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Assessment of work ability and its relation to musculoskeletal disorders among waste collectors in Minia City, Egypt

Maggi Mofeed Ayad[1], Refaat Raouf Sadek[1], Gehad Ahmed Ahmed Abou El Ata [2], Eman Ramadan Ghazawy[1], Omnia Kamal Abd El-Latif[1]

[1] *Faculty of Medicine, Minia University*

[2] *Faculty of Medicine, Cairo University*

Abstract

An increasing number of musculoskeletal disorders (MSDs) secondary to occupational hazards are observed among many occupations in developing countries, including waste collectors. This is due to lack of a well-established work environment, deficient occupational safety measures, and an expanding workload. The purpose of the current study is to investigate the burden of MSDs and their impact on work ability of waste collectors in Minia city, Egypt. A cross sectional study design was used on 310 waste collectors who responded to a face-to-face interview regarding their demographic data, occupational characteristics, work ability (Work ability index- WAI) and musculoskeletal disorders (Nordic musculoskeletal Questionnaire-NMQ). Minia waste collectors were all males and mainly middle aged (above 40 years old: 76.1%) with low educational levels (illiterate: 60%), high smoking rates (50.3% smokers) and vast majority from rural areas (94.1%). About 70% of the workforce have morning shifts, and more than half of them (55.8%) have permanent contracts. Their average work service is 17.4 years. The workers had excellent (56.8%) and good (33.5%) WAI scores and the prevalence of MSDs in the last 12 months was high (53%). Low back (19%), knees (15.5%), ankles/feet (6.5%), neck (5.2%), shoulders (14%) were the most frequently affected body parts. Regarding work=k ability scores, MSDs (41.3 ± 4.8), respiratory (38.8 ± 5.3) and cardiovascular (37.4 ± 5.8) diseases significantly decreased work ability scores in Minia municipal solid waste (MSW) workers. Conclusion**:** The study addressed the health issues and work ability for waste collectors, highlighting the need for preventive interventions targeted at MSDs, respiratory, and cardiovascular diseases in the studied workers.

Keywords: waste collectors, workability, musculoskeletal disorders.

Full length article **Corresponding Author*, e-mail: maggi.ayad@mu.edu.eg

1. Introduction

Waste management is one of the most important issues facing developing nations. There is an exponential increase in waste production in these countries due to their fast urbanization and population growth. Poor infrastructure, restricted resources, and socio-economic elements intensify the difficulties related to waste management in these areas. By using standardized waste management procedures, industrialized nations have significantly reduced the occupational health load on waste collectors [1]. Waste management is the process of gathering, moving, sorting, processing, and disposing of waste materials. It is a globally significant issue since it affects the environment and public health. Waste collection is a physically demanding task in developing nations since it mostly involves manual labor. In order to carry out the tasks of storage, processing, transportation, and disposal, machinery and human labor are used. Municipal solid trash is made up of a variety of abandoned materials, including metals, glass, paper, textiles, leftover food, and garden debris. Workers involved in solid waste management are constantly exposed to a wide range of illnesses and injuries, primarily during collection, transportation, and disposal locations [2]. The most severe morbid conditions that were found in these workers included animal bites, cuts and wounds; skin infections; respiratory disorders, eye disorders; gastrointestinal issues and hearing impairments [3]. Waste collectors face not just hazardous working circumstances but also the possibility of workplace accidents and musculoskeletal disorders (MSDs) thus affecting their capacity to work [4]. Numerous reports have linked the working environment to MSDs. Workplace practices that increase the risk of MSDs include heavy lifting, manual handling, extended sitting and standing, bending, and repetitive work [5]. Work ability (WA) is the

capacity of an employee to balance the demands of their profession with their physical and mental well-being. It considers every aspect that could affect their ability and helps to make the task achievable. The problem throughout time is to balance expectations and capacity in order to maximize the ability to work, since employment demands are likely to fluctuate throughout the course of a career [6]. Egyptian municipal solid waste (MSW) workers manually handle a wide range of hazardous substances, putting their health at risk. A great deal of waste management in Egypt has focused on collection and disposal issues, with little to no attention paid to waste collectors' health [7]. Research on this population's ability for work and health issues is scarce. This group of workers is overlooked and is consequently less likely to be the target of initiatives improving health because there isn't enough study on them.

Therefore, the aim of this study was to characterize the health issues and job capacity of Minia waste collectors. This occupational group's needs for health promotion are what we want to draw attention to.

2. Methodology

2.1 Study design and population

This is a cross-sectional study conducted among municipal solid waste workers in Minia city between January 2022 till January 2023. There are 383 municipal solid waste workers working throughout Minia city. All workers were recruited to participate in the study, of whom, 73 workers declined to participate. Accordingly, a total of 310 workers were included in the study, with a response rate 80.9%.

2.2 Data collection

An interview questionnaire was used to collect data about workers' demographic characteristics such as age, residence, smoking habit, and education level. Additionally, it included occupational history items such as status of employment, period of employment, and shift works.

2.2.1 The Work Ability Index (WAI) questionnaire [8]

Consists of seven items, considers the worker's health and both physical and mental demands of the job. The final score is categorized into four levels: poor (7–27), moderate (28–36), good (37–43), and excellent (44–49) work ability. The score range from 7 to 49.

2.2.2 The Nordic Musculoskeletal Questionnaire (NMQ) [9]

Consists of four items about symptoms within the previous year, symptoms within the last seven days, limitations in everyday activities, and seeking medical attention.

2.3 Ethical consideration

The study was conducted after obtaining the approval of The Institutional Review Board (IRB), Minia University Faculty of Medicine, with approval number (7592021), as well as the Minia City governorate and council who gave their approval for the study before any data were collected. The investigator obtained informed consent from each participant after explaining the purpose of the study and providing assurances that their information would be kept confidential and used only for scientific study.

2.4 Statistical analysis

The collected data was analyzed using the statistical software for social sciences (SPSS, version 26). The figures were produced with Excel 365 for Microsoft Office. The mean and standard deviation of the descriptive statistics were calculated for the quantitative data, while the frequency distribution and its percentage were utilized to display the qualitative data. The student's t-test was used to demonstrate the differences between quantitative data. p values were considered significant if they were less than 0.05.

3. Results

Table 1 showed that all waste collectors were males with age ranged from 15 to 67 years old. About 60% of them were illiterate and the majority (94.2%) were from rural areas. About half of the studied workers (50.3%) were current smokers, especially cigarette smoking. More than half of the workers (55.8%) have permanent contracts and about 70% work in morning shifts. The mean number of years they've worked was 17.4 years. Regarding their work ability, their mean score was 42.9 (4.5). About 56.8% and 33.5% of workers scored excellent and good respectively (Fig.1). The majority of respondents (85.5%) stated that they had not missed work because of health issues. The most commonly present illnesses among workers were MSDs (n=64, 20.7%) then respiratory diseases (n=31, 10%) and cardiovascular diseases (n=27, 8.7%). Table 2 showed that the higher predominance of MSDs is for the low back (19%), knees (15.5%), ankles/feet (6.5%), neck (5.2%), shoulders (14%) in the last 12 months. The most affected body part during the past seven days has been the lower back (7.7%), followed by the knees (6.1%), ankles/feet (4.5%), and neck (2.3%). Additionally, the most common cause of limitations in everyday activities (3.2%) and medical seek-outs (5.2%), was low back pain. Figure 2 showed that more than half of the MSW workers (53%) had MSDs. Table 3 showed a significant relationship between the WAI score and the presence of MSDs, respiratory and cardiovascular diseases as those who didn't have any complaints had significantly higher work ability scores.

4. Discussion

The majority of participants reported good or optimal work ability and high prevalence of MSDs, respiratory and cardiovascular diseases. Middle aged men predominate in the studied solid waste management workforce. Solid waste workers typically resided in rural areas where living circumstances are poorer than in urban areas, had lower socioeconomic status, and had less education [2, 5, 10-13]. About 50% of the workers in the present study were current smokers.

Table 1: Demographic and occupational characteristics of Minia waste handlers (n=310)

	Mean ± SD	Range
Age (in years)	46.8 ± 9.8	15-67
Working years	17.4 ± 8.9	1-42
	Number	**Percentage**
Age:		
Below 40 years	74	23.9
Above 40 years	236	76.1
Minia city districts:		
North	69	22.3
West	105	33.9
South	86	27.7
Central	50	16.1
Marital status:		
Single	17	5.5
Married	293	94.5
Educational level:		
Illiterate	186	60
Read and write	90	27.4
Primary to Secondary education	39	12.6
Residence:		
Rural	292	94.2
Urban	18	5.8
Smoking status:		
Smoker	156	50.3
Ex smoker	12	3.9
Nonsmoker	142	45.8
Type of smoking:		
Cigarettes	100	59.5
Shisha	65	3
Both	3	1.8
Occupation:		
Sweepers and collectors	254	81.9
Drivers	23	7.4
Inspectors	33	10.6
Contract:		
Permanent	173	55.8
Temporary **c**ontract	137	44.2
Time of shift:		
Morning	218	70.3
Afternoon	39	12.6
Night	52	16.8

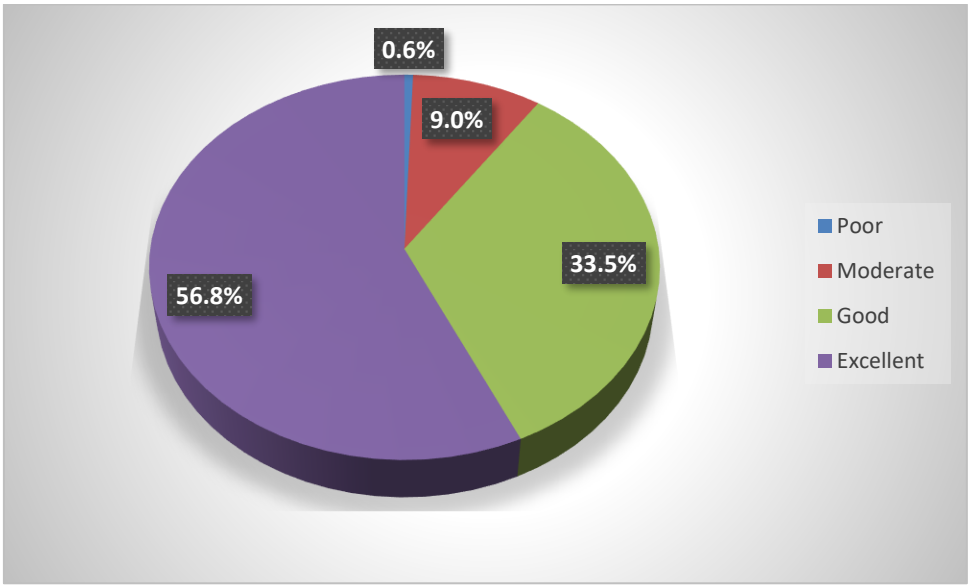

Figure 1: Work ability index score categories

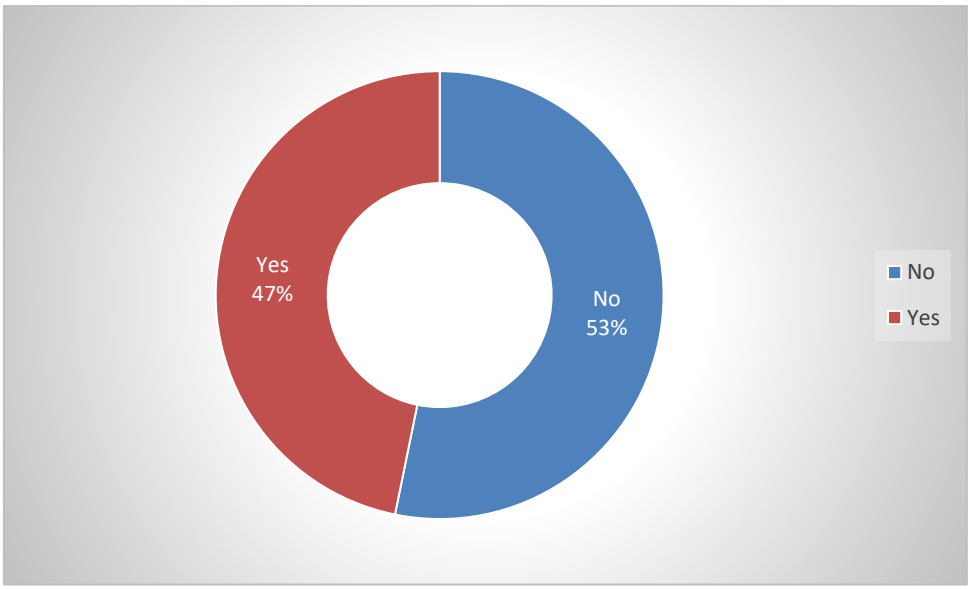

Figure 2: Distribution of musculoskeletal disorders among Minia city waste handlers in the last 12 months.

Table 2: Frequency distribution of musculoskeletal disorders among Minia waste handlers

	Number	Percentage
Neck troubles:		
Symptoms in last 12 months	16	5.2
Restrictions in daily activity	1	0.3
Seeking health care	1	0.3
Symptoms in last 7 days	7	2.3
Shoulder troubles:		
Symptoms in last 12 months	14	4.5
Restrictions in daily activity	3	1
Seeking health care	5	1.6
Symptoms in last 7 days	6	1.9
Upper back troubles:		.
Symptoms in last 12 months	6	1.9
Restrictions in daily activity	0	0
Seeking health care	0	0

	Number	Percentage
Symptoms in last 7 days	2	0.6
Elbow troubles:		
Symptoms in last 12 months	4	1.3
Restrictions in daily activity	0	0
Seeking health care	2	0.6
Symptoms in last 7 days	0	0
Hand troubles:		
Symptoms in last 12 months	6	1.9
Restrictions in daily activity	0	0
Seeking health care	1	0.3
Symptoms in last 7 days	1	0.3
Lower back troubles:		
Symptoms in last 12 months	59	19
Restrictions in daily activity	10	3.2
Seeking health care	16	5.2
Symptoms in last 7 days	24	7.7
Hip troubles:		
Symptoms in last 12 months	2	0.6
Restrictions in daily activity	0	0
Seeking health care	1	0.3
Symptoms in last 7 days	1	0.3
Knee troubles:		
Symptoms in last 12 months	48	15.5
Restrictions in daily activity	5	1.6
Seeking health care	6	1.9
Symptoms in last 7 days	19	6.1
Ankle / feet troubles:		
Symptoms in last 12 months	20	6.5
Restrictions in daily activity	8	2.6
Seeking health care	1	0.3
Symptoms in last 7 days	14	4.5

Table 3: The relation between work ability index score and presence of musculoskeletal disorders, respiratory and cardiac diseases among Minia waste handlers.

Presence of diseases	WAI score Mean ± SD	t-test value *p* value
Presence of MSD		
No (165)	44.4 ± 3.6	6.418
Yes (145)	41.3 ± 4.8	**0.0001***
Presence of respiratory diseases		
No (279)	43.3 ± 4.2	5.213
Yes (27)	38.8 ± 5.3	**0.0001***
Presence of cardiovascular diseases		
No (283)	43.4 ± 4.0	6.978
Yes (25)	37.4 ± 5.8	**0.0001***

These numbers were similar to Mansoura and Menoufia MSW workers where 55% and 42.9% of workers were smokers respectively [2, 10]. Brazilian and Indian studies showed lower percentage of smokers as 34% and 29.5% only were smokers respectively [4, 14]. while a Malaysian study showed higher percentages where 81.8 percent were smokers [15]. The majority of employees stated that their job ability was good (33.5%) and excellent (56.7%). The work ability of this working group in Egypt has not, as far as we are aware, been studied before; nevertheless, a study conducted in Brazil examined similar numbers of workers who reported having good (44%) and excellent (43%) work ability. [4]. Studies on workers in various Egyptian occupations, such as administrative, professional and technical workers revealed moderate work ability, with a mean score of 35.2 (SD 4.7) [16]. Since WAI scores were significantly (t= -2.637, p= 0.009) higher in temporary contract workers (43.7 ± 3.9) than permanent contract workers (42.4 ± 4.8) in the current study, hence we can hypothesize that the high work ability in the current study is related to the workers' fear of losing their jobs, as temporary contract workers did not have the possibility of addressing their complaints or taking a sick leave when needed. Fifty three percent of Minia waste collectors complained of MSDs. These symptoms were most prevalent in the low back, knees, neck and shoulder over the previous 12 months. These body parts are also in great demand at work because garbage collection requires walking long distances, leaning forward, lifting heavy objects, carrying, and pulling/pushing carts and containers while sorting and collecting waste on streets [2, 4, 17]. This was evident also in a study done among Mansoura waste collectors where 60.3% of the workers had MSDs with the most frequently complains occurring in the same regions [5].

Reports of musculoskeletal pain were common in MSW workers of Alexandria. too as 17.3% of investigated personnel experienced low back pain and sciatica, whereas 3.2% had generalized bone pains and arthralgia, primarily affecting the knee, hip, shoulder, and neck joints [13]. Collectors in Egypt suffer from MSDs as a result of the vast amount of rubbish they must manually handle. Ergonomic risk factors play a role and it's also possible that the untrained waste collectors are unaware of the appropriate safety precautions to take when collecting rubbish. In Iran, at least one MSD symptom was reported by 92.5% of garbage collectors in the previous 12 months and that was much more than those reported in the present study. An increased frequency and severity of lower back and knee injuries was observed, as the current study addressed [18]. In Ghana, the prevalence of musculoskeletal discomfort among electronic waste workers in the past 7 days was highest in the lower back (65.9%), shoulders (37.5%), and knees (37.5%) [19]. These figures are different from Minia workers where they complained of lower back (7.7%), followed by the knees (6.1%), ankles/feet (4.5%), and neck (2.3%) in the past week. In Ethiopia, waste collectors also had low back pain as the most frequent (70%) MSDs prevalent among them [20]. Minia MSW workers demonstrated significant difference in work ability scores between those having MSDs (44.4 ± 3.6) and those who don't (41.3 ± 4.8). These results were somewhat consistent with s study carried out in Netherlands which showed that the majority of workers with chronic muscular pain had poor to moderate work ability [21]. Another Swedish study that was done among health care workers found that recurrent musculoskeletal pain is highly associated with decreased work ability [22]. Respiratory symptoms and diseases (in the form of repeated infections, COPD and emphysema) affected about 10% of the MSW workers. This is expected as chronic exposure to high dust levels and a range of bioaerosols, such as microorganisms, fungal spores, and endotoxins, or to levels of total suspended particle matter beyond local regulations, can deteriorate lung function as well as the increased percentage of chronic smokers [2, 13, 17, 23]. These findings are consistent with those found in an Egyptian study that revealed significantly lower spirometric measurements in Menoufia waste collectors than controls [2]. These findings agrees too with Greek cross sectional study that showed a higher prevalence of respiratory symptoms and a greater decrease in lung function among MSW workers [23]. Cardiovascular symptoms were prevalent among Minia MSW workers as 8.7% had history of hypertension or coronary artery diseases (CAD). This was less than the Brazilian studies where 27.9% and 32.8% of the waste pickers were hypertensive [4, 24]. This could be explained by the unawareness and inattention of Minia workers to diagnose their conditions and the healthy worker effect could contribute to these lower numbers too.

5. Limitations

Due to the cross-sectional nature of the study, it is difficult to determine the direction of effects and to determine whether any of the health impacts was a preexisting or a recently developed one. In addition, some of the managers of the workers were uncooperative, saying that the study caused obstacles for the workers and caused them to arrive late to work.

Conclusion

This descriptive study assessed the health issues and work capacity of Minia MSW workers, which may be useful in identifying risk factors, suggesting preventive actions and educational programs for awareness of musculoskeletal disorders, respiratory and cardiovascular diseases and their relation to their work ability.

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