

RESPIRATORY HEALTH EFFECTS AMONG FEMALE STREET FOOD VENDORS IN MANSOURA CITY, EGYPT

By

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Abstract

Introduction: Street vendors work daily selling their goods on the sidewalks along the streets and seldom have breaks .They are considered the most working groups that are at the highest risk of exposure to air pollution as they usually work for long hours and are continuously exposed to inevitable: adverse weather conditions, atmospheric and road dust, vehicular emissions and air pollutants from industrial and other sources, resulting in a wide range of adverse respiratory health effects. **Aim of work:** To assess the prevalence of respiratory symptoms and the effect of outdoor work environment on pulmonary functions measurements among female street food vendors in Mansoura city. **Materials and methods:** A descriptive cross-sectional study was carried upon (152) stationary female street food vendors in Mansoura city during the period from August to December 2017. The sample size was calculated using MedCalc program version18. Data was collected using a questionnaire included sociodemographic characteristics, occupational and medical histories focusing on the respiratory symptoms in the last 12 months. Clinical examination and measurement of the pulmonary functions were done. **Results:** There was a high prevalence of respiratory symptoms among street food vendors in the last 12 months (86.2%). The mean observed values of FEV₁ and FVC were statistically significantly lower than their predictive values and the mean observed values of FEV₁/FVC % were statistically significantly higher than their predictive values. **Conclusion:** Street vendors are at high risk of respiratory symptoms and impaired pulmonary functions. Bronchial asthma ranked the first disorder for the respiratory system (18.4%) among street food vendors followed by chronic bronchitis (7.9%).

Keywords: Air pollution, Street vendors, Occupational respiratory disorders and Pulmonary functions.

Introduction

Air is the most important component of the environment and any deviation of its composition is likely to affect the health of the individual (Prakash et al., 2012), even the relatively low levels of air pollutants have implications on human health (Abelsohn and Stieb, 2011). Air pollution has been generally recognized as a major health hazard (Burgaz et al., 2002) some of which are genotoxins. An increased risk of cancer has also been reported in occupations with heavy exposure to traffic-related pollution. The aim of this study was to assess the cytogenetic effects of urban air pollution by analyzing the chromosomal aberration (CA) and it becomes a key challenge of 21st century (Ali et al., 2017). Uncontrolled urban population, increasing number of vehicles, industries, and poor implementation of air quality standards have made the problem of air pollution even worse.

In Egypt, like all developing countries, urban air quality has deteriorated gradually because of rapid urbanization, industrialization and population overgrowth (Shakour et al., 2013). Dakahlia governorate is ranked as the fourth Egyptian governorate in

number of licensed vehicles and their number is rising each year (Shoaeb and Gabr, 2016). Mansoura city (The capital of Dakahlia governorate) is characterized by traffic congestion in main arterial streets due to the large number of cars on the streets and the lack of efficient public transportation system.

Outdoor occupations especially those working along the road are characterized by prolonged exposure to high concentrations of outdoor air pollutants (Kongtip et al., 2008; and Patil et al., 2014) due to staying near roads or close to traffic lights where vehicles are required to stop and leave their engines running (Amaran et al., 2016). The emissions from roads are discharged in close proximity to human receptors. Moreover, a great number of these vehicles are old and poorly maintained which makes the situation even worse (Ekpenyong et al., 2012).

Air pollution greatly affects street vendors as they usually work for long hours and are regularly exposed to adverse weather conditions, atmospheric and road dust, vehicular emissions and air pollutants from industrial and other sources and this exposure produces a wide range of

adverse health effects (Kongtip et al., 2008; and Amegah and Jaakkola, 2014) a dominant occupation in urban areas of developing countries exposes the vendors to several environmental pollutants. We investigated whether work as street vendor impairs foetal growth and shortens gestational duration, and evaluated to what extent exposure to traffic-related air pollution is responsible for these adverse effects. **Methods:** A cross-sectional study was conducted among mothers and their newborns accessing postnatal services at the Korle Bu Teaching Hospital in Accra, Ghana in 2010, focusing on 105 street vendors and a reference group of 281 mothers. We categorized exposure to traffic-related air pollution on the basis of street vending activity patterns and traffic density in the working area. **Results:** Multivariate linear regression analysis adjusting for age, social class, marital status and gravidity of mothers, sex of neonate, and indoor air pollution, indicated a 177. g (95% CI: 324, 31. They work day after day selling their goods on the sidewalks along the streets and seldom have breaks from exposure to air pollution (Jones et al., 2002 and Kongtip et al., 2008).

The spectrum and severity of adverse respiratory health effects of the inhaled pollutants vary from subclinical effects to premature mortality (Ekpenyong et al., 2012). Air pollutants affect small as well as large airways leading to obstructive airway diseases, restrictive lung diseases, and lung cancer (Jones et al., 2002) short-term changes in response to pollution levels over days, weeks and months have been less well documented. Such investigation requires field studies using portable equipment. Therefore, we studied forced vital capacity (FVC). The present study is pioneer in studying the effect of air pollution on the respiratory system among female street food vendors in Mansoura city.

Aim of work

This study aims to describe and assess the prevalence of respiratory symptoms and the effect of outdoor work environment on pulmonary functions measurements among female street food vendors in Mansoura city.

Materials and methods

- **Study design:** A descriptive cross-sectional study was carried upon stationary female street food vendors in Mansoura city.

-Place and duration of the study of the study: Major streets and squares of Mansoura city in which female street food vendors frequently operate. The study was carried out during the period from August to December 2017.

- Study sample: Sample size was calculated using MedCalc program version 18. From previous study (Amaran et al., 2016), Mean \pm SD of FEV1/FVC % (102.8 ± 11.5), at alpha error 5%, beta error 20%, and level of precision 3%, sample size was calculated as 112 individuals and it was increased to 152 according to the availability and acceptance of participants.

-Study method: each participant was subjected to the following:

I - A preformed questionnaire to cover the following:

- a. Socio demographic characteristics such as age, marital status, residence, level of education, type of housing, family size, crowding index (number of family members/number of rooms) (El-Gilany et al., 2012), monthly income, earning members in the family and smoking history.
- b. Occupational characteristics: duration of food vending/years,

working hours/day, working days/week, rest break during workday and type of food sold.

- c. Respiratory symptoms in the last 12 months was assessed using American Thoracic Society and National Heart and Lung Institute Division of Lung Disease (ATS-DLD-78A) standardized questionnaire (Tennant & Szuster, 2003)

II-Clinical examination:

-including weight, height and Body Mass Index (BMI) (WHO, 2004).

III-Pulmonary function

measurements :-Each participant was subjected to measurement of pulmonary functions using a calibrated digital portable spirometer (SpiroLab III, MIR, Italy) with explanation of the technique to each subject. The test was carried out while the participant was in the sitting position, the participants were asked to take a deep breath followed by forced rapid exhalation into a disposable mouth piece that is connected to the spirometer while the nose was clipped to allow airflow only through the mouthpiece to and from the lungs and the lips were tightened around the mouthpiece to

prevent leakage of air. At least three technically accepted maneuvers were obtained with recording of the best trial. The cut off point for spirometry values: >80% of predicted values were considered normal (Whittle, 2009).

Consent

An informed verbal consent was obtained from each subject before the start of work. They were informed that all collected data will be confidential and will be used for scientific purposes only.

Ethical approval

The study was approved by Institutional Review Board (IRB)

of Faculty of Medicine, Mansoura University with code number (MS/17.03.28).

Data management

The collected data were analyzed using Statistical Package for Social Sciences (SPSS) version 22. Qualitative data were described as numbers and percentages. Difference between categorical variables was tested using chi -square test, odds ratio and 95% confidence interval. Independent t- test was used for comparison between two independent groups with quantitative data and parametric disruption. p value ≤ 0.05 was considered statistically significant.

Results

Table (1): Sociodemographic characteristics of female street food vendors in Mansoura city.

Sociodemographic characteristics	Total No=152	
	No	%
Age in years:		
< 40	42	27.6
≥ 40	110	72.4
Mean ±SD	47.6±11.52	
Educational level:		
Illiterate	112	73.7
Primary and secondary	40	26.3
Residence:		
Urban	95	62.5
Rural	57	37.5
Marital status:		
Married	93	61.2
Unmarried	59	38.8
Family size:		
< 5 persons	67	44.1
≥ 5 persons	85	55.9
Crowdness index:		
≤1	14	9.2
>1	138	80.9
Type of housing:		
Owned, < 4 rooms	72	47.4
Rented, < 4 rooms	80	52.6
Family income per month:		
Just enough	56	36.8
Indebt	96	63.2

Earning members in the family:		
Street vendor only	95	62.5
Others	57	37.5
Smoking:		
Non-smoker	152	100
Smoker	0	0.0
*BMI classification (in Kg/m²):		
Normal weight (18.50 - 24.99)	14	9.2
Over weight (25 – 29.99)	34	22.4
Obese (≥ 30.00)	104	68.4

*BMI: Body mass index

Table (1) showed that the mean age of female street food vendors in Mansoura city was 47.6 ± 11.52 years. The majority of them (72.4%) were in the age group of 40 years and above; 73.7% illiterate; 62.5% from urban areas; and 61.2% were married. More than half of the female street food vendors (55.9%) had a family size with more than 5 persons; 63.2% had insufficient family income per month; 52.6% live in rented houses; and 62.5% were the only earning member in their families. All the female street food vendors in Mansoura city were non – smokers. The majority of female street food vendors (68.4%) were obese.

Table (2): Occupational characteristics of female street food vendors in Mansoura city.

Occupational characteristics	Total No=152	
	No	%
Duration of food vending /years:		
< 20	55	36.2
≥ 20	97	63.8
Median (Min-Max) years	20 (2 - 55)	
Working days / week:		
≤ 6	67	44.1
7	85	55.9
Mean ± SD days	6.32 ± 0.95	
Working hours / day:		
≤ 8	11	7.2
>8	141	92.8
Mean ± SD hours	12.21 ± 2.42	
Rest break during the working day:		
Yes	9	5.9
NO	143	94.1
Type of food sold:		
Vegetables	95	62.5
Fruits	39	25.7
Egg, milk, and milk products	11	7.2
Fish	7	4.6

Table (2) showed that most of female street food vendors (63.8%) vended food for more than 20 years and 92.8% of them worked for more than 8 hours daily. More than half (55.9%) of them worked for the whole week and most of them (89.5%) did not take any rest break during the working day. Vegetables and fruits were the most frequent type of food vended by street vendors (61.8% and 25.7% respectively).

Table (3): Prevalence of respiratory symptoms and disorders among female street food vendors in Mansoura city.

Variables	Total No=152	
	No	%
Respiratory symptoms:	131	86.2
Upper respiratory symptoms:	83	54.6
Nasal congestion	72	47.4
Sore throat	48	31.6
Lower respiratory symptoms:	124	81.6
Shortness of breath	103	67.8
Chest tightness	101	66.4
Phlegm	83	54.6
Cough	65	42.8
Wheezes	56	36.8
Respiratory disorders:	50	32.9
Bronchial asthma	28	18.4
Chronic bronchitis	12	7.9
Allergic rhinitis / sinusitis	10	6.6

Table (3) showed that shortness of breath (67.8%) was the most frequent respiratory symptom among female street food vendors followed by chest tightness (66.4%); phlegm (54.6%); nasal congestion (47.4%); and cough (42.8%). Bronchial asthma ranked the first disorder for the respiratory system (18.4%) among street food vendors followed by chronic bronchitis (7.9%).

Table (4): Pulmonary function measurements of female street food vendors in Mansoura city.

Pulmonary function measurements	Observed values No =152	Predicted values No =152	Independent t- test, p value
	Mean \pm SD	Mean \pm SD	
#FEV ₁	2.18 \pm 0.54	2.46 \pm 0.34	t = 8.99, p \leq 0.001**
##FVC	2.59 \pm 0.59	3.17 \pm 0.36	t =10.45, p \leq 0.001**
###FEV ₁ /FVC %	85.15 \pm 12.38	82.95 \pm 2.75	t =2.48, p \leq 0.05 *

#FEV1 (Liter): Forced expiratory volume in the first second ##FVC (Liter): Forced vital capacity

FEV1/FVC: Ratio between them.

* Significant

** Highly significant

Table (4) showed that mean observed values of FEV1 and FVC of female street food vendors in Mansoura city were statistically significantly lower than their predictive values ($p \leq .001$), and the mean observed values of FEV1/FVC % were statistically significantly higher than their predictive values ($p \leq .05$).

Table (5): Relation between respiratory symptoms and pulmonary function measurements among female street food vendors in Mansoura city.

Respiratory symptoms	Pulmonary function measurements (FEV ₁ , FVC)				Chi square and p value	#OR (95% CI)
	Normal No = 72		Reduced No = 80			
	No	%	No	%		
I-Upper respiratory symptoms:						
Nasal congestion	24	33.3	48	60.0	$\chi^2=10.8, p\leq 0.001^{**}$	3.00 (1.5 -5.8)
Sore throat	22	30.6	26	32.5	$\chi^2=0.07, p > 0.05$	1.00 (0.5 -2.2)
II- Lower respiratory symptoms:						
Cough	21	29.2	44	55.0	$\chi^2=10.33, p\leq 0.001^{**}$	2.97 (1.5-5.8)
Phlegm	33	45.8	50	62.5	$\chi^2=4.25, p\leq 0.05^*$	1.97(1.0-3.8)
Wheezes	18	25.0	38	47.5	$\chi^2=8.25, p\leq 0.01^*$	2.70 (1.4-5.4)
Shortness of breath	37	51.4	66	82.5	$\chi^2=16.79, p\leq 0.001^{**}$	4.46 (2.1-9.3)
Chest tightness	35	48.6	66	82.5	$\chi^2=19.52, p\leq 0.001^{**}$	4.98(2.4-10.4)

#: OR: odds ratio,

CI: confidence interval,

 χ^2 : Chi Square test

* Significant

** Highly significant

Table (5) showed that upper respiratory symptoms (nasal congestion) and lower respiratory symptoms were statistically significantly higher among female street food vendors with reduced pulmonary function measurements (FEV₁, FVC) compared to those with normal pulmonary function measurements.

Discussion

Street vendors who mostly work and spend more time outdoors at the ground level, are one important susceptible and vulnerable population who are at risk of exposure to various outdoor air pollutant and this exposure can contribute to a wide variety of adverse respiratory health effects (Noomnual and Shendell, 2017).

The current study found that shortness of breath (67.8%) was the most frequent respiratory symptom among female street food vendors followed by chest tightness (66.4%), phlegm (54.6%), nasal congestion (47.4%), and cough (42.8%) (Table 3). Similarly, Jones et al., (2008) SCOPE AND BACKGROUND: The literature reports a high prevalence of respiratory symptoms associated with exposure to motor vehicle exhaust emissions and people exposed to vehicle emissions are at risk of reduced lung function and cardiovascular performance. Although the effect of traffic emissions is a known risk to respiratory health, retailers are often situated along major roads in a busy urban environment to maximise customers. Shop assistants in an air-conditioned environment should be less exposed to traffic fumes and their lung

function should be better preserved compared to ‘unprotected’ vendors exposed directly to vehicle emissions. The lung function of these two groups of workers has not previously been compared. The aims of this study are to determine if there is a difference in the concentration of respirable particles of diameter less than 10 micrometers (PM10 revealed that 54.8% of road-side vendors in Hong Kong complained of shortness of breath followed by cough (45.2%) and sputum (38.7%) .Also this study was in accordance with Amaran et al., (2016) who detected that (68.3%) of road side vendors in Malaysia suffered from wheezes followed by chest tightness (66.7%), cough (63.3%) and phlegm (50%). Noomnual and Shendell, (2017) reported that 50% of street vendors in Thailand had lower respiratory symptoms (cough, phlegm, wheezes, chest tightness and shortness of breath) and 37% of them had upper respiratory symptoms (sore throat, nasal congestion and cold).

This high prevalence of respiratory symptoms among street food vendors probably attributed to their prolonged outdoor activities which expose them to numerous ambient outdoor air pollutants and to climate changes.

The present study revealed that 32.9% of female street food vendors had respiratory disorders (Table 3). These results were consistent with Reoleto and Villarino, (2017) who reported that 37.5% of female street vendors in Philippines had respiratory diseases and Karthikeyan and Mangaleswaran, (2017) who found that 14% of street vendors in India suffered from respiratory problems .

The current study showed that mean observed values of FEV1 and FVC of female street food vendors in Mansoura city were statistically significantly lower than their predictive values, and the mean observed values of FEV1/FVC % were statistically significantly higher than their predictive values (Table 4). Similar results were obtained by Jones et al., (2008)

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maximise customers. Shop assistants in an air-conditioned environment should be less exposed to traffic fumes and their lung function should be better preserved compared to ‘unprotected’ vendors exposed directly to vehicle emissions. The lung function of these two groups of workers has not previously been compared. The aims of this study are to determine if there is a difference in the concentration of respirable particles of diameter less than 10 micrometers (PM10 who found that FVC among roadside vendors in Hongkong was significantly lower than the control group and FEV1/FVC % was significantly higher than the control group. Pakkala et al.,(2013) revealed that there was a significant decrease in FEV1 and FVC among street hawkers in India as compared to the control group. Also, Amaran et al.,(2016) reported that FEV1 among roadside vendors in Malaysia was significantly lower than the control group.

Lung function impairment among street food vendors could be attributed to the long exposure to outdoor air pollutants in their working environment nearby the roads.

Our study detected that upper respiratory symptoms manifested by

nasal congestion and lower respiratory symptoms as cough, phlegm, chest tightness, wheezes and shortness of breath were statistically significantly higher among female street food vendors with reduced pulmonary function measurements (FEV1, FVC) compared to those with normal pulmonary function measurements (Table 5). Amaran et al., (2016) in Malaysia and Jones et al., (2008) SCOPE AND BACKGROUND: The literature reports a high prevalence of respiratory symptoms associated with exposure to motor vehicle exhaust emissions and people exposed to vehicle emissions are at risk of reduced lung function and cardiovascular performance. Although the effect of traffic emissions is a known risk to respiratory health, retailers are often situated along major roads in a busy urban environment to maximise customers. Shop assistants in an air-conditioned environment should be less exposed to traffic fumes and their lung function should be better preserved compared to 'unprotected' vendors exposed directly to vehicle emissions. The lung function of these two groups of workers has not previously been compared. The aims of this study are to determine if there is a difference in the concentration of respirable particles

of diameter less than 10 micrometers (PM10 in Hong Kong found that the prevalence of respiratory symptoms were significantly higher among street vendors compared to control group.

Conclusion and recommendations

Street vendors are at risk for increased respiratory symptoms and pulmonary function impairment. Health education of street vendors about health hazards of exposure to ambient outdoor air pollutants and the need to use personal protective equipments like face masks should be conducted to improve their respiratory health. Performance of regular periodic screening for early detection of any respiratory impairment among street vendors and give suitable care for them are mandatory.

Conflict of interests

None.

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