



An Analysis of the Relation between Garbage Pickers and Women's Health Risk

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Abstract

The waste influences women's health. The quantity of waste is influencing the quality of the environment. The different cooperatives produce different types and amounts of garbage, virus, bacteria and fungi that affect the quality of life. Several protections must be used, such as masks, gloves, and boots. Solid waste is a common health problem. The analysis of different health problems is essential to verify the consequences of its inadequate management and final disposition. This paper analyses three different cooperatives about the prevalence of various diseases. The risk of chronic obstructive pulmonary disease was associated with sex and smoking, verifying that it is higher in smokers. Finally, the consequences of the inadequate management and final disposition can reflect on the health of the population.

Keywords: Bacterial; Fungi; Occupational; Virus; Waste

Introduction

The global population is continually expanding, and the production and consumption of industrial materials, with sequential growth of the stock of Municipal Solid Waste (MSW), discarded and its adverse effects on the environment and the health of the populations [1]. In 2016's Brazil, the production of MSW was almost 78.3 million tons, equivalent to 214,405 t/day. Unfortunately, much of this waste is deposited in improper locations, such as dumps and controlled landfills, receiving more than 81,000 tons of waste per day [2]. Debris affect the life and health of the Brazilian population, in addition to its direct impact on the environment. In the metropolitan area of São Paulo (MASP) are generated about 20,000 t/day of solid urban waste, according to data of 2017 of São Paulo's city, of these, around 12,000 t/day are household waste [3].

These data point to the importance of selective collection for the reuse of these materials.

By this scenario, the collectors of recyclable materials are the subjects that remove from the waste their livelihood, donations of recyclable materials. They are acting in the streets and dumps, or even working in cooperatives of Recyclable materials that receive such waste [4,5]. In 2002, through the MTE N^o 397, the profession called "recyclable material Collector" was recognized by the Ministry of Labor and Employment, as stated in the Brazilian classification document of Occupations [6].

Solid waste scavenging is a professional activity that entails health risks, given the nature of the material and the precarious conditions of the environment and the work process. The screen-

ing activity of the residues carried out in the cooperatives can cause ergonomic problems [7]. In addition to injury by glass pieces, sharp metals, hospital material, and other needle stick objects present in the waste discarded [8]. Another vital aspect is mental health since they are exposed to essential loads of stress and sadness [9]. Finally, it is also a source of illness among scavengers contact with Bioaerosols and toxic metals, fungi, viruses, and bacteria [10-12].

The recyclable material manipulated by the scavengers often contains waste of food discarded in the domestic, commercial, industrial, and public environments, providing the proliferation of fungi and vectors on how toxic metals, coronavirus disease [13,14] and bacteria. The organic matter present in these materials releases fungal spores at the time of separation, causing possible contamination of the scavenger who is manipulating them. Thus, the exposure of workers dealing with solid waste to the microorganisms has been considered an occupational health problem [12]. Some symptoms and illnesses associated with this activity are nausea, allergy, diarrhoea and respiratory symptoms how coronavirus disease [13-16].

The fungi commonly present in the air environment are called airborne, such as those of the general alternate, *Aspergillus*, *Cladosporium*, *Curvularia*, *Fusarium* and *Penicillium* [17], can cause diseases, such as cutaneous lesions, sinus infections, nasal septum, lung diseases, among others [18]. Some of these fungi are described in studies of environments related to solid waste [19]. However, fungal distribution varies between geographical regions and is also influenced by seasonal, climatic, and other environmental factors [20]. Also, some of these genera are potential mycotoxin producers resistant to adverse environmental factors. They may be present in the environment even after the death and disintegration of the producing species [21]. Thus, the identification of the genera of fungus to which recyclable material scavengers are exposed is essential for assessing occupational risk fungi and vectors how toxic metals, coronavirus [13,14] and bacteria.

Based on the recyclable material collectors and the social vulnerability and occupational risks of this profession, this study evaluates the degree of fungal and toxic metals, COVID-19 [13,14], and bacterial contamination in the cooperatives of Recyclable material. Also, this study intends to identify possible sources of exposure and to check for the relationship with respiratory problems presented by workers.

Problem statement

The activity carried out by the recyclable material collector can be carried out autonomously and informally, under precarious conditions of sanitation and safety, or through cooperatives of recyclable material pickers [1]. Currently, organizations seek to give lectures and training to their intervenient, such as safety courses at work, environment, hygiene, to minimize health risks to these workers.

According to the demographic census of 2010, of the Brazilian Institute of Geography and Statistics (IBGE), 387,000 people had by main occupation the scavenging, with monthly average national income of R \$571.56 [22]. These workers were distributed in 4,961 Brazilian municipalities (89% of the country's towns), with the southeast region concentrating the most significant number of scavengers in the country, with 42% of the workforce of this occupation [23].

Methodology

In the initial phase of this study, random visits were performed in 12 cooperatives of recyclable materials from the metropolitan area of São Paulo (MASP). Subsequently, three organizations were selected that showed representative characteristics to the others and had at least 30 workers. The selected cooperatives were visited between August 2013 and July 2014.

A total of 156 individuals from the three cooperatives participated in this study. A questionnaire about demographic and socio-economic variables, labour information and signs, and symptoms of COPD (chronic obstructive pulmonary disease) and asthma, was applied to characterize the profile of cooperative workers and relate the concentration of fungi with respiratory conditions. For COPD, the questions were based on the Global Initiative for Chronic Obstructive Lung Disease (GICOLD) questionnaire and adopted by the Ministry of Health [2]. In the case of asthma, the questionnaire ISAAC (International Study of Asthma and Allergies in Childhood) validated by [24] was used.

Results

The average concentration of total fungi (UFC/m³) was obtained by collection areas in each cooperative and for the grouped samples. The composition's comparison of the fungi between the cooperatives was performed by arranging the collection areas.

The composition of workers to sex, race, and schooling was described in relative terms (%). The average age and working time in the cooperative (average ± standard deviation) and the standard of use of protective equipment were also calculated. Individual (PPE). The categorical variables were compared by the chi-squared test and the others by the analysis of variance (ANOVA).

The prevalence of COPD and asthma were compared between the cooperatives, controlled by the variable age, sex, smoking, use

of masks, and cooperative, to assess a possible relationship between the concentration of fungal material in the working environment and respiratory diseases. Also, we evaluate the prevalence of diarrhoea due to the high incidence of waste-handling activities. The binary logistic regression was used to assess the risk of the morbidity referred to in the three cooperatives, adjusting to the age, sex, smoking, and cooperative variables. For each variable, the odds (OR = odds ratio) and its confidence interval (IC 95%) were calculated.

A		Cooperatives			p	
		B	C	Total		
Sex (%)	Men (N = 62)	23	38	51	40	0.024
	Women (N = 94)	77	62	49	60	
Age (average ± standard deviation)		50.1 ± 8.9	41.6 ± 12.5	42.8 ± 12.3	44.0 ± 12.1	0.002
Race (%)	White (N = 35)	31	19	21	22	0,368
	Black (N = 48)	37	31	27	31	
	Brown (N = 71)	31	48	51	46	
	Yellow (N = 1)	0	2	0	1	
Schooling (%)	White (N = 35)	31	19	21	22	0.368
	Elementary level (N = 116)	63	84	71	74	
	Middle level (N = 30)	29	12	21	19	
	Higher level (N = 1)	0	0	2	1	
Working time in cooperatives/Street Scavenger (average ± standard deviation)		5.7 ± 4.3	4.0 ± 2.9	4.0 ± 3.3	4.4 ± 3.4	0.935
Use of PPE (% workers)						
Masks	Every time (N = 4)	3	-	5	3	0.008
	Eventually (N = 36)	3	22	35	23	
	Never (N = 113)	94	78	56	72	
Gloves	Every time (N = 105)	20	86	76	67	0
	Eventually (N = 31)	43	11	20	20	
	Never (N = 17)	34	-	11	11	
Boots	Every time (N = 136)	74	86	97	87	0.012
	Eventually (N = 7)	11	5	-	5	
	Never (N = 11)	14	6	3	7	

Table 1: Description of the results obtained.

*: Didn't know or didn't answer: Race (N = 1); School (N = 1); Use of Masks (N = 3), Gloves (N = 3) and boots (N = 2).

The logistic regression analysis indicated that the risk of asthma was not associated with the sex of the workers (P-value = 0.059) and the Cooperative (P-value = 0.034). Thus, the chance to have asthma 3.4 times higher for women and about 6 and 3 times higher in cooperative C and both the highest fungal concentrations when compared with cooperative B (Table 1). The risk of COPD was associated with gender (P = 0.041) and smoking (P = 0.000), where the probability is 2.4 times higher in women, and 31.9 and 9.8 times higher in smokers and smokers (Table 1). The prevalence of diarrhoea was not associated with any variable (p = 0.053), the probability ratio (OR) higher in cooperative C (3.2).

Discussion

Our results showed a large female presence of fertile age (60%) in the sector of collection and sorting of recyclable materials with 2% of pregnant pickers in the sector of sorting, collecting, and electronics waste. Many workers are brown and black (77%), and they have only up to the elementary level of schooling (74.4%). These characteristics, when compared to other studies, are like those found in other Brazilian cities and Regions [25].

Following the increasing importance of the process of collection, sorting and recycling, and the large amount of waste generated daily, it is created the need to observe the profile of the workers and the vulnerability of the exposition. In our study, when we analyzed the fungal microbiota in the air of the cooperatives, we observed a variation concentrations of 116 UFC/m³ to 751 UFC/m³, our notes were based on the grouping.

Conclusion

It is observed that more women and more educated people are occupying jobs such as the scavenging, characterized by food, social, and economic vulnerability. It should be an attention's object to health policies that act on diseases of the respiratory tract, digestive, dermatological and mental health. Moreover, it is suggested the importance of triage the fungi and complement the studies in the cooperatives. Thus, it was possible to observe that the cooperatives have respiratory problems. These problems are related to the absence of PPE, and the existence of fungi, toxic metals, COVID-19 [13,14] and bacteria. Also, with our data, we already suggest that workers are motivated to stop smoking and to use all personal protective equipment during work. If possible, be assisted at least annually by a medical team that can monitor their health.

Since urban solid waste is a common health problem. The consequences of its inadequate management, and final disposition can reflect on the health of the population. There is a need to assess the fungal microbiota present in the cooperatives with a greater number of samples. Thus, the actual risk to be established to which these workers are exposed. Also, careful measures are established to avoid the worsening of the worker's health or even exposure to some new problem. It is necessary to establish a consensus as to the maximum permitted values of these workers' exposure to this fungal microbiota in this type of environment fungi and vectors how toxic metals, COVID-19 [13,14] and bacteria. Values are still under discussion in the various regulatory bodies worldwide.

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