ORIGINAL ARTICLE

Respiratory symptoms and their determinants among adult women in an urban slum area of Delhi

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Abstract

Background: Globally, respiratory disorders accounted for 7.4% deaths, out of total deaths during the year 2015. **Aim & Objective:** - To estimate the magnitude of respiratory symptoms and their determinants in adult women of 18-59 years. **Material & Methods**: A cross sectional study was conducted among 500 women of 18-59 years in an urban slum of Delhi. Assessment of respiratory symptoms was done using questionnaire and observations on environmental conditions. **Results**: Overall prevalence of major respiratory symptoms was 24.8% in the study population. Dyspnea, chronic cough, chronic phlegm, wheeze was observed in 14.2%, 5.6%, 2.4% and 2.6% respectively.

Keywords

Respiratory Symptoms; Urban Slum; Delhi; Women; Risk Factors

Introduction

Respiratory diseases erode health and wellbeing of patients and have negative impact on families and societies. In the year 2012 chronic respiratory diseases accounted 7.4% DALYs, in India. (1,2) Proportion of patients with respiratory symptoms among those over 5 years of age ranged from 8.4% to 37% in Primary Health Centers as per a WHO survey in nine countries. (3)

Magnitude of respiratory symptoms directly relates to increase in exposure to the risk factors like household & ambient air pollution, active or passive smoking, low socio-economic status, fuel used for cooking and other environmental factors. Worldwide, 2.8 billion people still rely on solid fuels for cooking and heating and 780 million of them live in India. (4) Added together, Household air pollution (6%) and ambient air pollution (3%) account for 9% of the national disease burden. (5) According to WHO 13 of the top 20 cities with the worst ambient air quality were in India, with Delhi featuring at the top of the list, which has now moved to 12th position in May 2016, due to rigorous efforts taken by the government. (6)

Currently, 6 million people die annually from tobacco use, with over 0.6 million deaths due to exposure to second-hand smoke. (7) As many as 40% of children,

35% of women, and 33% of men are regularly exposed to second-hand smoke. (8)

Women living in slums, particularly those living close to highly polluted areas, spending most of their time in the households, are at higher risk of respiratory disorders due to multiple sources of air pollution.

Aims & Objectives

To estimate the magnitude of respiratory symptoms and their determinants in adult women of 18-59 years.

Material & Methods

A cross sectional study was conducted in Vishwas Nagar, an urban slum area of East Delhi, with a population of 5500 living in s 528 houses (9) settled for 15-25 years. This is one of the most air polluted area because of large vehicular density with Inter State Bus Terminus, Anand Vihar, just half kilometer away, many factories at Sahibabad, Ghazipur and Jhilmil Industrial areas, within 5 kms and number of construction activities nearby. Air quality data of Anand Vihar Quality Monitoring site revealed that during last 2 years, PM-10 was 9 times above safe limits and PM-2.5, NO2 levels were also above their safe limits. (10)

Taking prevalence of the respiratory disorders as 31%(11), standard error as 5% with 95% confidence level and response rate of 95%, estimated sample size was 485. Estimated number of adult female aged 18-59 years in the area was around 560. We therefore decided to cover all eligible women. Women who were residing in the study area for minimum of one year were included while, women with the history of heart disease or any other severe debilitating illness and those pregnant were excluded.

House visits were made, written and informed consent was taken from all individuals enlisted in the study after explaining the purpose of the study. In case more than one woman was present in the house, one of them was randomly selected. Of 528 households, 34 refused to give the consent, while 6 households who were living on the rented upper floors gave the consent for the study. Eventually 500 households gave consent for interview. Observations on domestic environmental conditions were made during home visit. Biomass Fuel Exposure Index was derived by multiplying duration of biomass fuel usage (years) and cooking duration/day. (12)

Smokers were classified (13) as into current smokers; who smoked regularly within one month prior to the interview; non-smokers; who never smoked or occasionally smoked; and ex-smokers; who stopped smoking more than one month prior to the interview. One pack year was defined as smoking 20 cigarettes per day for 1 year. In case of beedi smokers, the number of pack years was further divided by 4 as the net weight of tobacco per beedi is about one-fourth compared to a cigarette. (14)

Clinical history regarding respiratory symptoms based on MRC Respiratory questionnaire (15) translated in Hindi, was used. Chronic cough was defined as any cough lasting for 8 weeks or longer or occurring for most days in a month for 3 or more months in a year for two consecutive years. Chronic phlegm production was defined as regular sputum production for 3 or more months in a year for two consecutive years. Dyspnea was defined as breathlessness when walking, which required the subject to stop or slow down for breathing while walking on the level. Wheeze referred to the occurrence of wheezing/whistling sounds in breathing associated with breathlessness on most days or nights.

The study was approved by Institutional Ethical Committee of Lady Hardinge Medical College and data collection was done from January to December 2015. Statistical analysis was performed using SPSS version 12. Chi-square test was applied wherever it was necessary to derive association of risk factors with respiratory symptoms.

Results

Mean age of 500 women study subject was 35.4±10.3 years, 87% of them were currently married. Mean duration of stay was 15.2 ± 9.5 years. Majority of the subjects were Hindu (92.4%) and were part of nuclear family (3/4th) and 73% were illiterate. Nearly 60% of subjects were employed outside their homes, mainly as housemaids and majority (86%) had their jobs within 5 km of the residential area. Most of the families belonged to upper lower socio economic (69.2%) status as per Modified Kuppuswamy's scale. (16)

Almost half (51.4%) of the study subjects were asymptomatic, remaining 48.6% had one (17.4%), two (14.4%) and three or more (16.8%) symptoms. Common symptoms like dyspnea walking uphill/ climbing upstairs, cough, phlegm, tightness of chest was not included for the analysis as these were nonspecific and can be seen in other systemic diseases. Only major symptoms i.e dyspnea while

walking at normal pace or at rest, chronic cough, chronic phlegm, wheeze was observed in 14.2%, 5.6%, 2.4% and 2.6% respectively.

Majority (84.6%) of the study subjects were currently using LPG introduced during last 3 years.10.4% were using both, LPG and biomass fuels such as wood and coal and rest 5% were totally dependent on wood as cooking fuel.

Mean Biomass Exposure Index was 24.98±21.6 hr. yrs. Proportion of women without any symptoms was significantly higher in those with no or low exposure index (80.7%) as compared to those with moderate (69.3%) or high exposure index (69.7%).

Only 5.8 % women were current smokers and 1% were ex-smokers. Out of this 73.6 % of smokers had smoked for less than 2.5 pack years. All of them were smoking beedi. Indoor smoking was seen in 35% of the households, mainly (90.2%) beedis.

Discussion

Overall prevalence of major respiratory symptoms was 24.8% in the study population and was higher as compared to the earlier studies by Jindal SK *et al* (17) which was 8.5%, Chhabra P *et al* (18) reported 9.6%, Johnson P *et al* (19) who found it 5%. But, lower than that were observed in a multi-centric study conducted in urban and rural centers of China (20). Such differences were possibly related to the varying ethnicity, different socio-economic strata and environmental conditions of the population or, only had one or the other risk factors like biomass fuel or ambient air pollution whose effect was observed during the study.

Domestic environmental conditions of the study area were poor as compared to findings seen at Aligarh city (21) which had 1/3rd of kucha/semi pucca dwellings. Overcrowding was present in 68% of homes as compared to current study where it was a part of most of the households. A secondary analysis of NFHS-3 data (22) derived that separate kitchen was seen in 54.6%, outdoor type in 16.7% and within the living room in 28.5% and cleaner fuels were used by 29.8% and biomass fuels by 70.2% households for cooking. A finding opposite to ours since NFHS data is representative of whole country population. These poor environmental determinants seen in the study area posed higher risk of exposure to smoke and other pollutants emitted from cooking fuels thereby leading to respiratory symptoms.

A higher prevalence (6.8%) of tobacco smoking was seen as compared to national average (2.9%) (23), was thought to be related to higher illiteracy among the study population. Within smoker's chronic cough, dyspnea were more common as compared to non-smokers, finding supported by Jindal SK *et al* (17) and Chhabra P *et al* (18). Environmental tobacco smoke (ETS) has been shown to result in respiratory morbidity as per literature (17, 24) but we could not find any such association. The difference in the findings was theorized as continuous exposure to ambient air pollution in the study may have masked the effect of ETS.

Conclusion

The current study found that respiratory morbidity was related to age, education status, socio economic status, type of house, duration of stay in an area with poor air quality, type of house biomass fuel exposure, presence of pet and tobacco smoking. Though other factors like poor domestic environmental conditions, absence of separate kitchen, type of fuel used for cooking, cooking duration and ETS which had been separately shown to effect respiratory health had not shown any association.

Recommendation

Due to high costs of LPG many women using mixed type of fuels revert back to biomass fuels for a few days every month to save money, provision of continuous supply of LPG at subsidized costs will discourage them to use biofuels. Government should invest on research and development to find out effective solutions for reducing vehicular density. Since health outcomes are determined by total exposure to air pollutants, a comprehensive cohort study need to be undertaken, to know the burden and combined effects of indoor air pollution and ambient air pollution in various parts of the country.

Limitation of the study

This was not a follow-up study; therefore, period prevalence and seasonal variation of the respiratory symptoms could not be derived. Nonspecific symptoms may be initial marker of health effects of air pollution but these were excluded due to difficulty & cost of carrying out multiple lab tests. Individual exposure to indoor air pollutants could not be measured due to financial constraints.

Authors Contribution

All authors have contributed significantly in this study.

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Tables

TABLE 1 RELATIONSHIP OF RESPIRATORY SYMPTOMS WITH THE SOCIO DEMOGRAPHIC PROFILE

Socio-demographic Factors	n	Chronic cough	Chronic Phlegm	Dyspnea	Wheeze
Age in years					
< 20	20	0(0)	3(15)	1(5)	1(5)
20-29	176	7(4)	4(2.3)	11(6.3)	6(3.4)

30-39	180	10(5.5)	5(2.8)	32(17.8)	2(1.1)
40-49	86	5(5.8)	0(0)	18(21)	3(3.5)
50-59	38	6(15.8)	0(0)	9(23.7)	1(2.6)
Education Status					
Illiterate	365	20(5.4)	6(1.6)*	59(16.1)	7(1.9)*
Primary school	48	3(6.2)	1(2.01)*	4(8.3)	5(10.4)*
Middle school	44	4(9.0)	1(2.2)*	4(9.0)	0(0)*
High school	27	0(0)	2(7.4)*	3(11.1)	0(0)*
Intermediate	11	1(9.0)	0(0)*	1(9.0)	1(9.0)8
Graduate/postgraduate	5	0(0)	2(40)*	0(0)	0(0)*
Socio economic status					
Upper	1	0(0)	1(100)*	0(0)	0(0)
Upper middle	18	2(11.1)	0(0)*	1(5.5)	1(5.5)
Lower middle	77	3(3.9)	4(5.2)*	17(22)	1(1.3)
Upper lower	346	19(5.5)	6(1.7)*	42(12.1)	10(2.9)
Lower	58	4(6.9)	1(1.7)*	11(19)	1(1.7)
Duration of stay (years)					
1-10	200	9(4.5)	4(2.0)*	20(10)*	3(1.5)
11-20	172	9(5.2)	8(4.6)*	24(13.9)*	4(2.3)
>20	128	10(7.8)	0(0)*	27(21)*	6(4.6)
Occupation					
Homemaker	201	8(4.0)	5(2.5)	30(14.9)	5(2.5)
Employed outside home	299	20(6.7)	7(2.3)	41(13.7)	7(2.7)
Total	500	28 (5.6)	12(2.4)	71(14.2)	13(2.6)
(Figures in brackets denote percentages)			*p < 0.05		

TABLE 2 RELATIONSHIP OF RESPIRATORY SYMPTOMS WITH THE ENVIRONMENTAL DETERMINANTS

Environmental factors	n	Chronic cough	Chronic Phlegm	Dyspnea	Wheeze
Type of House					
Kucha/kucha-pucca house	132	5(3.8)*	3(2.3)	27(20.4)*	3(2.3)
Pucca house	368	23(6.2)*	9(2.4)	44(12)*	10(2.8)
Other housing determinants					
Ventilation inadequate	491	11(2.2)	27(5.5)	71(14.5)	13(2.6)
Dampness present	192	13(6.8)	6(3.1)	33(17.2)	6(3.1)
Overcrowding present	493	26(5.2)*	12(2.4)	71(14.4)	13(2.6)
Presence of Pet	18	1(5.5)	0(0)	7(38.9)*	0(0)
Kitchen characteristics					
Separate kitchen**	77	1(1.3)	2(2.6)	16(20.8)	1(1.3)
Within the living room	423	27(6.4)	10(2.4)	55(13)	12(2.8)
Smoke outlet absent€	313	18(5.7)	7(2.2)	50(16)	8(2.6)
Exhaust absent€	369	21(5.8)	9(2.4)	57(18.4)	9(2.4)
Fuel type					
LPG	423	20(4.8)*	9(2.1)	61(14.4)	12(2.8)
Biomass fuel#	77	8(10.4)*	3(3.9)	10(13)	1(1.3)
Cooking duration					
< 2 hours	367	20(5.4)	7(1.9)	56(15.3)	7(1.9)
> 2 hours	133	8(6)	5(3.7)	15(11.3)	6(4.5)
Biomass Fuel Exposure Index (hour.years)					
No exposure or < 20	249	10(4.0)	7(2.9)	22(18.8)*	9(3.6)
20-40	152	9(5.9)	2(1.3)	34(22.4)*	1(0.6)
>40	99	9(9.1)	3(3.0)	15(15.2)*	3(3.0)
Smoking related factors					
Tobacco Smoking (self)	34	8(23.5)*	1(2.9)	6(17.6)*	18(52.9)
Presence of environmental tobacco smoke	175	10(5.8)	6(3.4)	26(14.8)	5(2.8)

** p< 0.05, ** includes separate and outdoor kitchen, # who used LPG + biomass fuel and/or only biomass fuel for cooking, € excluding outdoor kitchen.*