

RAG PICKERS OCCUPATIONAL HEALTH ASSESSMENT IN CHANDRAPUR CITY, CENTRAL INDIA

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Abstract: Background: Solid waste has emerged as a major problem in our society. Rag pickers are playing an important role in collection of this waste and while doing so they are exposed to occupational health hazards. **Objective:** To objective of the study was to access the occupational health of rag pickers in Chandrapur district of Central India. **Method:** For the study 30 rag pickers (25 Female and 5 Male) were identified. Occupational health was assessed on the basis of peak expiratory flow rate (PEFR) analysis along with an interview schedule specially designed for the study. **Result:** Occupational health problems reported by the rag pickers include musculoskeletal disorder, dermatological problems, eyes problems, respiratory diseases, and gastrointestinal problems. Viral fever has emerged as a common infectious disease (83%, n=25). Exposure to dust, domestic waste, extreme heat of sunlight and broken sharp items are reported by all respondents. PERF values are found to be less than expected values. No personal protective equipment is used by the rag pickers; however, individual personal hygiene is maintained by them. **Conclusion:** Government apathy towards these workers needs to be addressed at the earliest so as to reduce the disease burden on them to a large extent.

Key Words: Chandrapur, Occupational health, Rag picker, Solid waste.

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Introduction:

Solid waste is generated from the beginning of human civilization. In earlier time the quantity of solid waste generation and density of population was low and hence the waste was disposed off in an open space or land; however, due to rapid industrialization, urbanization and globalization, increase in population, rise in community living standard, and rise in consumer's choice has accelerated the solid waste generation rate (Chattopadhyay *et al.*, 2009; Sharholly *et al.*, 2008)^[1]^[2]. Solid waste is the unwanted or useless solid materials generated from human activities in residential, industrial and commercial areas. It is categorized according to its origin, content, hazardous potential and depending on their source it is classified as municipal solid waste (MSW), industrial solid waste (ISW) and biomedical waste or hospital waste (BMW).

The municipal solid waste consists of everyday items such as product packing, grass clipping, furniture, clothing, bottles and cans, food scraps, newspapers, appliances, electronics, and batteries. In 1990, 1.3×10^9 tonne of municipal solid waste was generated globally. In Asia it is 760×10^3 tonne per day and it is estimated to grow 1.8×10^6 tonne per day by 2025 (Chattopadhyay *et al.*, 2009)^[1].

Rag pickers are the solid waste scavenging community. They separate the recyclable waste from the municipal solid waste. The rag pickers are also known as waste pickers, binners, recycler, informal resource recoverer, etc. Rag pickers generally collect the plastics, metal, and papers. They spend their entire day in recovering recyclable materials from the municipal solid waste, at the time of their work they come in contact with domestic waste, sometimes hospital waste, dead animals, and sharp items (Syamala Devi *et al.*, 2014)^[3].

Some of the occupational diseases like musculoskeletal disorder, respiratory system, and skin infection problems are common among rag pickers. Musculoskeletal disorder is the injuries in the human musculoskeletal system, including the joints, ligaments, muscles, nerves, tendons, and structure support limbs, neck, and back. Thakur *et al.*, (2018) found that all the workers working with municipal solid waste management suffer from various types of musculoskeletal injuries, muscles and ligament sprain, and cuts and laceration^[4]. Abou-El Wafa *et al.*, (2012) reported that low back, shoulder, neck, knee, hips and thighs, and elbow are the frequently affected body regions among municipal solid waste workers^[5]. The skin problems are common in waste workers. When chemicals

like chlorine, fluorine, plastic additives and equipment cleaning solvents, insecticides and herbicides come in contact with skin or inhaled or even ingestion can cause dermatitis and skin irritation. Cuts and pricks at work site can cause bacterial and fungal infection (Jeri, 2016)^[6].

The waste workers have respiratory symptoms like sore throat, high prevalence of chronic obstructive pulmonary disease (COPD), coughing in the morning, asthma and have upper airway inflammation. When exposed to organic dust neutrophils cause inflammation that results in respiratory symptoms (Athanasίου *et al.*, 2010; Wouter *et al.*, 2002)^{[7] [8]}. Takala *et al.*, (2014) stated due to work-related stress and occupational injuries globally 2.3 million deaths take place annually. Reasons for death are work-related cancer, work-related circulatory disease, cardiovascular disease, communicable disease and occupational accidents^[9].

The proposed study was carried out with objectives to assess occupational health of rag pickers, factors responsible for the deterioration of their occupational health, peak expiratory flow rate analysis and suitable measure for protection of these workers.

Study Area:

Chandrapur city is a municipal corporation in Chandrapur district, Maharashtra state, Central India. It is the centre of governance in the district. Chandrapur is situated at 19.57° North latitude and 78.18° East longitude and has an area of about 70.02 sq km. Chandrapur has hot and dry climate. December is the coldest month, with a minimum average temperature of 9°C and a maximum average temperature of 23.2°C. May is the hottest month with a mean maximum temperature of 46°C and mean minimum temperature of 28.2°C. The monsoon comes between June and September, the average annual rainfall is 1249.4 mm and average number of rainy day are 59. As per the census of India 2011 the population of city was 3,20,379. According to the annual report on implementation of Solid Waste Management Rule, 2016 for the state of Maharashtra 2016-2017 reported municipal solid waste generation in Chandrapur city as 120.0 MT/day^[10]. The municipal solid waste generated from the household is collected by a specially designed house-to-house collection system. The collected waste from household is

deposited in a specially designated location from which it is being collected in a large vehicle and transported it to disposal site. However, it has been observed that a number of places in the city household dump the MSW at a designated location where rag pickers usually go every day to scavenge solid waste.

Material and Methods:

To carry out the objectives of the study, 30 rag pickers were selected in a systematic manner from the Chandrapur city. The sample size comprises of 25 female and 5 male (16.66%) rag pickers with an inclusion criterion of those working in this occupation for 15 years or more. To compare the results obtained from the study a control group of five females was identified those who were doing routine household work.

To assess the occupational health assessment, two methodologies were adopted viz. interview schedule through a predesigned questionnaire and peak expiratory flow rate analysis to assess lung capacity. The questionnaire was specially designed and validated by a pilot study. The questionnaire comprises of personal information, occupational exposure duration, identification of occupational diseases and use of personal protective equipment. The interviews were conducted in the respondent's working time, at home or in their leisure time.

The Peak Expiratory Flow Rate (PEFR) is a measure of how well air is able to move out of the lungs. Breathe-o-meter, (Cipla, India) was used to test PEFR. When a person blows out through a breathe-o-meter, it measures the speed at which air is pushed out of the lungs. In people with asthma, the PEFR reading is reduced as their airways are narrowed. The peak flow meter is a simple and easy way to use device to assess the health of individual's airway. It measures the peak expiratory flow rate of individuals. When the individual blow into the mouthpiece of the instrument the pointer moves forward and the reading will be taken to check the lung power. It measures the airflow through the bronchi and the degree of obstruction in airways.

Result:

Among the 30 rag pickers identified for the study, 25 were female and 5 were male in the age group of 20-70 years. The education, daily working time, quantity of solid waste collected and occupational health problems were studied. Table 1 presents

the demographic characteristics of the study population.

Table 1: Demographic characteristics of rag pickers

Characteristic	Respondent	
	Frequency (n= 30)	Percentage
Gender		
Female	25	83.3%
Male	5	16.6%
Age group		
20-30	7	23.33%
31-40	8	26.66%
41-50	11	36.66%
51-60	2	6.66%
61-70	2	6.66%
Education		
Illiterate	29	96.66%
Literate	1	3.33%
Marital Status		
Married	22	73.33%
Widows	7	23.33%
Separated	1	3.33%

Work profile:

Occupational exposure duration of rag pickers from identified sample size can be divided into two, those workers with work exposure of <20 years and other with >20 years. Of the identified sample size, 30% (n=9) has exposure period of <20 years, whereas, 70% (n=21) with >20 years. Rag pickers usually work for 9-12 hours a day and walk an area of <20 km/day. They collect the waste in a sack which is on their back throughout a day and sell the same to a scrap dealer in the evening. The solid waste collected in the sack weighs from 11 to 20 kg with 27% (n=8) respondent reported in the range of 11-15 kg followed by 43% (n=13) in 16-20 kg and 30% (n=9) with >20 kg.

Solid waste collection by rag pickers is a continuous activity in all seasons. During summer due to intense temperature they work till 2 pm only; however, during rainy and winter seasons they work from 9 am to 6 pm. These workers visit the waste site regularly once a day. The municipal solid waste condition during summer was dry; whereas, during rainy and winter seasons it was wet and flies and insects' nuisance was reported.

Occupational health problems:

Rag pickers collect municipal solid waste in an unhealthy environment where they are exposed to dust, dirt, domestic waste, sharp material, etc. The exposure to these waste materials causes injury and occupational health problems. Problems reported by respondents include cut and pricks from sharp metals, respiratory problems, and eye problems. Exposure to harmful material, general illness and health problems reported by rag pickers is prepared in Table 2.

Table 2: Exposure to harmful materials, general illness and occupational health problems

Problem	Respondent	
	Frequency (n=30)	Percentage
Exposure during work		
Dust	30	100%
Domestic waste	30	100%
Extreme heat of sunlight	29	96.6%
Broken sharp items	28	93.3%
Dead /Alive animals	13	43.3%
General illness (cold, fever, mild diarrhoea)		
Yes	16	53.33%
No	14	46.6%
Infectious diseases		
Viral fever	25	83.3%
Malaria	7	23.3%
Typhoid	7	23.3%
Dysentery	3	10%
Eyes Problems		
Redness	26	86.6%
Watering	22	73.3%
Swelling	14	46.6%
Soreness	3	10%
Musculoskeletal system related problems		
General body ache	28	93.3%
Joint pain	28	93.3%
Backache	28	93.3%
Respiratory diseases		
Cough with expectoration	17	56.6%
Breathlessness	11	36.6%
Cough	8	26.6%
Dermatological problems		
Itching	26	86.6%
Rashes	6	20%

Pigmentation on skin	6	20%
Gastrointestinal problems		
Nausea	12	40%
Heartburn	7	23.3%
Vomiting	6	20%
Diarrhoea	5	16.6%
Dry skin	1	3.3%
Problems arise mainly while working		
Animal/Insect bites	5	16.6%
Skin problems	4	13.3%
Irritation	1	3.3%

Observations reported in Table 2 revealed that all workers exposed to dust and domestic waste followed by the extreme sunlight heat and broken sharp items. Viral fever is reported as the predominant disease (83%, n=25) to workers. Redness of eyes followed by watering are the reported eyes problems. Musculoskeletal system related problems are general body ache, joint pain, and backache (93%, n=28). In case of respiratory illness, cough with expectoration (56%, n= 17) and breathlessness (36%, n= 11) are predominant occupational health problems. Itching is a major (86%, n=26) dermatological problem among the workers. Nausea has been reported as the most common (40%, n=12) gastrointestinal problem. Animal/insect bites have identified as the problem arise mainly while working. The observation recorded in the study agrees with the Thakur *et al.*, (2018); Abou-ElWafa *et al.*, (2012); Jeri (2016) [4] [5] [6].

Women's health:

Out of 30 rag picker respondents, 25 (83.3%) were female. They were interviewed for particularly menstrual cycle, health care, pregnancy, etc. Of the selected rag pickers, 19 (76%) do not go for rag picking during menstrual cycle. The women use clothes as a menstrual pad. Stomach pain and heavy bleeding during the menstrual cycle are reported by 4 (16%) respondent; whereas, 8% (n=2) reported complication during pregnancy and delivery. Women rag pickers do not visit hospitals for regular check-up during pregnancy. The 20 (80%) women rag pickers have delivered baby at home, 2 (8%) in government hospital and 3 (12%) in private hospitals. Musculoskeletal problems viz.

back, shoulder and wrist pain is reported by all-female rag pickers.

Precautionary behaviour and personal hygiene:

It was observed that rag pickers do not use any personal protective equipment while working. Personal hygiene is maintained by all respondent by taking bath after returning from work, 80% (n=24) follow hand hygiene practice before drinking water or eating. Of the identified rag pickers, 60% (n=18) use the toilet and 23% (n=7) follow personal hygiene.

Peak Expiratory Flow Rate analysis:

The Peak Expiratory Flow Rate (PEFR) analysis was carried out to check the lung capacity of rag pickers. Results obtained for PEFR test for male and female rag pickers are presented in Table 3. The results are classified on the basis of duration of rag pickers exposure (in year) to this occupation with <20 years of exposure and >20 years of exposure period.

Table 3: PEFR values according to the duration of exposure (Years)

Duration of Exposure (years)			
16-20 years		>20 years	
Female		Female	
Expected value	Observed value	Expected value	Observed value
337	300	294	250
321	280	286	240
323	280	250	190
340	300	314	300
321	270	286	180
340	290	287	200
323	300	305	240
342	300	319	220
		323	200
		302	250
		314	280
		294	250
		279	167
		294	170
		302	230
		293	230
		293	230
n=8		n= 17	
Male		Male	
414	350	433	350
		502	380
		484	300
		466	380

n=1	n=4
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From the table, it can be seen that there is difference between expected PEFR value and the observed value. Observed values are lower than the expected value. The observation indicates the lung capacity of rag pickers is below the expected value and as they are exposed to organic dust and other microorganisms present in the solid waste which may have resulted into asthma, bronchitis, or other lung diseases. The results are in agreement with Patil and Kamble (2017)^[11].

Discussion:

Occupational health assessment of rag pickers from the study area revealed exposure to dust, domestic waste, extreme heat, and sharp objects. Owing to these exposures, for a prolonged period of time (>15 years) has resulted in reduction of lung's peak expiratory flow rate. This indicates that lung capacity of these workers got reduced down due to exposure to aero-allergens and micro-organisms present in municipal solid waste which perhaps also gets entered into respiratory system. Results pertaining to diarrhoea and vomiting is in agreement with Agarwalla *et al.*, (2017)^[12]. The unhygienic conditions at municipal solid waste collection site as well as at their residence may be responsible for these findings.

Animal bite and problems related to eyes such as redness, watering, swelling corroborate with Mote *et al.*, (2016)^[13]. Continuous exposure to extreme heat in the study area (47 °C) followed by extended working hours (9-12 hours per day) without the use of any personnel protective equipment's results into these occupational health hazards.

Skin infection, cuts and joint pain problems reported by Soni (2014)^[14] are also recorded from the study. Majority of rag pickers due to their poor socio-economic conditions are forced to work barefoot as a result of which sharp objects in the municipal solid waste cause's injury which has been identified as the common injury among them. Furthermore, many of the time they do not know the substance which has lead to the injury. Exposure to dust, chemicals present in waste and pathogenic micro-organisms present in the waste resulted in skin itching, rashes, pigmentation, and other dermatological problems.

Musculoskeletal pain (De Silva, 2006)^[15] and joint pain (Soni, 2014)^[14] is also reported by respondents

from the study. Owing to the frequent lifting of solid waste sack weighing about 16-20 kg and maintaining static posture while walking >20 km per day are the reasons for these occupational health hazards which is reported by all identified rag pickers for this study.

Viral fever has emerged as a major infectious disease among rag pickers. Owing to unhygienic conditions in municipal solid waste collection site, at their home and exposure to micro-organisms and aeroallergens with extreme environmental conditions may have resulted in this finding.

Abuse of substances such as tobacco with lime, areca nut/betel nut, inhalation of *nuss* (a fine powder of tobacco), *bedi* (traditional local cigarette) and alcohol was common among rag pickers in both male and female. The results are in agreement with Soni (2014)^[14]. As rag pickers start early in the morning without carrying any food with them as a result of extended working hours (9-12 hours) when they feel hungry to kill their hunger they consume tobacco alone or with lime number of times during the working hours. Three fingers test results among female rag pickers revealed that out of 11 identified five could not pass the test. This indicates that they may suffer from mouth carcinoma due to prolonged consumption of tobacco or tobacco with lime. This observation needs further clinical investigation.

Conclusion:

The study was carried out with an objective to assess the occupational health of rag pickers. The result obtained indicates rag pickers face number of occupational health-related problems during their work. The musculoskeletal problem has emerged as a major one among these workers. PEFR test indicates the reduced lung capacity due to exposure to dust and micro-organism. No personal protective equipment is used by these workers and as they are working in unorganized sector no government policy is covering them. Rag pickers owing to their important role in recycling and reuse of solid waste and thus reducing pressure on municipal authorities to process this waste appropriate medical facilities, healthcare facilities need to be provided to them. In addition, personal protective equipment and regular medical check-up need to be carried out. These workers should be brought under government policy. The study has limitation as it was carried out in

Chandrapur city only which can be extended to other parts of the country. Additional occupational health-related aspects need to be assessed so as to have a more comprehensive understanding of the issue.

References:

1. Chattopadhyay S, Duta A, and Ray S. Municipal solid waste management in Kolkata, India- A review. *Waste Management*, 2009; 29:1449-1458.
2. Sharholi M, Ahmad K, Mahmood G, and Trivedi R. Municipal solid waste management in Indian cities- A review. *Waste Management*, 2008; 28:459-467.
3. Syamala Devi K, Swamy A, and Hema Krishna R. Studies on solid waste collection by rag pickers at greater Hyderabad Municipal Corporation, India. *International Research Journal of Environment Science*, 2014; 3(1): 13-22.
4. Thakur P, Gangualy R, and Dhulia A. Occupational health hazard exposure among municipal solid waste workers in Himachal Pradesh, India. *Waste Management*, 2018; 78:483-489.
5. Abou-ElWafa H, El-Bestar S, El-Gilany, and El-SayedAwad E. Musculoskeletal disorder among municipal solid waste collectors in Mansoura, Egypt: a cross-sectional study. *BMJ Open*, 2012; 2:1-8.
6. Jerie S. Occupational risks associated with solid waste management in the informal sector of Gweru, Zimbabwe. *Journal of Environmental Science and Public Health*, 2016; 1-14.
7. Athanasiou A, Markrynos G, and Dounias G. Respiratory health of municipal solid waste workers. *Occupational Medicine*, 2010; 60:618-623.
8. Wouter I, Hilhorst S, Kleppe P, Doekes G, Douwes J, Peretz C, and Heederik D. Upper airway inflammation and respiratory symptoms in domestic waste collectors. *Occupational and Environmental Medicine*, 2002; 59:106-112.
9. Takala J, Hamalainen P, Saarela K, Yun L, Manickam K, et al. Global estimates of the burden of injury and illness at work in 2012. *Journal of Occupational and Environmental Hygiene*, 2014; 11:326-337.
10. Annual report on implementation of Solid Waste Management Rules, 2016 for the state of Maharashtra. 2016-2017. Maharashtra Pollution Control Board.
11. Patil P, and Kamble R. Occupational health hazards in street sweepers of Chandrapur City, Central India. *International Journal of Environment*, 2017; 6(2): 9-18.
12. Agarwalla R, Pathak R, Singh M, Islam F, and Parashar, M. Effectiveness of awareness package on occupational health hazards among rag pickers of New Delhi, India. *Indian Journal of Occupational Environmental Medicine*, 2017; 21(2): 89-93.
13. Mote B, Kadam S, Kalaskar S, Thakare B, Adhav A, and Muthuvel T. Occupational and environmental health hazards (Physical & Mental) among rag-pickers in Mumbai slums: A cross-sectional study. *Science Journal of Public Health*, 2016; 4(1): 1-10.
14. Soni P. Problem and situation of girl rag pickers in national capital territory of Delhi. *Journal of Alcoholism & Drug Dependence*, 2014; 2(4): 1-7.
15. De Silva M, Fassa A, and Kriebel D. Musculoskeletal pain in rag pickers in a southern city in Brazil. *American Journal of Industrial Medicine*, 2006; 49:327-336.