked in urgent units, 16.1% worked in the

emergency unit, 14.2% worked in the burn unit, 11.4% worked in the trauma center and 6.66% worked in the radiology department along with their surgical work.

Graph 2:

Graph 2:



(Number of different types of safety training received)

“Distribution of surgeons by the number of different types of safety training received”

Graph 2: 49% have their surgical skills so they did not need any training, 26% have practice experience during their house job and MBBS. 14.3% did short courses from abroad that helped them, 5.7% received written material to implement in their work or during any emergency. (3.8%) received in-person training and 1.9% received no

training. 48.6% have received PPE of all kinds. 9.5% received steel toe caps, 17.1% received gloves and 24.8% received protective clothing.

Table 1: Distribution of surgeons

Characteristics		Count (N)	Marginal Percentage
Occupational injuries	cuts	25	23.8%
	diathermy burns	13	12.4%
	serious injuries	47	44.8%
	bruises	19	18.1%
	33	1	1.0%
Age	30-40 years	32	30.5%
	40-50 years	73	69.5%
Gender	male	30	28.6%
	female	75	71.4%
Qualification	college to higher school	27	25.7%
	higher school to abroad	37	35.2%
	higher study along with courses	41	39.0%
Years in Pakistan	20-30 years	22	21.0%
	30-40 years	59	56.2%
	40 years or more	24	22.9%
English proficiency	well	41	39.0%
	somewhat	38	36.2%
	not at all	26	24.8%
Years in hospital work	3 - 5 years	9	8.6%
	5-10 years	10	9.5%
	10 years or more	86	81.9%
Years in hospital	5-10 years	28	26.7%
	10-15 years	54	51.4%
	5 years or less	23	21.9%
Years at the current hospital	5 years or less	40	38.1%
	6-10years	52	49.5%
	more than 10 years	13	12.4%
Origin	Punjabi	76	72.4%
	Sindhi	6	5.7%
	Kashmiri	4	3.8%
	Pathan	4	3.8%
	Balochi	15	14.3%
Address	Lahore	105	100.0%
Valid		105	100.0%
Total		105	

The results showed of distribution that a higher number of injuries were due to accidents (44.8%) and cuts (23.8%), people who participated were Punjabi (72.4%), and all participants were from Lahore. Most of the surgeons were aged 30-40 years (56.2%) and (22.9%) were 40+ age. (51.4%) spent 10-15 years in hospital, (49.5%) were still

working at current hospital, and (81.9%) have more work experience. (54.3%) were cardiologists, (26.7%) were general surgeons and (19%) were orthopedic who participated. The ratio of participants ever having an injury in hospital work increased with duration of employment in healthcare and hospital work.

Classification of injuries:

Valid	Predicted	cuts	diathermy burns	serious injuries	bruises	33	Percent Correct
cuts	13	0	1	0	11	52.0%	
diathermy burns	0	5	0	0	8	38.5%	
serious injuries	0	0	35	0	12	74.5%	
bruises	0	0	0	12	7	63.2%	
33	0	0	1	0	0	0.0%	
Overall Percentage	12.4%	4.8%	35.2%	11.4%	36.2%	61.9%	

Table 2: Frequency of Injuries

Body parts injured		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	arms	9	8.6	8.6	8.6
	Back	20	19.0	19.0	27.6
	Eyes	7	6.7	6.7	34.3
	Fingers	40	38.1	38.1	72.4
	Hand	17	16.2	16.2	88.6
	other	12	11.4	11.4	100.0
	Total	105	100.0	100.0	

Cause of injury		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Accident	36	34.3	34.3	34.3
	Bad posture	20	19.0	19.0	53.3
	hazardous chemicals	7	6.7	6.7	60.0
	knife cuts	13	12.4	12.4	72.4
	Needle stick	12	11.4	11.4	83.8
	Stiffness	17	16.2	16.2	100.0
	Total	105	100.0	100.0	

Types of injuries		Frequency	Percent	Valid Percent	Cumulative Percent
	diathermy burns	13	12.4	12.4	36.2
	serious injuries	47	44.8	44.8	81.0
	bruises	19	18.1	18.1	99.0
	33	1	1.0	1.0	100.0
	Total	105	100.0	100.0	

The highest percentage is of accidents (34.3%), then bad posture is also a common problem (19%), then we can see hazardous chemical also affects the health of a surgeon with (6.7%), knife cuts were (12.4%), needle stick (11.4%) and stiffness of hand (16.2%). Serious

injuries were only due to accidents with a value of (44.8%), cuts (23.8%), burns (12.4%), and bruises (18.1%). Arms got injured (8.6%), back (19.0%), eyes (6.7%), fingers (38.1%), and hand (16.2%) and other are (11.4%).

Table 3: Regression analysis

Surgeons characteristics		Count (N)	Marginal Percentage
Occupational injuries	cuts	25	23.8%
	diathermy burns	13	12.4%
	serious injuries	47	44.8%
	bruises	19	18.1%
	33	1	1.0%
Gender	male	30	28.6%
	female	75	71.4%
Qualification	college to higher school	27	25.7%
	higher school to abroad	37	35.2%
	higher study along with courses	41	39.0%
English proficiency	well	41	39.0%
	somewhat	38	36.2%
	not at all	26	24.8%
Provision of PPE	Protective clothing	26	24.8%
	gloves	18	17.1%
	steel toe cap boots	10	9.5%
	all of above	51	48.6%
Safety training	received training	102	97.1%
	not received	3	2.9%
Surgery size	small	21	20.0%

	medium	42	40.0%
	big	42	40.0%
Working hours	8 hours or more	63	60.0%
	less than 8 hours	42	40.0%
Workdays	more than 5 days	58	55.2%
	5 days or less	47	44.8%
Employee count	11 or more	48	45.7%
	10 or fewer	57	54.3%
Age	30-40 years	32	30.5%
	40-50 years	73	69.5%
RF1	.2500000000000000	27	25.7%
	.285714285714286	12	11.4%
	.3333330000000000	1	1.0%
	.3333333333333333	17	16.2%
	.3750000000000000	12	11.4%
	.4000000000000000	16	15.2%
	.4166666666666667	20	19.0%
RF2	.3000000000000000	1	1.0%
	.3333330000000000	1	1.0%
	.3333333333333333	44	41.9%
	.3750000000000000	39	37.1%
	.4000000000000000	8	7.6%
	.428571428571429	12	11.4%
RF3	.2000000000000000	8	7.6%
	.2500000000000000	32	30.5%
	.2666666666666667	7	6.7%
	.285714285714286	12	11.4%
	.3000000000000000	1	1.0%
	.3333330000000000	1	1.0%
	.3333333333333333	17	16.2%
	.3750000000000000	27	25.7%
	1.0000000000000000	93	88.6%
	Total	105	100%

The results showed that more injuries are because of accidents with a value of 44.8% and this could be possible when you take less sleep and work more (60%) and when you also work more than 5 days of the week (55.2%). Most of the participants were provided with PPE (48.6%). Most of the surgeons who participated in this study showed that females were more injured than males (71.4%); an age group of 40-50 years has more injuries (69.5%). Surgeons that can do small surgeries were (20%) while others that can do large

and medium-sized surgeries were (40%). (45.7%) has an employee count of 11 or more workers and (54.3%) showed an employee count of 10 or fewer workers. The results showed that more working days, hours, less sleep causes more accidental injuries, and also when you have an employee count of fewer than 10 workers with more departments in the hospital and more injuries are faced by cardiac and general surgeons. English proficiency, provision of PPE, number of jobs performed in the hospital had no significant

association with injury.

Model Fitting Information

Model Fitting Criteria		Likelihood Ratio Tests		
Model	-2Log-Likelihood	Chi-Square	df	Sig.
Intercept Only	266.897			
Final	5.250	261.647	60	.000

Model is significant at 0.000 level which means it is statistically significant at 95% confidence interval.

III. CONCLUSION:

An occupational injury is defined as any personal injury, disease, or death caused by an accident during work. Workplace injuries are different from a work-related illness, which is a result of prolonged exposure to harmful substances in the workplace. Every day workers face serious injuries both physical and mental. Accidental injuries are possible during surgery for all surgeons. It could be possible with the transmission of diseases such as hepatitis B, AIDS, viral fever or it could be an inefficient use of equipment tools or machinery, etc. The purpose of this study is to identify the frequency, characteristics, and risk factors for occupational injuries experienced by surgeons of Lahore, Pakistan. There are different types of surgeries which involve cardiac surgery, colon and rectal surgery, general surgery, gynecology and obstetrics, gynecological oncology, neurosurgery, eye surgery, oral and maxillofacial surgery, orthopedic surgery, otorhinolaryngology, plastic surgery and pediatric surgery, urology and vascular surgery. Occupational hazards faced by surgeons are of different types which include musculoskeletal disorders, stress, radiation exposure, risk of transmission of blood borne pathogens, sharp injuries, and diseases. We divided the causative factors into accidental hazards, physical hazards, chemical hazards, biological hazards, ergonomic, psychosocial, and organizational factors. This study was conducted using a structured questionnaire that involved participants aged 30 or 30+. Data were collected from different surgeons of Lahore considering their injury risk and that individuals should be currently employed. Among 150 participants which were invited, 105 people responded to the survey. The

ratio of females who participated was 75(71.43%) and males were 30 (28.57%). Most of the people who participated were 28 general surgeons, 57 cardiothoracic surgeons, and 20 orthopedic surgeons. Most participants worked in more than one hospital. 29% worked in surgical units, 23% worked in urgent units, 16.1% worked in the emergency unit, 14.2% worked in the burn unit, 11.4% worked in the trauma center and 6.66% worked in the radiology department along with their surgical work. The analysis was conducted using descriptive statistics and logistic regression to determine risk factor analysis. The results showed that more working days, hours, less sleep causes more accidental injuries, and also when you have an employee count of fewer than 10 workers with more departments in the hospital and more injuries are faced by cardiac and general surgeons. English proficiency, provision of PPE, number of jobs performed in the hospital had no significant association with injury. Further to exclude surgical injuries from the health care department, a surgeon must be trained enough as well as there must be a good employment count, they should take complete rest, should not work more than 8 hours, should take a break from their work to release the anxiety of emergency patients as well as traumatic patients.

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