ORIGINAL ARTICLE

Medico-legal Assessment of Non-fatal Cases of Fall from Height in Karachi

Syed Perwez Alam[1], Roohi Ehsan[2], Wasiq Ahmed[3]. Fahad Hussain Mirza[4]

ABSTRACT

Background: Fall from height is a tragedy, largely avertable, often leading to death or morbidity. Apart from the physical dimension, it also has important medico-legal implications. There is a dearth of serious study to document the overall fall from height cases in the metropolis of Karachi or to formulate suggestions to improve the situation. The current study has been undertaken in this direction.

Objective: To assess and document the incidence of medico-legally relevant cases of fall from height in the metropolis of Karachi and to suggest ways to minimize this mishap.

Methods: Descriptive, retrospective, cross-sectional study of medico-legally relevant cases of falls from height in Karachi registered from 1st January, 2007 to 31st December, 2011; the data having been retrieved from the three medico-legal sections of Karachi located at Abbasi Shaheed Hospital, Jinnah Post-graduate Medical Centre & Civil Hospital and from the Police Surgeon's Office, Karachi. Findings were expressed in numbers & percentages.

Results: The total number of registered medico-legal cases of fall from height in Karachi during the study period was 1029. Of these 49.17% (n=506) were reported at ASH, followed by 28.67% (n=295) at CHK and 22.16% (n=228) at JPMC. Of the total number of fall cases, 86.01% (n=885) were non-fatal and 13.99 (n=144) proved fatal. Further, 51.41% (n=455) of the non-fatal cases were referred to ASH while 28.59% (n=253) went to CHK and 20% (n=177) to JPMC. Most of the referrals to ASH were due to location of the hospital.

Conclusion: Fall from height is one of the leading causes of medico-legal cases in Karachi with a high morbidity rate as well as mortality with about 15% of them being fatal in the five year period 2007-2011. Despite the incidence, most of these mishaps are preventable. As majority of these cases involve the construction industry, a multi-pronged team effort is required to improve the situation.

[1] Syed Perwez Alam

Assistant Professor, Department of Forensic Medicine & Toxicology, Karachi Medical and Dental College, Karachi.

[2] Roohi Ehsan

Assistant Professor, Department of Forensic Medicine & Toxicology, Karachi Medical and Dental College, Karachi.

[3] Wasiq Ahmed

Demonstrator, Department of Forensic Medicine & Toxicology, Karachi Medical and Dental College, Karachi.

[4] Farhat Hussain Mirza

HOD, Department of Forensic Medicine & Toxicology, DOW Medical College, DOW University of Health Sciences, Karachi.

Corresponding Author

Syed Perwez Alam

KEY WORDS: *Falls from Height, Karachi, Medico-legal, Morbidity, Abbasi Shaheed Hospital.*

Cite as: Alam SP, Ehsan R, Ahmed W, Mirza FH. Medico-legal assessment of non-fatal cases of fall from height in the Karachi metropolis. Pak J Med Dent 2014; 3(4):3-8.

INTRODUCTION

To scale heights has been an endeavor of mankind since time immemorial. Great perils & difficulties were no bar in the path to reach the top.

This endeavor however has now become a necessity of modern age. With a population explosion, a shifting trend from rural to urban areas & an increase in life expectancy, the accommodation in the cities became a gigantic problem. The solution was envisaged in vertical configuration of buildings i.e. multi storied high-rises.

The vertical ascension may have many advantages as far as living space is concerned but it has its perils, the worst being fall from height. Most of these falls are accidental during construction phase. As a matter of fact, the most common type of accident in occupational settings is fall from height.[1] It is estimated that worldwide each year 37.3 million falls occur that are severe enough to require medical attention.[2] In children they are the most common cause of non-fatal injuries but are usually fatal amongst the aged.[3, 4]

Like many other cities of the world the metropolis of Karachi has also experienced a boom in construction industry most of which comprise multi-storied buildings. These high-rises offer the only affordable abodes for middle & low income groups of people. However, the construction of these buildings & their subsequent habitation has posed many safety problems, fall from height being one of the most pertinent. "Fall can be defined as sudden dropping down from a height of relatively high position by force of gravity wherein the potential energy due to height is converted to kinetic energy."[5]

Falls result in injuries which could be serious in nature. The severity increases with the height of fall, also depending on body & surface features.[6] Many of these injuries subsequently lead to physical impairment and/or permanent disability adding to the financial burden of family/institution and the state. In a study conducted by Faruqui et al in 2007, fall injuries topped the list of major injuries of workers on project sites of construction firms of Pakistan.[7] In other countries as well, construction related falls comprise the bulk of injuries. In Hong Kong 150 reported accidents per 1000 workers per year were recorded in the year 2000.[8] In China's construction industry, falls are responsible for approximately 51% of injuries.[9] In New Zealand falls from heights are the major cause of occupational injuries.[10]

Falls from height entail not only morbidity but also mortality. An autopsy based study of fatalities of fall injuries in Karachi during the period 2007-2011 found that 1.29% of all medico legal autopsies conducted in three major hospitals of Karachi were those of fall from height, accidental falls being the most common.[11] Falls continue to be the biggest cause of fatal injury in Britain's workplaces.[12] In 2004, work-related falls from heights accounted for more than 47% of the total fatal mishaps in Hong Kong.[13]

However falls can also occur at ground level due to slipping on polished surface or rugs, CVA, postural hypotension, intoxication etc.[5] A major cause of falls is the Slips & Trips in retail /wholesale establishments.[14] Healthcare workers in hospital settings are also at risk.[15] The elderly comprise yet another vulnerable group. WHO reports that each year 28% --35% of people over 65 years and 32%—42% of people over 70 years have a fall.[16]

Apart from the autopsy based study by Mirza F H et al on fatalities of fall injuries in Karachi[11], no serious study has been conducted to document the overall fall injuries. These injuries have an impact in the shape of compensation claims and related medico-legal liabilities. The present study was undertaken to document the incidence of medico-legal cases of fall from

height in the sprawling metropolis of Karachi and to suggest ways to minimize the tragedy.

METHODOLOGY

One of the purpose of this study being to assess the incidence of falls from height in Karachi, the data of medico-legal cases with focus on cases of fall was collected for the period 2007—2011 from medico-legal sections of the government designated three hospitals of Karachi viz Abbasi Shaheed Hospital, Jinnah Post-Graduate Medical Centre and Civil Hospital and from the Police Surgeon's office. The data was analyzed, categorized, tabulated and the trend specified.

The other purpose of the study was to suggest ways to minimize the tragedy. A comprehensive literature search for relevant studies that contributed to understanding the factors influencing falls from height was undertaken. Papers were retrieved from multiple databases. This information pack was integrated with the data available and suggestions formulated to minimize this mishap.

All cases of fall that were registered as medico-legal cases were included in the study while those that were not registered as such were excluded. Also cases of fall taken to hospitals other than the three specified major centers were excluded.

RESULTS

The total number of registered medico-legal cases of fall from height in the metropolis of Karachi during the period 2007-2011 was 1029 *(*Table 1*)*. Of these 49.17% (n=506) reported at Abbasi Shaheed Hospital, followed by Civil Hospital 28.67% (n=295) and Jinnah Post-graduate Medical Centre 22.16% (n=228).

Out of the total number of fall cases, 86.01% (n=885) were non-fatal while 13.99% (n=144) proved fatal.

A majority i.e. 51.41% (n=455) of the non-fatal cases were referred to Abbasi Shaheed Hospital while only 28.59% (n=293) went to Civil Hospital and 20.00% (n=177) to JPMC (Table 2).

Table 1. frequency of cases of total medico-legal falls for the period 2007-2011

Hosp./Year	2007	2008	2009	2010	2011	TOTAL	%age
ASH	121	125	117	96	47	506	49.17
CHK	104	69	14	59	49	295	28.67
JPMC	67	41	36	3	81	228	22.16
TOTAL	292	235	167	158	177	1029	100.00

ASH=Abbasi Shaheed Hospital
CHK=Civil Hospital Karachi
JPMC=Jinnah Post-Graduate Medical Centre

Table 2. Frequency of fatal falls during 2007-2011[11]

Hosp./Year	2007	2008	2009	2010	2011	TOTAL	%age
ASH	12	10	16	6	7	51	35.42%
CHK	14	6	7	9	6	42	29.16%
JPMC	14	11	8	3	15	51	35.42%
TOTAL	40	27	31	18	28	144	100.00%

Table 3. Frequency of non-fatal falls during the period 2007-2011

Hosp. /Year	2007	2008	2009	2010	2011	TOTAL	%age
ASH	109	115	101	90	40	455	51.41%
CHK	90	63	07	50	43	253	28.59%
JPMC	53	30	28	00	66	177	20.00%
TOTAL	252	208	136	140	149	885	100.00%

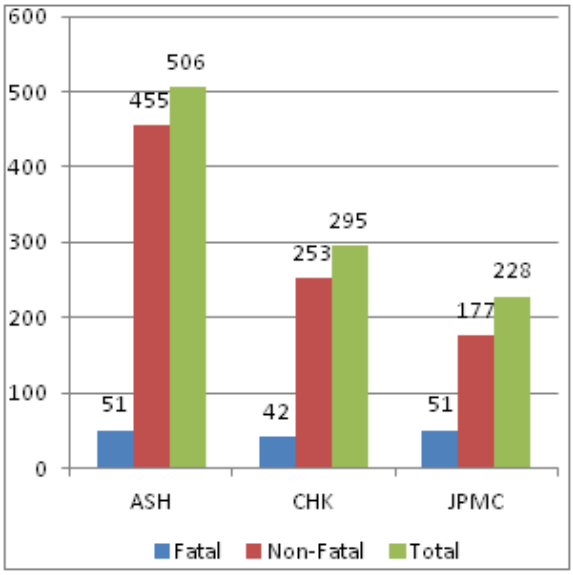
Table 4. Hospital-wise 5 years' average fatality due to fall

ASH	CHK	JPMC	MEAN VALUE
10.079%	14.237%	22.368%	15.561%

Table 5. Share of fall cases among total medico legal cases

YEAR	2007	2008	2009	2010	2011
TOTAL MEDICO-LEGAL CASES	24819	25683	25364	26325	25968
TOTAL FALL CASES	252	2O8	136	140	149
% OF FALL CASES	1.02%	0.81%	0.54%	0.53%	0.57%

Figure 1: Graphical illustration representing nature of falls



There was an overall peak in fall cases in the year 2007 with a decreasing trend over rest of the years (Table1). This could be due to more awareness of safety procedures while doing hazardous work at height and/or more stringent promulgation of safety regulations for the labour class.

The maximum number of cases of fall during the study period was reported in Abbasi Shaheed Hospital, comprising 49.17% of the total (Table 1).

Both ASH & JPMC received an equal number of fatal cases of fall during the study period while CHK remained behind (Table 2).

During the study period, 51.41% (n=455) of the non-fatal falls were referred to ASH while 28.95% (n=253) went to CHK & 20% (n=177) to JPMC (Table 3). The preponderance of cases reported in Abbasi Shaheed Hospital is all too obvious (Figure 1).

On an average, 10.08% of the total cases of falls reporting in the medico legal section of Abbasi Shaheed Hospital proved fatal. Likewise14.24% at Civil Hospital and 22.37% in JPMC were fatal cases of fall(Table 4).This again highlights the serious nature of injuries sustained due to fall and calls for appropriate implementation of remedial measures. As it is, falls are preventable and many of these fatalities could have been averted.

In Karachi, fall injuries accounted for 1.02 % of all medico legal cases reported in the year 2007, followed by a steady decrease in the coming years except for a slight rise in 2011 (Table 5).

DISCUSSION

Injuries due to falls from height have not only a physical dimension but also important medico-legal implications. These are particularly relevant in cases of workers /laborers who work at heights. These implications begin with the consideration of provision of safe environment at work site by the employer/contractor, the assessment of extent of injury, the liability for treatment and then the extent of compensation if the injury has resulted in partial or total disablement or death.

This study highlights the seriousness of fall injuries. More than 15% of the total fall cases reported in the medico legal sections of three hospitals in Karachi during the five years study period proved fatal (Table 4).The situation becomes all the more tragic because most of these mishaps could have been averted or controlled had certain precautions been taken.

The preponderance of cases reporting in one of the three hospitals i.e. Abbasi Shaheed Hospital is attributed to various factors:

1. The said hospital caters to a large part of the metropolis which is thickly populated and comprises many multi-storied residential building blocks.

2. Being a growing area of the metropolis as compared to the old areas of the city which are already built up, construction activity in this part is more evident.

3. It also receives fall victims from the nearby SITE area which is the industrial hub of the country and where the labour class is prone to accidents especially falls from height.

Besides fatalities, many of the fall injuries are non-fatal that could subsequently lead to complications & disabilities. Fall is the second leading cause of spinal cord injury in the United States.[17] A one year study in a tertiary care hospital in Delhi notes that 9.5% of orthopedic emergency admissions were due to skeletal injuries following fall from height.[18] In Australia injuries to the knee, ankle or back accounted for nearly half of all serious claims due to a fall from height.[19] As it is, a sizeable number (n=885) of the total medico-legal cases of fall in Karachi during this study period were non-fatal.

Compensation & medical costs for fall injuries constitute a considerable financial burden worldwide. In many countries falls are still the most costly work hazard.[20,21] The annual costs of fall-related occupational injuries in the USA were nearly 6 billion dollars in 2000.[22] In Holland, total health care costs due to work-related injuries were €1.15 billion in 2004, out of which 44% of injuries resulted from falls from height.[23]

Besides other causes, the major causes of fall are falls from unguarded roof or balcony edges, falls from unguarded scaffolds & falls from ladders. These can be avoided by utilizing suitable prevention systems. Passive systems prevent falls by placing a physical barrier between the worker and the fall hazard. Examples are guardrails. Active systems protect workers that have already fallen by limiting the fall and also limiting the abrupt force that the worker is suddenly subjected to. Examples are harnesses & personal fall-arrest systems.

In Pakistan the outlook is bleak. Effective legislation to provide safe working conditions for workers is lacking. Moreover the labor class itself is ignorant of its rights. This situation is exploited by the contractors/employers. Most organizations do have a safety policy but only on paper. No safety training programs for workers exist. Injuries generally are unreported. Compensation mostly is not paid.

Following are some recommendations to improve the situation:

1. Safety regulations need to be enforced by the government. Legislation is required for establishment of regulatory agency/organization for occupational safety management.

2. There is a need of robust safety awareness campaign among the site workers. Informal safety training for workers is essential.

And finally the onus lays with the firms especially construction firms which should develop the attitude of an active on site safety implementation program.

CONCLUSION

Falls from height are one of the leading causes of medico-legal cases in Karachi. They have a high mortality and morbidity rate. Many of these mishaps are preventable. As most of the cases involve the construction industry, the need of the hour is to regulate this sector on modern lines. This requires a multi-pronged team effort involving the construction firms, the contractors & the workers; and it has to be overseen by an effective & efficient government regulatory authority.

REFERENCES

[1] Jeong BY. Occupational deaths and injuries in the construction industry. Appl Ergon 1998; 39(5): 355-360.

[2] World Health Organization. Media Center Fact sheet No.344. WHO [Internet] 2012 Oct. Available from: http://www.who.int/mediacentre/factsheets/fs344/en/

[3] Baker SP, O'Neill B, Ginsburg MJ, Li G. The injury fact book. 2nd ed. New York: Oxford University Press; 1992.

[4] Mosenthal AC, Livingston DH, Elcavage J, Merritt S, Stucker S. Falls: Epidemiology and strategies for prevention. J Trauma 1995; 38: 753-756

[5] Dikshit PC. Textbook of Forensic Medicine & Toxicology. New Delhi: Peepee Publishers; 2007.

[6] Atanasijević T, Nikolić S, Djokić V. Level of total injury severity as a possible parameter for evaluation of height in fatal falls. Srp Arh Celok Lek 2004; 132(3-4) :96–98

[7] Farooqui RU, Ahmed SM, Panthi K. Developing Safety Culture in Pakistan Construction Industry – An Assessment of Perceptions and Practices among Construction Contractors. Proceedings of the Fourth International Conference on Construction in the 21st Century: (CITC IV Australia).2007: 420-437.

[8] Rowlinson S. Hong Kong construction-Safety management and the law. Hong Kong: Sweet & Maxwell Asia; 2003.

[9] Yung P. Institutional arrangements and construction safety in China: An empirical examination. Constr Manage Econ 2009; 27: 439-450.

[10] Bentley TA, Page SJ, Laird IS. Accidents in the New Zealand adventure tourism industry. Safety Science 2001; 38: 31-48

[11] Mirza FH, Parhyar HA, Tirmizi SZ, Waheed A. Fatalities of Fall Injuries in Karachi – a five year autopsy based study. Medical Channel 2013; 19(4): 53-58

[12] Health & Safety Executive (HSE). Slips & trips & falls from height in Great Britain.[Internet] 2013. Available from: http://www.hse.gov.uk/statistics/causinj/kinds-ofaccident.htm

[13] Chan APC, Wong FKW, Chan DWM, Yam MCH, Kwok AWK, Lam EWM et al. Work at height fatalities in the repair, maintenance, alteration, and addition works. J Constr Eng M Asce 2008; 134: 527-535.

[14] National Institute for Occupational Safety & Health. Preventing slips, trips & falls in wholesale & retail trade establishments. NIOSH [Internet] 2012 Oct; Pub No 2013-100 Available from: http://www.cdc.gov/niosh/docs/2013-100/

[15] National Institute for Occupational Safety & Health. Slips, trips & fall prevention for healthcare workers. NOISH [Internet] 2010; Pub No.2011-123. Available from: http// www.cdc.gov/niosh/docs//2011-123/

[16] World Health Organization. WHO Global Report on falls prevention in older age, France: WHO; 2007: 53. Available from: www.who.int/ageing/publications/Falls_prevention7March.pdf

[17] Maull KI, Whitley RE, Cardea JA. Vertical deceleration injuries. Surg Gynecol Obstet 1981; 153: 233-236.

[18] Gulati D, Aggarwal AN, Kumar S, Agarwal A. Skeletal injuries following unintentional fall from height. Ulus Travma Acil Cerra Derg 2012;18(2): 141-146

[19] Safe Work Australia. Work-related injuries and fatalities involving a fall from height, Australia: Safe Work Australia; [Internet] 2013 Oct: 60. Available from http://www.safeworkaustralia.gov.au/sites/swa/about/publications/%20pages/work-related-injuries-fatalities-involving-fall-from-height-australia

[20] Horwitz IB, Mccall BP. Disabling and fatal occupational claim rates, risks, and costs in the Oregon construction industry 1990-1997. J Occup Environ Hyg 2004; 1(10): 688-698.

[21] Gavious A, Mizrahi S, Shani Y, Minchuk Y. The costs of industrial accidents for the organization. J Loss Prevent Proc 2009; 22: 434-438.

[22] Courtney TK, Sorock GS, Manning DP, Collins JW, Holbein-Jenny MA. Occupational slip, trip, and fall-related injuries. Ergonomics 2001; 44(13) :1118-1137.

[23] Meerding WSM, Beeck EFV. Incidence and costs of injuries in The Netherlands. Eur J Public Health 2005; 16: 271-277.