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Identifying Risk Factors of Health of Solid Waste Collectors: A Cross Sectional Study

Swati Sanjeev Raje[1], Tanvi Patil[2]

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Author's Affiliation:
[1]Asst Professor; [2]Intern, Dept. of Community Medicine, MIMER Medical College, Talegaon Dabhade

Correspondence
Raje Swati Sanjeev
raje_swati@yahoo.co.in

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ABSTRACT

Introduction: Increase in urbanization has resulted in exponential generation of solid waste. Exposure to various types of harmful waste is known to affect health of solid waste collectors. Hard manual labour involving frequent bending, travelling for long distance and early working hours further increase their risk of health morbidity.

Aims and Objectives: To identify risk factors of health hazards in solid waste collectors of urban Maharashtra.

Results: A cross-sectional study was conducted to collect data regarding clinico-social profile of solid waste collectors of Pune. Diet of all the population was found to be deficit for calorie and protein. Average female solid waste collector was anemic. More than 80% of the study population reported musculoskeletal problems such as leg and black problem which increased with increase in duration of job. Skin problems like Itching, Dryness, Hypopigmentation, Lymphadenopathy and respiratory illness were significantly more among those who worked for less than five years in this job.

Conclusion: Frequent health checkups and proper counseling regarding health care is essential for this population to decrease burden of disease.

Keywords: solid waste collectors, musculoskeletal problems, skin problems

INTRODUCTION

Rapid industrial growth in the last few years has resulted in emergence of occupational health related issues in developing countries including India. [1] In developing countries, the waste discharged for collection is seldom stored in closed containers and is dumped on the ground directly, requiring that it be shoveled by hand, or left in an open carton or basket to be picked up by hand.[1]

Workers, therefore, have significantly more direct contact with solid waste than their counterparts in high-income countries, who predominantly handle sealed plastic bags and covered dustbins [2]. Waste pickers in these countries work on dumps and landfills, sifting through highly contaminated household waste and are exposed to health hazards. Exposure to organic dust while manual sorting of the waste is reported to be the cause of organic dust toxic syndrome (ODTS). In addition, cases of severe occupational pulmonary diseases (asthma, alveolitis, bronchitis) have also been reported in this population. [3]

However, risk factors associated with them are seldom studied. Present study aims to identify risk factors of health hazards in solid waste collectors of urban Maharashtra.

MATERIAL AND METHOD

A cross sectional study was conducted in Feb 2018 by organizing a free health camp for solid domestic waste collectors in an urban setup of Maharashtra.

The purpose and procedure of the study was explained in the local language for better understanding. All those who attended the camp voluntarily were included in the study sample. Benefit of health camp was given even if a person was not willing to participate in the study.

The data pertaining to demographic details, clinical history, social problems was collected using a structured questionnaire. Pre tested food frequency questionnaire (FFQ) was used to record consumption of various food and their frequency in last one month. In India, various customs and religious activities like festivals and fastings lead to a vast variability of food intake. Therefore, a reference period of one month period was considered approximate to cover this variability. Data was collected in terms of frequency and quantity of food items commonly consumed in the area. Data thus collected was converted to daily food intake and then into calory, protein and fat intake by using known values of nutrients. Dietary deficiency was observed with respect to average daily requirement (RDA) of adult Indian Man and women as given by ICMR. General physical examination, eye and skin examination was done by experts after obtaining an informed written consent from the participants. Approval of the Institutional Ethical Committee was obtained.

Statistics: Data was summarized using mean and standard deviation for quantitative data. Qualitative information was summarized using percentages. Variation in quantitative data in different groups was studied using ANOVA after verifying normality of the data. Chi square test of association was used to see association of prevalence of disease with respect to risk factors.

RESULTS

Total 28 male and 70 female solid waste collectors between the age group 15yr to 75 years participated in the study. While 34% of the solid waste workers were in this occupation for less than 5 yrs, comparable group (39%) were in this occupation for more than 10 yrs.

Most of them (85.7%) had mixed diet. Diet of all the population was found to be deficit for calorie and protein. BMI ranged from 13.4 kg/m^2 to 47.4 kg/m^2 with average BMI of females as 24.18 kg/m^2 ± 6. kg/m^2 and that of males was 22.4 kg/m^2 ± 4.5 kg/m^2.

BMI, hemoglobin, and health problems were analysed with respect to frequency of consumption of street food. (Table 1)

BMI was maximum among those who never had street food and it decreased significantly with increase in intake of street food ($F = 8.621$, $P < 0.004$)

Average female solid waste collector was anemic with mean hb of 11.33g/L ± 1.98 g/L while average hb of male solid waste collector was 14.75 g/L ± 1.6 g/L.

BMI, haemoglobin and prevalence of morbidities was analysed with respect to duration of job. Comparison of BMI and hemoglobin with respect to duration of job is shown in table 2.

It was observed that BMI increased with increase in duration of job. As against this, mean hemoglobin level was significantly more amongst those working for <5 years. (BMI: $F = 11.68$, $p = 0.001$), (Hb: $F = 8.629$, $p <= 0.005$).

Table 1: BMI according to frequency of street food

Frequency of Street food	Number	BMI (Mean +/- SD)
Never	17	25.7 +/- 7
1-2	33	25.33 +/- 6.1
>3	48	21.83 +/- 4.7

Table 2: BMI & Hb according to Duration of job

Duration of Job	BMI kg/m	Hb (g/L)
<5 years	21.36 +/- 4.9	13.04 +/- 2.4
5-10 years	23.5 +/- 6.1	11.64 +/- 2.1
>10 years	26.2 +/- 5.9	11.11 +/- 1.9
Average	23.8 +/- 5.9	11.96 +/- 2.31

Table 3: Morbidities with respect to duration of job

Morbidities	<5 years (24)	5-10 years (27)	>10 years (47)	Chi square
Pallor	13 (54.17%)	14 (51.85%)	31(65.60%)	0.71
Icterus	2 (8.3%)	1 (3.70%)	2 (4.25%)	0.66
Lymphadenopathy	5 (20.83%)	3 (11.11%)	3 (6.34%)	2.96
Itching	16 (66.67%)	9 (33.33%)	17 (36.17%)	4.23*
Dryness	20 (83.33%)	13 (48.15%)	20 (42.56%)	5.13*
Hyperpigmentation	4 (16.67%)	3 (11.11%)	4 (8.51%)	0.94
Hypopigmentation	4 (16.67%)	3 (11.11 %)	0 (0%)	7.00*
Redness	9 (37.50%)	10 (37.04%)	11 (23.40%)	1.53
Back Problem	23 (95.83)	24 (88.89%)	40 (85.10%)	0.21
Leg problems	16 (66.67%)	23 (85.19%)	47(100%)	2.04
Respiratory Illness	15 (62.50%)	11 (40.74%)	18 (38.30%)	2.21

*Indicates significance

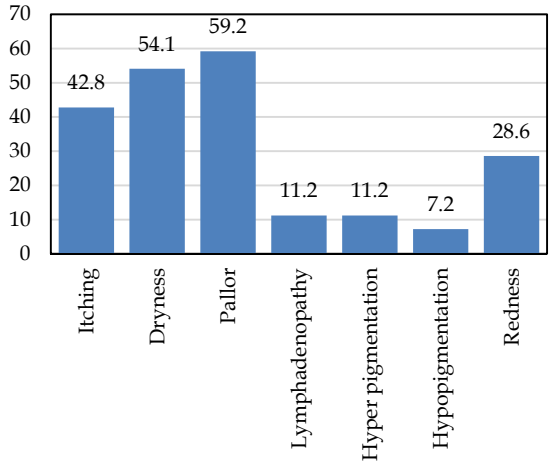

Fig 1: Prevalence of skin problems

Most common health problem reported was leg and back problems with more than 80% of the study population suffered with it.

Fig 1 shows prevalence of skin problems in solid waste collectors. Pallor and dryness were most common skin problems, followed by itching.

Morbidities were studied with respect to duration of job. (Table 3)

It was observed that Itching, Dryness and Hypopigmentation was significantly more in people who were less than five years in this job. The prevalence of these symptoms were almost 20% more among those who were doing this job for less than 5 years as compared to those who were doing it for more than 10 years. Lymphadenopathy and respiratory illness was also more prevalent among those who worked for less than five years, however the difference was not statistically significant.

As against this all those who worked for more than ten years had leg problems. Prevalence of leg problem increased with increased duration in this job.

When compared with gender it was noted that Hyperpigmentation and musculoskeletal problems were more in females as compared to males, though the difference was not statistically significant. However, significantly more males (14.1%) had hypo pigmentation as compared to females (4.3%). The difference was statistically significant ($\chi^2 = 4.4$, $p < 0.04$).

Morbidity pattern was also analysed with respect to consumption of street food, and it was observed that itching was significantly more (54.2%) in those who had street food more than twice per week as compared to those who never had (2.9%).

Similarly, prevalence of dryness ranged from 58%-60% among those who consumed street food as compared to those who never had (24.4%). However, the difference was not statistically significant with $\chi^2 = 5.08$, $p=0.08$ and $\chi^2 = 5.08$, $p=0.07$ respectively.

DISCUSSION

As a result of their exposure to multiple risk-factors Waste collectors around the world suffer high rates of occupational health-problems.[4,5]

Among the most frequent diseases there are allergic and other diseases of the respiratory system, as well as musculo-skeletal, gastro-intestinal and infectious diseases. High prevalence of respiratory diseases is reported in studies done in India [6-9] as well as from other parts of the world. [10-12]

Prevalence of respiratory illness was comparable in the present study except that in Delhi. The difference may because Delhi is reported to have high pollution The reason for high prevalence of respiratory problems as reported by Thorn JR et al is that certain dusts from household waste may cause airway inflammation as well as general symptoms, and the effects were associated with higher (1-->3)-beta-D-glucan levels. [13.]

The work of a solid waste collector involves bending frequently, walking over long distances for collection of domestic waste and lifting and pushing heavy leads. Continuous exposure to such hard manual work over a period can pose a risk for many health problems. It also involves considerable heavy lifting as well as other manual handling of containers, increasing the risk of musculoskeletal problems. Among all occupational health issues, musculoskeletal problems are reported to be common among waste collectors in the form of nonfatal injuries because of the presence of lifting, carrying, pulling, and pushing heavy loads. [14,] The ILO estimates that 40% of all costs related to work-related injuries and diseases are due to musculoskeletal disorders.[15.] Among these, low back pain is the most common.

The joints affected in the order of predilection are knee, back; shoulder, elbow, ankle and neck (range 39-17 %).[16] The strength of association as relative risk for musculoskeletal problems was reported to be in the range 1.9 to 4.[14] The present study support the observation in a study done in Egypt that longer duration of work is found to be independent risk factor for musculoskeletal disease.

The musculo- skeletal problems are worsened by inappropriate ergonomics, the non-availability of worker friendly and women friendly tools and equipments.[17]

Ray MR have reported that, they suffered more often from diarrhea, fungal infection and ulceration

of the skin, burning sensation in the extremities, tingling or numbness, transient loss of memory, and depression.[7]

Prevalence of important skin problems such as Tinea, Melasma and Scabies accounting for 7%, 5% and 5% respectively according to our study is comparable with that of a dermatological study done in Manipal, where prevalence is 18.3%, 6.1% and 6.1% respectively[18.] [Skin lesions were found in 40% of solid waste collectors in our study. It is comparable to a study done in Kerala where it was reported to be 36.4%. [19]

Among our study population 40% have raised levels of eosinophils suggestive of allergies to various allergen. It is closely comparable to a study done in Chandigarh where 35.3-48.9% workers suffered from allergy.[17]

High prevalence of fever , cough and diarrhea as observed in the current study is in accordance with other studies done in India as well as other parts of world where the system is prevalent.

According to our study, injuries are fairly common during work as nearly 70% of solid waste collectors suffer from at least some kind of cuts and injuries frequently which is closely comparable to 73.2% incidence of the same reported by a study done in Kerala, India to be caused because of highly limited supply of protective gears. [19] It is also comparable to 60.4% of waste collectors of Dharan Municipality. [6]

Prevalence of dental caries was more (76%) in the present population as compared to those in Dharan Municipaliy (52%).[6]

CONCLUSION

The most prevalent health problem faced by the solid waste collectors is musculoskeletal. BMI, Haemoglobin and health problems are associated with time spent in this job. The musculoskeletal problems and decreased immunity maybe due to the poor quality diet and high frequency of street food intake.

Frequent health checkups and proper counseling regarding health care is essential for this population as most of the occupational diseases are incurable and, therefore, the best course of action in dealing with them is their prevention.

REFERANCES

1. Habibullah N Saiyed and Rajnarayan R Tiwari. Occupational Health Research in India. Industrial Health 2004;42:141–148
2. Herzstein JA, Bunn WB, Fleming LE, Harrington JM, Jeyaratnam J, Gardner IR, Solid waste.. International Occupational and Environmental Medicine.1998:620-32.
3. Poulsen, Otto M., et al. "Collection of domestic waste. Review of occupational health problems and their possible causes." Science of the Total Environment 1995;170(1-2) 1-19.
4. Athanasiou M, Makrynos G, Dounias G. Respiratory health of municipal solid waste workers. Occup Med (Lond) 2010;60:618-23.
5. Tooher R, Griffin T, Shute E, Maddern G. Vaccinations for waste-handling workers. A review of the literature. Waste Manag Res 2005;23:79-86.
6. Thapa, K., S. Ghatane, and S. P. Rimal. "Health problems among the street children of Dharan municipality." Kathmandu University Medical Journal 2009;7.3 272-279
7. Ray Manas Ranjan, et al. "Respiratory and general health impairments of ragpickers in India: a study in Delhi." International Archives of Occupational and Environmental Health 2004;77.8:595-598.
8. Tandon R. A study on the working conditions and occupation hazards at the dumping sites of Bombay. Occup Environ Health 1994;1:9-17.
9. Priyanka V. Patil and R. K. Kamble. Occupational Health Hazards In Municipal Solid Waste Collecting Workers Of Chandrapur City, Central India. International Journal Of Environment. Dec-Feb 2016/17;6(1):46-57
10. Gelberg KH. Health study of New York City Department of Sanitation landfill employees. J Occup Environ Med.1997;39:1:103-10.
11. Poulsen OM, Midtgard U. Bioaerosol exposure and health problems. In: Proceedings of the International Meeting for Waste Collection and Recycling; Koge, Denmark. 1996 Sep:13-14.
12. Sharholy, Mufeed & Ahmad, Kafeel & Mahmood, Gauhar & C Trivedi, R. Municipal solid waste management in Indian cities – A review. Waste management (New York, N.Y.). 2008; 28:459-67. 10.1016/j.wasman.2007.02.008.
13. Thorn, Jörgen, Lena Beijer, and Ragnar Rylander. "Airways inflammation and glucan exposure among household waste collectors." American journal of industrial medicine 1998; 33(5): 463-470.
14. Reddy Endreddy Manikanta, and Sandul Yasobant. "Musculoskeletal disorders among municipal solid waste workers in India: A cross-sectional risk assessment." Journal of family medicine and primary care.. 2015;4(4) : 519.
15. Rajgopal T (2000) Musculoskeletal disorders. Indian J Occup Environ Med. 4:2-3.
16. Ramin Mehrdad M Majlessi-Nasr.Musculoskeletal disorders among municipal solid waste workers. Acta medica Iranica .46(3):233-238
17. I. D. Norman, J. P. Kretchy and E. Brandford. Neck, Wrist and Back Pain Among Solid Waste Collectors: Case Study of a Ghanaian Waste Management Company. The Open Public Health Journal. 2013; 6: 59-66
18. Nayak. S, Shenoi S, Kaur G, Bisen N, Purkayastha A, Chalissery J. Dermatologic evaluation of street sanitation workers. Indian J Dermatol [serial online] 2013 [cited 2019 Apr 5]:58:246..
19. Jayakrishnan, Thayyil, Mathummal Cherumanalil Jeeja, Rao Bhaskar. "Occupational health problems of municipal solid waste management workers in India." International Journal of Environmental Health Engineering.2013; 2.1: 42.