



Original Research Article

Morbidity pattern among stainless steel industry workers of Tamil Nadu: A cross sectional study

Hanitha Rajasekar¹, Sowmiya K R^{1,*}, G Ravivarman¹¹Dept. of Community Medicine, Chettinad Hospital & Research Institute Chettinad Academy of Research & Education, Chennai, Tamil Nadu, India

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ABSTRACT

Background: In developing countries, where work is being increasingly mechanised, a number of work processes have been developed that treat workers as tools in production, putting their health and lives at risk. Hence the current study was done to identify the morbidity pattern among stainless steel industry workers and to determine the relationship between morbidities and other associated factors related to work.

Study Methodology: A cross sectional study was conducted in a small scale stainless steel industry of Tamil Nadu. 143 industrial workers were selected by using universal sampling method. Workers with experience of not less than 1 year were automatically included in the study and those with pre-existing illness before joining the industry were excluded. A structured questionnaire was used to collect the data from study participants.

Results: It was estimated that nearly 15.4% of employees had work experience of more than a year and 84.6% had experience of more than 2 years. Overall prevalence of morbidity pattern in employees as per this study was 95.1%. Most common morbidity among workers was myalgia (50.3%) and second commonest was mechanical injuries (49%). The association between nature of work and morbidity suggested that 59% employees working in powdering, polishing section had history of mechanical injuries and 38.2% of employees in powdering, polishing section developed hearing loss. Among the employees not using PPE, 15.2% of them developed bronchial asthma, 29.3% had hearing loss, 21.2% had skin manifestation and 42.4% had mechanical injuries, these associations were found to be statistically significant.

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1. Introduction

Occupational health aims at the enhancement of the physical, mental and social well-being of workers and support for the development and maintenance of their working capacity, as well as professional and social development at work. In developing countries, where work is being increasingly mechanised, a number of work processes have been developed that treat workers as tools in production, putting their health and lives at risk.¹ Occupational hazards may result in occupational diseases and it depends on the type of industry and duration of exposure to a substance. Stainless steel industry is one

such industry where employees are exposed to various occupational hazard.² It is a type of metal product that is more resistant to rust, staining and corrosion than regular steel. The elements which are present in stainless steel are chromium, nickel, molybdenum, silicon, aluminium and carbon.³ Most of the household articles which we use in our day today life are made up of stainless steel. Workers employed in stainless steel manufacturing units are exposed to the elements present in these products which results in various health hazards.⁴ Important health problems among them are mechanical injuries from machineries, occupational asthma, musculoskeletal problems and skin problems.⁵ Long term exposure to steel dust causes health effects on humans such as genetic damages, damage to nerves and endocrine system.⁶

* Corresponding author.

E-mail address: krs3012@gmail.com (Sowmiya K R).

These disabilities may have an irreversible impact on well being of an individual, One DALY (Disability-Adjusted Life Year) can be thought of as one lost year of 'healthy' life. The sum of these DALY across the population, or the burden of disease, can be thought of as a measurement of the gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability.⁷ Another important aspect is Years of potential life lost, the total YLL's by certain etiological factor such as non-communicable diseases by WHO GHE was 46 and injury was 12.⁸ These morbidities may also cause Sickness absenteeism which results in a major economic loss. Sickness absenteeism is defined by the Labour department in India as the total man shifts lost because of absences as a percentage of the total number of man-shifts scheduled.⁹ According to ILO 2008, 317 million accidents and diseases occurred on job annually; and about two thirds them caused employees away from work for four working days resulting in economic effects and loss of labour time in both developed and developing countries.¹⁰ As stated earlier in the study Stainless steel industry products are being widely used by the consumers but the industrial hazards arising out of these industries are often neglected and also only few studies are available for identifying the morbidity pattern among these employees. This study will help to identify morbidity pattern among steel industry workers and also to determine the relationship between morbidities and other associated factors such as PPE, sex, age etc.

2. Materials and Methods

2.1. Study setting

A Cross sectional study was carried out in a small scale Stainless steel industry in an urban area of Tamil Nadu. The Industry was laid in 15000 square feet and was well equipped with finest machineries. It was ventilated and had adequate lighting. It had three units as follows:

1. Pressing and cutting section.
2. Powdering and polishing section.
3. Beading and packing section.

2.2. Study population

The total number of employees working in the industry were 165 and they work in two shifts, a regular shift and evening shift. Each shift had working hours of 8 hours. Morning shift was from 8am to 4pm and evening shift was from 11:30am to 7:30pm. Among these 165 workers 143 workers were willing to participate in the study.

2.3. Sample size and sampling technique

Universal sampling method was used for selecting the study participants and after clearly explaining about the

purpose of study and getting an informed consent from the participants in their own language the study was initiated.

2.4. Study tool

A structured close ended questionnaire comprising of three sections was used to collect the data from study participants. First section dealt with socio demographic profile of participants like age, years of experience, monthly income, working hours. The second section was related to morbidity pattern, History of Non communicable diseases in past 3 months were self reported by the employees and hard of hearing was assessed by whispering test, Myalgia was reported by showing a body chart to employees and asking them to mark the parts were they had pain, mechanical injuries and skin lesions were reported on inspection findings. Third section was about the association between morbidity pattern and other associated factors like PPE usage and years of experience etc.

2.5. Statistical analysis

Data was collected by using standard self-administered structured questionnaire and was entered in excel sheet Data analysis was done by IBM SPSS software. Percentage was used to describe morbidity pattern and chi-square was used to estimate the association between morbidity and use of PPE.

2.6. Ethical consideration

Informed consent was obtained from the study population in their local language before initiating the study. They were clearly informed about the purpose and benefits of conducting the study.

3. Results

Total number of workers employed in the industry for more than a year were 165, male workers employed were 119 and female workers were 46. All the employees were permanently employed in the Industry and there were no contract workers. Male workers were made to work in Pressing, cutting, powdering and polishing section and female workers worked in Beading and packing section. Out of 165 permanent employees, 143 gave consent to participate and were included in the study and those who were suffering from some illness even before joining in the Industry were automatically excluded. These employees were provided with basic protective equipment like face mask, gloves, ear plugs and safety boots however few employees did not show interest to use them. The total number of workers employed in pressing and cutting section was 30.8%, powdering and polishing was 23.8%, beading and packing was 45.5%. Among these workers 15.4% of them had working experience of more than a year and

84.6% had experience of more than 2 years. Mean height of the employees was 157 + 0.013, weight was 59 + 1.92 and waist circumference was 88 + 1.86. 31.2% of workers used basic protective equipment like face mask, gloves, ear plugs and safety boots and remaining 68.8% did not use any form of protective equipment. Out of 143 employees 136 were suffering from either one of the occupational disease mentioned above. The overall prevalence of workers with morbidity pattern as per this study was estimated to be 95.1%. Nearly 10.5% suffered from non-communicable diseases, 25.9% had Bronchial Asthma, 30.8% had hard of hearing, 19.6% had various forms of skin diseases, 50.3% of them suffered from myalgia and 49.7% sustained mechanical injuries.

Among the study participants having experience of more than a year nearly 25.9% was suffering from bronchial Asthma and this association was said to be statistically significant. Among the employees not using personal protective equipment 15.2% of them developed bronchial asthma, 29.3% developed hearing loss, 21.2% developed skin manifestation and 42.4% had injuries. 65.9% employees using PPE gave history of mechanical injuries and this suggested that workers using PPE were also in risk of mechanical injuries. It was estimated that nearly 18.6% in the age group of 41-50 years gave history of non-communicable disease like diabetes, hypertension and dyslipidemia. On estimating association between nature of work and morbidity 59% working in polishing and powder coating gave history of mechanical injuries, 38.2% of employees in polishing and powder coating section developed hearing loss.

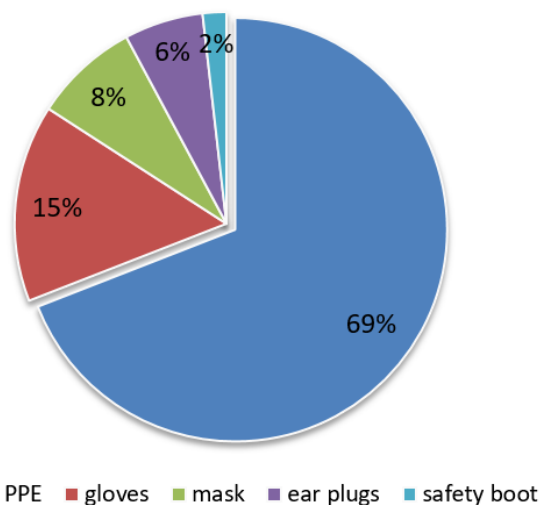


Fig. 1: Percentage of employees using Personal Protective equipment

Table 1: Socio demographic characteristics

Sociodemographical factors	Frequency (%)
Age	
20-30 years	63(44.1)
30-40 years	22(15.4)
40-50 years	43(30.1)
>50 years	15(10.5)
Sex	
Male	111(77.6)
Female	32(22.4)
Department	
Pressing and cutting	44(30.8)
Powdering and polishing	35(23.8)
Beading and packing	65(45.5)
Years of experience	
1-2 years	22(15.4)
>2 years	121(84.6)
Morbidity pattern	
Musculoskeletal pain	72(50.3)
Mechanical injury	71(49.7)
Hard of hearing	44(30.8)
Skin manifestation	28(19.6)
NCD	15(10.5)

Table 2: Association between years of experience and Bronchial Asthma was statistically significant; P value was 0.03

Years of experience		Bronchial asthma		Total
		Yes	No	
Years of experience	1-2yr	0	22	44
	>2 yr	37	84	121
Total		37	106	143

Table 3: Association between age and non-communicable diseases were statistically significant; P value was 0.00

Age		Non-communicable diseases		Total
		Yes	No	
Age	20-30	7	56	63
	31-40	0	22	22
	41-50	8	35	43
	>50	0	15	15
Total		15	128	143

4. Discussion

In conducting field investigation for occupational illness one of the critical step is identification and engagement of the stakeholders. Workplace management, labor and government are the three basic stakeholder groups. In any small scale industry, owner may be main contact of operation, health, safety issues and human resources. The owner will provide epidemiologist with key information in the form of describing the work process, safety data sheets, recorded injury and illness and employee rosters.¹⁰ A small scale industry was selected for our study and basic face

Table 4: Association between Nature of work (Department); history of mechanical injuries and hard of hearing was statistically significant; P value was 0.00

		Mechanical injuries		
		Yes	No	
Department	Pressing and cutting	23	21	44
	Powdering and polishing	20	14	34
	Packing and beading	28	37	65
Total		71	72	143
		Hearing loss		Total
		Yes	No	
Department	Pressing and cutting	15	29	44
	Powdering and polishing	13	21	34
	Packing and beading	16	49	65
Total		44	99	143

to face interview was done with the owner of the industry and above mentioned information was obtained. The main aim of this study was to identify morbidity pattern among stainless steel industry workers and for better understanding of morbidities the workers were categorised based on the nature of work. There were three sections in the small scale industry and workers were employed in various sections depending on their age, experience and physical ability to work. Male workers were employed in areas which requires manual work like section with machineries like hydraulic press, foaming, bending and polishing motors. Most of the female workers were employed in packing section. Workers were provided with health check-ups on regular intervals and awareness program for safe working environment was also provided. Protective equipment like gloves, mask and cap were provided to workers but few workers were not willing to use them. In our study overall morbidity pattern was 95% and major morbidity was myalgia and mechanical injuries. In a study done by Manish J. Biswas, Anil R. Koparkar et al,⁴ the overall prevalence of morbidities among the workers was 60% and the commonest morbidity in the workers was lumbago (musculoskeletal pain) 33.25% followed by occupational dermatitis (27%). Bjørn Hilt, Torgunn Qvenild og Olve Rømyhr¹¹ studied the prevalence of ischemic heart disease in workers at a stainless steel welding factory. By using multiple logistic regression analysis with control for potential confounding factors, the odds ratios for the study group as compared to the control group, were 2.6 (95% CI 1.3-5.3) for "chest pain on exercise", 2.5 (95% CI 1.1-5.8) for "angina pectoris", and 2.4 (95% CI 1.1-4.9) for myocardial infarction. In our study prevalence of non-communicable disease was studied and only 10.4% had NCD like diabetes and hypertension and duration of illness as compared to their working experience was not significant. James S. House in his review article on occupational stress and coronary heart disease has mentioned certain factors like low job satisfaction, job pressure such as work overload, status inconsistency and job mobility as factors related heart diseases.¹² In present study

workers in the age group of 41-50 years have history of non communicable disease which may be associated with job stress indirectly.

In this study major morbidities like NCD, bronchial asthma, skin diseases, hard of hearing, myalgia and mechanical injuries related to stainless steel industry were given importance. History of duration of each of illness was obtained which was compared with years of experience. Major skin manifestation was contact dermatitis followed by fungal infection. Whispered voice test was used for screening hearing impairment in workers. Musculoskeletal pain was the commonest complaint by workers and injuries ranged from simple abrasion to major cuts or laceration. As mentioned earlier in the study 317 million accidents and deaths occurred in job annually worldwide hence new measures as discussed in review article by Lesley Rushton like disease proportions, number of deaths, incidence and prevalence of diseases and quality of life measures provide decision makers with data to facilitate prioritisation of risk reduction strategies.¹³

5. Conclusion

This study suggested overall prevalence of morbidities to be 95% and commonest among them was musculoskeletal pain. Pre-employment investigation, health check-up at regular intervals and making protective equipment mandatory are some of the preventive measures which can be followed to reduce prevalence of these occupational diseases.

6. Recommendation

Every industry should follow working guidelines proposed by central government like adequate bathing places, separate rest rooms for males and females, locker rooms, sitting arrangement for all workers obliged to work in a standing position, temporary living accommodation, adequate standard of canteen or canteens and medical examination of workers thereof in an establishment employing one hundred or more workers, creche under the

age of six years, first aid boxes and other welfare measures required for decent life of workers.¹⁴ A supervisor must be available in small scale industries to monitor the working condition. Government should focus more on occupational health by expanding present legislations and facilities to workers of unorganised sector and periodic reviews should be done for improving the health of such worker.

7. Source of Funding

None.

8. Conflict of Interest

None.

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Author biography

Hanitha Rajasekar PG Student

Sowmiya K R Professor

G Ravivarman Professor

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