

Research Article**Temporal Trends in Fatal Occupational Injuries around Bangalore: An Autopsy study****Rajshekhar Myageri^{*1}, Rajini Patil²**¹Assistant Professor, Department of Forensic Medicine, Gadag Institute of Medical Sciences, Gadag, Karnataka, India²Assistant Professor, Department of Pharmacology, S.S. Institute of Medical sciences and Research Centre, Davangere, Karnataka, India***Corresponding author**

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Abstract: As per International Labour Organization (ILO) 2005, estimates that nearly 2.2 million workers die annually. The ILO report said the number of accidents - in particular fatal accidents - appear to be increasing, particularly in some Asian countries due to poor reporting, rapid development and strong competitive pressures of globalization. An Autopsy study of fatal industrial accidents autopsied at Victoria Hospital Mortuary was carried out over a period of 18 months. The aims of the study were to know the incidence of accidental deaths in industrial workers, diurnal distribution of the victims and survival period. Data were collected from police, relatives, photographic evidence from the scene, post mortem findings and chemical analysis examination where ever necessary and the results were analyzed. 128 cases of deaths due to fatal industrial accidents are studied. Majority of the accident occurred during late morning and afternoon. Most of them were working on morning shift and 8 hours/day schedule. The accidents involved workers having 6months to 2 years of work experience (44.5%) was more than the experienced works of 5 years (21.9%) or more. Well-structured training programmes may help reduce this trend of accidents in early years of service. Provision for relaxation at leisure period such as retiring rooms with recreation facilities may be provided.

Keywords: Autopsy, Occupational Injuries, Death.

INTRODUCTION

Fatal occupational injury is defined as death resulting from accidents or other external causes that occurred when the person was in working status [1]. As per International Labour Organization (ILO) 2005 estimates that nearly 2.2 million workers die annually. The ILO report said the number of accidents - in particular fatal accidents - appear to be increasing, particularly in some Asian countries due to poor reporting, rapid development and strong competitive pressures of globalization [2].

A study suggested several rarely studied factors that might exacerbate the potential fatiguing effects of longer work periods. These compounding influences include work place stressors - such as work load, noise, exposure to toxic chemicals, heat, organizational issues such as staffing levels, nature of job tasks, and rest breaks as well as commuting time and pressure due to domestic and social responsibilities outside work [3]. The adverse effect of shift work is well chronicled [4]. They include biological disruption to physiological process, including the sleep work cycle [5]. The impairment of physical health and psychological wellbeing, [6] problems with alertness,

performance and safety [7] and lastly, interference with social and domestic life [8]. Hence in this study effort is made to analyze temporal trends in occupational fatalities.

MATERIALS AND METHODS

The study of 128cases has been carried out in the department of Forensic Medicine, Victoria Hospital attached to Bangalore Medical College and Research Institute, Bangalore. All the cases brought to the department of medico legal autopsy with alleged history of deaths due to fatal industrial accidents were selected on continuous basis. The study did not involve any removal of organs or mutilation of bodies which is prohibited by the ICMR guidelines. The clearance for the study was obtained from the college ethical committee.

Study analyzed data such as time of the incident, day and date of the incident, place of the incident and the circumstances of the death, experience at work of deceased, work schedule and work shift were collected from the police and relatives.

Inclusion Criteria

- All the cases of deaths due to industrial accidents.
- Cases belonging to all ages above 18 years.
- Cases belonging to both sexes.
- Both treated / untreated.

Exclusion Criteria

- All the natural deaths occurring at industrial set up
- All cases less than 18 years of age.
- All visitors to industry.

RESULTS

The highest number of accidents were seen on Sunday (17.2%) followed by Thursday (16.4%) and Monday (14.8%).

Table-1: Shows day-wise distribution of accidents

Day of Occurrence	Frequency	Percent
Sunday	22	17.2
Monday	19	14.8
Tuesday	18	14.1
Wednesday	16	12.5
Thursday	21	16.4
Friday	14	10.9
Saturday	18	14.1

Majority of accidents took place in afternoon hours (43.8%) and in late morning hours (27.3%) followed by evening hours (17.2%).

Table-2: Shows distribution of accidents in relation to the time of the day

Time of Occurrence	Frequency	Percent
12.00am – 4.00 am	3	2.3
4.00am - 8.00am	3	2.3
8.00am - 12.00pm	35	27.3
12.00pm - 4.00pm	56	43.8
4.00pm - 8.00pm	22	17.2
8.00pm – 12.00am	9	7.0
Total	128	100.0

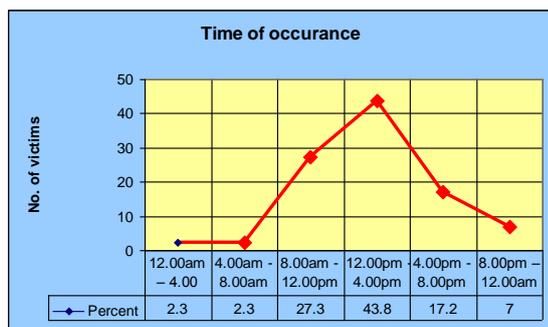


Fig-1: distribution of accidents according to time of occurrence

The majority of the accidents involved workers having 6months to 2 years of work experience(44.5%) followed by workers having more than 5 years of experience(21.9%) and workers having less than 6months of experience.

Table-3: Shows distribution of accidents according to work experience.

Experience	Frequency	Percent
< 6 months	19	14.8
6months – 2yrs	57	44.5
>2yrs - 5yrs	24	18.8
> 5yrs	28	21.9
Total	128	100.0

That 91.4% of the victims were working on 8hours/day shift and 8.6% of the victims were working on 12 hours/day shift.

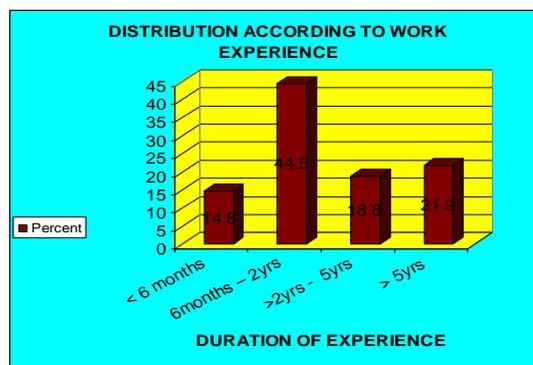


Fig-8: Depicts distribution of accidents according to experience at work.

The majority of the victims were working on morning shift (91.4%), followed by night shift (4.7%) and pay shift (3.9%).

Table-4: Shows distribution of accidents according to work shift

Shift	Frequency	Percent
Morning shift	117	91.4
Night shift	6	4.7
Pay shift	5	3.9
Total	128	100.0

DISCUSSIONS

In our study the maximum number of industrial accidents occurred during the day with time period between 12.00 pm to 4.00 pm (43.8%) followed by 8.00 am to 12.00 pm (27.3%) next highest number occurred during the time period of 4.00 pm to 8.00 pm (17.2%). Only 7% cases occurred between 8.00 pm to 12.00 pm, these findings are similar to the findings observed by Williams, Ann M, Feyer, Anne Marie [9].

According to the study by Folkard S and Toker P[10], the risk was found to increase in an approximately linear fashion across three shifts showing an increased risk of 18.3% on the afternoon shifts and

30.4% on the night shifts. Similar findings were also observed in our study in the morning hours. However, the risk decreased in the night shift. This discrepancy was probably attributed to the fact that our study involved more number of construction sector victims (48.4%), which virtually came to halt in the night except for few days or under few circumstances such as roof construction, enforcing RCC is involved etc. and also (91.4%) victims were working on the morning shift. The reason for this crowding of accident at midafternoon hours was probably attributed to fatigability and decreased alertness with increase in hours of work.

According to Folkards and Toker P [10], apart from slightly heightened risk from second to fifth hour the risk increases in an approximately exponential fashion with time on the shift such that in the tenth hour it was more than double than the first eight hours. Similar findings were also observed in our study were there was gradual increase in numbers over successive hours. Ten times increase during fourth to fifth hour, 20 times increase in sixth to seventh hour of work. However, the risk beyond eighth hour could not be analyzed since 91.4% cases were working on eight hour shift and morning shift. These findings could probably be attributed to increased fatigability with increased working hours.

According to John Everett Park [11] approximately 50% of the employees had accident in first six months of employment followed by 23% in the next months and 3% subsequently. However, in our study highest number of incidents occurred in victims having six months to two years' experience (44.5%) followed by workers having more than 5 years of experience (21.9%) and then followed by workers having >2years to 5 years' experience. This discrepancy was probably due to the fact that most of the victims of our study belonged to the construction sector where they were appointed on ad-hoc basis for a period varying from 15 days to 4 months. After the completion of work they will be shifted to new site and given a new labor job. So is the possibility of error in reporting and recording exact years of experience in particular type of labor work.

According to Benack J, Benarides FG, Jarque S [12] 58% of the accidents involves workers on the temporary contract and 49% affects workers with less than one year of service in the company. Also workers on temporary contract are more than twice likely to suffer on accidents than the permanent contracts, especially in construction sector. These findings are in accordance to our study where a majority of the workers were recruited on temporary contract basis and crowding of cases occurred in victims having 6 months to 2 years of experience. In our study it is observed that the majority of the workers (91.4%) worked on 8 hours/day shift, 8.6% worked on 12hours/day shift and

also 91.4% worked on morning shift, 4.7% worked on night shift, 3.9% worked on pay shift.

CONCLUSION

Majority of the accident occurred during late morning, just before the lunch and afternoon period. The workers had most of the fatalities in the morning shift (91.4%) and the workers were on 8 hours/day schedule. The incidence of accidents increased over successive hours at work. Hence suggesting a need to regularize the work hours with adequate leisure periods. Majority of the accidents involved workers having 6 months to 2 years of work experience i.e duration of association with present occupation. Well-structured training programmes may help reduce this trend of accidents in early years of service. Provision for relaxation at leisure period such as retiring rooms with recreation facilities may be provided.

REFERENCES

1. Census of fatal occupational injuries, 2003.
2. Global workplace deaths vastly under-reported, says ILO.
3. Smith L, Folkard S, Tucker P, McDonald F; Work shift duration: A review comparing eight hour and twelve hour shift system. *Occupational Environ Med*, 1998; 55: 217-219.
4. Scott AJ, Ladou J; Shift work effect on sleep and health with recommendation for medical surveillance and screening In, A J Scott. Ed. *Occupational medicine: State of the art reviews: Shift work*. Philadelphia Honely and Belfus, 1990; 5: 273-300.
5. Tepas DI, Mohan RP; The Many meaning of sleep work stress, 1989; 3: 93-102.
6. Akerstedt T; Psychological and Psychophysiological effect of shift work. *Scand F work environs health*, 1990; 16: 67-73.
7. Folkard S; Circadian performance rhythms: Some practical and theoretical implications. *Philostrons R soc Land B BiolSci*, 1990; 327: 543-553.
8. Fischer FM, Mareno CRC, Fernadez RI; Day and shift workers leisure time ergonomics 1993; 30:43-49.
9. Levin L, Oler J, Whiteside J R. Injury incidence rates in a paint company on rotating production shifts. *Accid Anal Prev*, 1985; 17: 67-73.
10. Williamosn, Ann M, Feyer, Anne-Marie. Causes of accidents and the time of the day work stress, 1995; 9(2-3): 158-164.
11. John Everett Park; PARK'S Text book of preventive and social medicine. 18th edi, BanarsidasBhanot Publisher; 2005: 612.
12. Gimeno D, Benavides FG, Amick BC, Benach J, Martínez JM; Psychosocial factors and work related sickness absence among permanent and non-permanent employees. *Journal of Epidemiology and Community Health*, 2004; 58(10):870-876.