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Original Article

A Study of Pattern of Death due to Industrial Accidents Around Moradabad City

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ABSTRACT

Background: *Accidental deaths and injuries are inevitable in this modern way of living.* ***Methods:*** *We retrospectively studied unnatural death cases brought for the post mortem examination at district mortuary of J P Nagar in the two years from 2014-2015. All the cases of death which are caused due to the injuries within the industrial premises were included in the study and the results are analysed.* ***Results:*** *Death from industrial area accounted for 5.01% of total autopsies. Male outnumbered the female in the ratio of 5:1 and they suffered injuries mostly in their third decade of life. Maximum incidences occurred in the morning shift followed by afternoon shift and are brought dead to the hospital.* ***Conclusions:*** *The most common cause of death in industrial area is head injury either due to falling of heavy object or by fall from height. This can be attributed to the poor enforcement of safety measures in these areas.*

Key words: *Industrial Area, Accidents, Fatality, Injuries*

Section – Forensic Medicine

INTRODUCTION

According to the indirect estimates by the World Health Organization (WHO) and the Global Burden of Diseases Study (GBD) suggest that unintentional injuries account for 3.9 million deaths worldwide[1] of which about 90% occur in low- and middle-income countries. The WHO also estimates occupational health risks as the tenth leading cause of morbidity and mortality. This is due to the globalization and rapid industrial growth during the past few years which is measured around 7% annual economic growth and has led to complex occupational health related issues.[2] To ensure the safety of the workers efforts are taken both by the central and state governments to minimize the number of deaths while on duty.[3] Moradabad caters total population of 887,871 as per 2011 census. It is famous for brassware industry from the early 19th century. From 1980 various other metal wares like EPNS, iron, aluminium etc were introduced. New technologies like electroplating, lacquering, powder coating also found application. In Moradabad, there are several hundred units engaged in the manufacture and export of brass products. Majorly all retail conglomerates like Walmart, IKEA, Target, etc. purchase brass products from Moradabad.[4] Due to increase in population the industries were shifted out from the Moradabad city to the outskirts along the national highway 24 up to JP Nagar formerly known as Amroha which was part of Moradabad before becoming new district. As industries are established to manufacture products for the prosperity of human but human employed in those industries unfortunately meet with accidents resulting in injuries, disability and death. As per International Labour Organisation (ILO) estimates, nearly 2 lakhs workers die annually and about 1200 lakhs are injured.[5]

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METHODS

The present retrospective study on the pattern of industrial deaths was done by Department of Forensic Medicine, T.M.M.C & R.C Moradabad during the period of 2 years from January 2014 to December 2015. All the cases having history of injuries in the industrial premises and died in the

hospital during treatment or brought dead were included in the study and the variables regarding the age, sex, survival period, causative agent and cause of death was obtained from the police records and from the post mortem examination done in the district hospital of JP Nagar. Workers dying due to natural cause inside the factory and deaths occurring outside the industrial premises are excluded from the study. The data was collected and tabulated to determine the frequency and results expressed in percentage.

RESULTS

This retrospective study was carried out in Department of Forensic Medicine in collaboration with the district mortuary J P Nagar.Total958post-mortem examinations were done during 2year period from January 2014 to December 2015 out of which 48 cases were due to death caused within the industrial premises situated near the Moradabad. Thus incidence of industrial death is 5.01%. Table I shows the age and sex distribution of the victims. The age varies from 15 year to 70 years and peak incidence of fatalities was observed in age group of21-30 year comprising 17 (35.41%) cases followed by 31-40 year which has 11(22.91%) cases. Out of total 48 cases 40(83.33%) were male while 8 (16.67%) were female. Thus male: female ratio of 5:1 was observed. Table II shows distribution according to time of incidentin relation to number of victims. Morning shift constituted17 (35.41%) cases followed by afternoon shift13 (27.08%) cases and least number of fatalities was recorded in 7 (14.59%)cases in late night shift. Table III shows that out of 48 patients 43.75% were brought dead to the hospital and only 2 (4.10%) patients survived for up to 1 hour. Table IV shows the pattern of death having a wide spectrum ranging from head injury to death due to suspected poisoning. Head injury was commonest cause of death seen in 14(29.16%) cases followed by fall from height 8(16.67%), electrocution in 7(14.58%) cases and thermal burn 5 (10.41) cases. In 3 (6.26%) cases cause of death is under investigation.

Table I: Age & Sex distribution

Age groups	Male (%)	Female (%)	Total (%)
0-10 yr	0	0	0 (0%)
11-20 yr	7	1	8 (16.67%)
21-30 yr	14	3	17 (35.41%)
31-40 yr	9	2	11 (22.91%)
41-50 yr	6	1	7 (14.59%)
51-60 yr	3	1	4(8.34%)
61-70 yr	1	0	1 (2.08%)
Total	**40**	**8**	**48(100%)**

DISCUSSION

Industrialization is an important step in the overall development of a country. Due to rapid industrialization in developing countries people are recruited directly from the rural areas.

Table II: Distribution of study population according to time of incident

S. No	Time of incident	Number of cases	%
1	Morning	17	35.41
2	After Noon	13	27.08
3	Evening	11	22.92
4	Late Night	07	14.59
	Total	**48**	**100**

Table III: Survival Period

S. No	Time	No. of Cases	%
1	Brought dead	21	43.75
2	< 1 hr	2	4.10
3	1-6 hr	5	10.41
4	6-24 hr	7	14.58
5	1-3 day	8	16.67
6	> 3 day	5	10.41
	Total	**48**	**100.00**

Table IV: Cause of Death

S. No	Cause of Death	No. of Cases	%
1	Head injury	14	29.16
2	Fall from height	8	16.67
3	Electrocution	7	14.58
4	Hanging	3	6.26
5	Machinery	2	4.16
6	Thermal burn	5	10.41
7	Blunt trauma abdomen	2	4.16
8	Traumatic asphyxia	2	4.16
9	Suspected poisoning	1	2.09
10	Spinal Cord injury	1	2.09
11	Under investigation	3	6.26
	Total	**48**	**100**

The present study was conducted by Department of Forensic Medicine T.M.M.C & R.C Moradabad for the period of 2 years from 2014 to 2015 and the incidence of industrial deaths was 5.01% which is similar to the study done by Shreedhara KC et al[6] (4.62%). However the study done by Zine KU et al[7] showed the incidence of fatalities was 6.85%. In present study, the age of the victims varied from 15-70 years. The peak incidence was observed in the age group 21-30 years comprising 17(35.41%) of the cases. It was also observed that 22.91% belonged to the age group 31-40 years. More than half 58.32% of cases comprised age group of 21-40 years in the study. Individuals in the age group less than 10 years and more than 70 years were not involved in the fatal industrial accidents. This is in accordance with studies done by Stephen MP et al,[8] Behera C et al[9] and Takala J et al[10] They also found that commonest age group was 21-30 years and next common was 31-40 years. However according to the study done by Zine KU et al[7] most common age group involved was 31-40 years. Individuals in the first and seventh decade were not affected in present study. The reason for the above is that young adults are the prime bread earners of the family and this is the most productive age and is also entrusted with hazardous work, takes risks and has less regard to safety precautions and hence is more prone to accidents. There are no fatalities up to the age of 15 years and this is

because of the enforcement of Child Labour Act and above the age of 60 year people are more experienced and are careful for their safety.

Males 40(83.33%) outnumbered the females 8(16.67%) in the present study with the male: female ratio of 5:1and is according to the study done by Shreedhara KC et al[6] where 86.54% of the victims were male. It is also similar to the study done by Zine KU et al[7] who reported 76.54% victims were males. The reason for the male majority is that much of the work in industries is male oriented like machinery work, electrical work, construction and females mostly keep themselves indoor mostly due to cultural background and low potential for employment rate owing to poor literacy, along with the tendency that females are not employed in hazardous work and don't take risks and follow safety precautions while working in industries.Similar finding were observed in the studies done by Stephen MP et al,[8] Behera C et al[9] and Ince H et al.[11] In the study it was observed that number of death is highest in the morning 17(35.41%) followed by afternoon 13(27.08%) and is due to the fact that these are productive hours in any occupation. Least fatality was observed in late night shift 7 (14.59%) because of less person employed and safety rules are followed. This is similar to the finding by Shreedhara KC et al[6] and Zine KU et al[7] Out of 48 patients 43.75% were brought dead to the hospital and only 2 (4.10%) patients survived for up to 1 hour. Similar findings are reported by Zine KU et al[7] which show the severity of industrial accidents. Almost half of the patients die after the injuries caused so there is importance of having the hospital with facilities within the industrial set up to deal with the emergency situations and transportation should be available to reach the nearest hospital. Out of 48 cases of unnatural deaths head injury due to falling of heavy object on the head claimed 14(29.16%) lives followed by death due to fall from height in 8(16.67%) cases. Thus almost half of the fatalities are due to trauma to head. Other important cause of death are due to electrocution in 7(14.58%) cases and thermal burn 5 (10.41) cases. Similar finding were observed in the studies conducted by Yanai O et al,[12] Shreedhara KC et al[6] and Zine KU et al.[7] People working in the industries prove to be inadequate in using proper protective measures. So the proper using of personal protective measures along with the enforcement of use of helmets and belts is utmost required to decrease the incidence of deaths to a considerable amount.

CONCLUSION

- Death in industrial setup subjected for medico legal autopsy contributed for 5.01% of total autopsies conducted
- Males 83.33% outnumbered the females 16.67%
- 21-30 years age group contributed the highest number 35.41% of deaths
- There were no cases in the age group 0-14 years because of enforcement of child labour act
- Head injury was the commonest form of death in industrial premises
- Fatalities were more common in morning 35.41%
- Factories do not implement safety measures and also lacks basic first aid facilities and attachment to nearby hospitals

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