International Journal of Community Medicine and Public Health
Sreevishnu S et al. Int J Community Med Public Health. 2017 Mar;4(3):764-768
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20170755

Original Research Article

Association between passive smoking and respiratory illness: a case control study

Sreevishnu S., Jesha Mohammedali M.*, Sheela P. Haveri

Department of Community Medicine, MES Medical College, Perinthalmanna, Kerala, India

Received: 29 December 2016
Accepted: 03 February 2017

***Correspondence:**
Dr. Jesha Mohammedali M.,
E-mail: jesha_ali@yahoo.com

ABSTRACT

Background: The adverse effect of passive smoking on human health and quality of life is a debatable matter. There is high risk of respiratory illness among spouses of smokers due to exposure to passive smoke. The objective of present study was to find an association between second hand smoke exposure and risk of developing respiratory illness in the last six months among married women aged 20 years and above and currently living together.
Methods: A case-control study was conducted during a 6-month period (January to June 2016) among married women aged 20 years and above, who have been currently living with their husband for at least past two years in Perinthalmanna. Women with known respiratory disease such as bronchial asthma and tuberculosis were excluded. The sample size was calculated to be 87 cases and 87 controls. The cases were selected from the out-patient department of MES Medical College, Perinthalmanna, Kerala, India. The controls were selected from ward 28, Perinthalmanna. From each house only one female was interviewed.
Results: The major symptoms in the cases were headache (35%), morning cough (34%) and chest pain (25%). The odds of having a respiratory illness when the husband is a smoker is 1.527 (95% C.I. 0.804 to 2.899) and the odds ratio increases to 4.7 (95% C.I.2.11 to 10.86) if the husband smokes at home.
Conclusions: The study showed that the risk of having respiratory illness is higher in females when the husband is a smoker and the risk increases four times if the husband smokes at home.

Keywords: Case control study, Passive smoking, Respiratory illness, Second hand smoking, Spouses

INTRODUCTION

Passive smoking is exposure to a mixture of smoke exhaled by smokers and smoke released from the smoldering cigarettes, cigars, pipes, beedis etc. Second hand tobacco smoke consists of both gases and particulates which change as they get diluted and distributed in the environment with time. Passive smoking can damage your body as second hand smoke contains more than 4000 chemicals, many of which are irritants and toxins and some are even known to cause cancer.[1]

Second hand smoke (SHS) affects the heart and blood vessels, increasing the risk of heart attack and stroke in non-smokers. Some studies have linked SHS to mental and emotional changes too. Association between involuntary inhalation of cigarette smoke and increased number of various respiratory diseases, both in children and adults have been documented in many studies.[2-3] Inhaling SHS causes acute irritation in the upper and lower (to a lesser extent) airways of even healthy people. The condition worsens for those with existing airway problems. A study conducted in New Mexico, USA showed passive smoking as a risk factor for COPD among non-smokers. There are growing evidence

suggesting that passive smoking is a risk factor for adult onset asthma and COPD, although the magnitude of association is small.[3] There are many studies reporting deleterious effects on heart and lung.[4-5] There is growing evidence that exposure to SHS increases risk of developing lung cancer. People who have never smoked but live with a smoker have 30% more risk of developing lung cancer.[1] The effect of passive smoking on chronic respiratory symptoms have also been studied and is debatable with few studies showing a significant association[6-10], while some others studies showed no association.[11-14]

The concentration of respirable particles maybe elevated substantially in closed spaces. Nicotine concentration in the air in homes of smokers typically range from 2 to 10 micrograms/m^3 Hence women and children are the ones who are affected the most, as shown in many studies in India and other countries.[15-20] A study done in a rural community in Islamabad showed an association between passive smoking and respiratory symptoms among married women.[2] Females are the ones who suffer more from passive/second hand smoke exposure as they don't have any say in this matter. This study intends to identify their risk for respiratory illness due to passive smoking.

Hypothesis

There is high risk of respiratory illness among spouses of smokers due to exposure to passive smoke.

Objectives

To study the association between second hand smoke exposure and risk of developing respiratory illness in the last six months among married women aged 20years and above and currently living together in Perinthalmanna, Kerala.

METHODS

It was a case control study conducted for a period of 6 months, January to June 2016.

Study Setting

Cases

Outpatient Department (OPD) of MES Medical College Hospital, Perinthalmanna, Kerala, India.

Controls

Ward 28 of Perinthalmanna Municipality, Kerala, India.

Study population

Married women aged 20years and above who have been living with their husband for at least past two years.

Women with known respiratory disease such as Bronchial asthma and history of tuberculosis were excluded from the study.

Sample size

The sample size was calculated using "Statclac Epi Info", taking the symptom "cough" as the reference, with odds ratio 2.4 from the study done in Islamabad.2 The percentage of controls exposed in the study was 46%, hence the sample size was calculated to be 87 cases and 87 controls at 95% C.I and at 80% power.

Sampling technique

Cases

87 consecutive patients with respiratory illness attending the General medicine and Respiratory medicine OPD between 9am to 1pm during the study period.

Controls

First house was selected randomly from ward 28, Perinthalmanna and from each house the first married women (meeting the inclusion-exclusion criteria) we met without respiratory illness was enrolled. Consecutive houses were visited till the required sample size was attained.

Working definition

Respiratory illness in spouses was defined as having any one of the following symptoms in last 6 months. Women with any two or more of the symptoms given below were enrolled as cases.

- Rhinorrhea
- Nasal irritation
- Headache
- Cough at night/morning
- Wheezing
- Morning tightness on chest
- Chest pain
- Dyspnea on exertion
- Chronic Pharyngitis
- Dysphonia
- Ear ache
- Hemoptysis

Passive smoking exposure was defined as living in the house with husband who has been smoking for at least past two years. A smoker is defined as a person who smokes more than 5 cigarettes a day.

Study tool

A pre-designed pre-tested semi-structured questionnaire was used to elicit details about respiratory illness within

last six months and exposure to passive smoke inside the house in the past two years.

Ethical concerns

Informed written consent was taken from the participants. Institutional Ethical Committee approval was obtained.

Statistical analysis

Data was entered in microsoft excel and analyzed using Epi info. Association between exposure and risk of respiratory illness was expressed in odds ratios. Univariate analysis, chi-square test and regression analysis were also done.

RESULTS

The cases and controls were similar with respect to age distribution, educational qualifications, occupational status and socio economic status (Table 1). Most of the participants in the case group (39.1%) and control group (46%) were educated up to high school. Majority in both groups were home makers. Most in both groups belonged to class III socio economic status (as per BG PRASAD's classification).

Table 1: Baseline characteristics.

Baseline variables	Cases (N=87)	Controls (N=87)	*p value*
Age distribution	38.62±12.4	38±10.4	0.399
Education	**n (%)**	**n (%)**	**p value**
Less than primary	7 (8)	4 (4.6)	0.055
Primary school	12 (13.8)	8 (9.2)	
Secondary school	24 (27.6)	20 (23.0)	
High school	34 (39.1)	14 (46.0)	
College	11(11.4)	15 (17.2)	
Occupation	**n (%)**	**n (%)**	**p value**
Professional	2 (2.3)	3 (3.4)	0.333
Semi-profession	1 (1.1)	4 4.6)	
Skilled worker	3 (3.4)	3 (3.4)	
Semi-skilled worker	1(1.1)	2 (2.3)	
Unskilled	6 (6.9)	4 (4.6)	
Students	4 (4.6)	0 (0)	
Home maker	70 (80.5)	71 (81.6)	
Socioeconomic classification	**n (%)**	**n (%)**	**p value**
SES class I	1 (1.1)	1 (1.1)	0.725
SES class II	18 (20.7)	17 (19.5)	
SES class III	38 (43.7)	39 (44.8)	
SES class IV	25 (28.7)	24 (27.6)	
SES class V	5 (5.7)	6 (6.9)	

The major symptoms experienced by the cases were headache (35.5%) followed by cough (34.5%) and chest pain (25.3%). Symptoms like chest pain, morning tightness of chest, Rhinorrhoea, nasal irritation and dysphonia showed a significant risk when the husband smokes at home (Table 2).

Table 2: Pattern of symptoms in Cases (n=87) (multipleresponse).

Symptoms	n (%)	Husband smoker Odds ratio (95% C.I)	Husband smokes at home Odds ratio (95% C.I)
Headache	31 (35.5)	1.00 (0.43 to 2.30)	1.79 (0.76 to 4.21)
Cough at night/morning	30 (34.5)	0.59 (0.23 to 1.47)	1.56 (0.65 to 3.75)
Chest pain	22 (25.3)	2.37 (0.96 to 5.88)	2.70 (1.05 to 6.89)
Dyspnea on exertion	18 (20.7)	0.38 (0.10 to 1.40)	1.79 (0.62 to 5.13)
Rhinorrhea	16 (18.4)	1.29 (0.44 to 3.76)	3.93 (1.37 to 11.29)
Nasal irritation	15 (17.2)	4.91 (1.59 to 15.16)	6.19 (2.05 to 18.70)
Earache	15 (17.2)	0.45 (0.12 to 1.67)	2.18 (0.74 to 6.44)
Wheezing	10 (11.5)	0.50 (0.10 to 2.48)	0.82 (0.16 to 4.07)
Chronic Pharyngitis	9 (10.3)	1.73 (0.44 to 6.74)	2.86 (0.73 to 11.23)
Morning tightness on chest	8 (9.2)	3.75 (0.86 to 16.32)	6.23 (1.42 to 27.38)
Dysphonia	4 (4.6)	2.14 (0.29 to 15.65)	10.78 (1.09 to 106.7)
Haemoptysis	1 (1.1)	0.99 (0.97 to 1.00)	0.99 (0.97 to 1.00)

Husband being a smoker was seen more in the case group (36.8%) and majority were smoking at home (96.8%). Other house members smoking at home was more in the case group (26.4%). Firewood users with chimney and without chimney were similar in cases and controls.

Table 3: Variables related to passive smoke exposure.

Variables related to passive smoke	Cases (N=87)	Controls (N=87)
Husband smoker	32 (36.8)	24 (27.6)
Husband smoking at home (n=husband smoker)	31 (96.8)	9 (37.5)
Other members smoking at home	23 (26.4)	3 (3.4)
Firewood with chimney	6 (6.9)	13 (4.9)
Firewood without chimney	61 (70.1)	58 (66.7)
No LPG	21 (24.1)	18 (20.7)

In univariate analysis, the odds for having respiratory illness if the husband is a smoker was 1.527 (0.804 to 2.899). And the odds increased 3 times if the husband smoked inside the house 4.728 (2.114 to 10.86). The odds further increased to 6.917 (1.859 to 24.740) when other family members also smoked inside the house (Table 4).

Table 4: Risk analysis.

Univariate analysis	p value	Odds ratio	95% C.I.	
			Upper	Lower
If husband is a smoker	0.194	1.527	0.804	2.899
If the husband smokes at home	0.008	4.728	2.110	10.86
if any other family member smoked in home	0.001	6.917	1.859	24.740
Multivariate analysis	**p value**	**Odds ratio**	**95% C.I.**	
			Upper	**Lower**
If husband is a smoker	0.255	0.836	0.306	2.284
If the husband smokes at home	0.009	5.481	1.520	19.764
if any other family member smoked in home	0.004	9.582	1.524	60.232

The Binary logistic regression model was adjusted for factors such as age, education, occupation, socioeconomic status, firewood use and type of fuel used. Smoker husband, husband and/or other member smokes at home were adjusted as per condition. The model had an R2 value of 0.261 (Cox and Snell R square). After adjusting the odds increased for both husband smoking at home to 5.481 (1.520 to 19.764) and other family members smoking at home increased to 9.582 (1.524 to 60.232) (Table 4).

DISCUSSION

In the present study, the two major symptoms seen were headache (35.5%) and cough (34.5%) similar to the Islamabad study done in a rural community, where the two major respiratory symptoms that were found to be associated with passive smoking were sinusitis and cough.[2]In an Italian study dyspnoea and rhino-conjunctivitis was the most frequently reported condition.[21]

The odds for having respiratory illness if the husband is a smoker was 1.527 (0.804 to 2.899) and the odds ratio increased to 4.7 (2.11 to 10.86) if the husband smokes at home. On multivariate analysis, we found a significant association between husband smoking in the house and respiratory illness (adjusted odds 5.481). This finding was similar to Islamabad study where an association between passive smoking and respiratory symptoms among married women was seen. A significant association was found between passive smoking and respiratory symptoms in many studies,[6-10] while many reported no such association.[11-14] The effect of SHS in non-smokers married to smokers was found to be 1.41 to 1.87 compared to those married to non-smokers according to the National Research Council.[22]

Here symptoms like chest pain (2.70; 95%CI 1.05 to 6.89), morning tightness of chest (6.23; 95%CI 1.42 to 27.38), rhinorrhea (3.93; 95%CI 1.37 to 11.29), nasal irritation (6.19; 95%CI 2.05 to 18.70) and dysphonia (10.78; 95%CI 1.09 to 106.7) showed significant risk when the husband smokes at home. In the Islamabad study the odds of sinusitis was 2.2 (1.3 to 3.5) and cough 2.4 (1.2 to 4.8).[2]In an Italian study dyspnoea showed an odds of 1.24 (0.97-1.58), rhino-conjunctivitis had odds 1.29 (1.06 to 1.57), shortness of breath at rest 1.41 (1.03 to 1.93) and cough with odds of 1.29 (1 to 1.66).[21] In a population based cross sectional study done in Singapore, exposure to one or more smokers at home was weakly associated with allergic rhinitis having an odds ratio 1.43 (.094 to 2.18).[23] Similar results have been shown in study done in France, where there was reduction in lung function of the women exposed to SHS.[24] According to surgeon general report, there is sufficient evidence to infer a causal relationship between second hand smoke exposure and nasal irritation. The evidence is suggestive but not sufficient to infer a causal relationship between second hand smoke exposure and acute respiratory symptoms including cough, wheeze, chest tightness, and difficulty breathing among healthy persons.[25]

CONCLUSION

The study showed that the risk of having respiratory illness is higher among females when the husband is a smoker and the risk increases three times if the husband smokes at home.

Recommendations

Since adverse effects of passive smoking on human health and quality of life, have been ascertained there is a need to promote awareness about the risks associated with passive smoking.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. CDC's Office on smoking and health. smoking and tobacco use; fact sheet; health effects of cigarette smoking. Centers Dis Control Prev. 2015.
2. Hammad M, Atta K, Manzoor M, Tariq M, Saeed Z, Masood Z, et al. Association of passive smoking with respiratory symptoms and clinical correlates, among married women, in a rural community in Islamabad. J Pak Med Assoc. 2010; 60(7):601-4.

3. Coultas DB. Passive smoking and risk of adult asthma and COPD: an update. Thorax. 1998;53(5):381-7.
4. Fischer F, Kraemer A. Meta-analysis of the association between second-hand smoke exposure and ischaemic heart diseases, COPD and stroke. BMC Public Health. 2015;15(1):1202.
5. Sieminska A, Olszewska A. The influence of passive smoking on the respiratory tract. Przegl Lek. 1997;54(5):353-5.
6. White JR, Froeb HF. Small-airways dysfunction in non-smokers chronically exposed to tobacco smoke. N Engl J Med. 1980;302:720.
7. Kauffmann F, Tessier JF, Oriol, P. Adult passive smoking in the home environment; a risk factor for chronic airflow limitation. Am J Epidemiol. 1983;117:269.
8. Brunekreef B, Fischer P, Remijin B, Van Der Lende R, Schouten J, Quanjer P. Indoor air pollution and its effect on pulmonary function of adult non-smoking women. III passive smoking pulmonary function. Int J Epidemiol. 1985;14:227.
9. Svendsen IC, Kuller LH, Martin MJ, Ockene JK. Effects of passive smoking in the multiple risk factor intervention trial. Am J Epidemiol. 1987;126:783.
10. Kauffmann F, Dockery DW, Speizer FE, Ferris BG Jr. Respiratory symptoms and lung function in women with passive and active smoking. Am Rev Respir Dis. 1986;133:A157.
11. Schilling RSF, Letai AD, Hui SL, Beck GJ, Schoenberg JB, Bouhuys A. Lung function, respiratory diseases, and smoking in families. Am J Epidemiol. 1977;106:274.
12. Comstock GW, Meyer MB, Helsing K, Tockman MS. Respiratory effects of household exposures to tobacco smoke and gas cooking. Am Rev Respir Dis. 1981;124:143.
13. Kentner M, Triebig G, Weltle D. The influence of passing smoking on pulmonary function- a study of 1,351 office workers. Prey Med. 1984;13:656.
14. Jones JR, Higgins IT, Higgins MW, Keller JB. Effects of cooking fuels on lung function in non-smoking women. Arch Environ Health. 1983;38:219.
15. Tejero MA, Trullen PA, Garcia CR, Sanchez GN, Bravo CMJ. Exposure to environmental tobacco smoke at home increases the need for medical attention for respiratory diseases in childhood. An Pediatr. 2007;66(5):475-80.
16. Helsing KJ, Comstock GW, Meyer MB, Tockman ML. Respiratory effects of household exposures to tobacco smoke and gas cooking on non-smokers. Environ Int. 1982;8(1-6):365-70.
17. Ng TP, Hui KP, Tan WC. Respiratory symptoms and lung function effects of domestic exposure to tobacco smoke and cooking by gas in non-smoking women in Singapore. J Epidemiol Comm Health. 1993;47(6):454-8.
18. Mishra V, Smith KR, Retherford RD. Effects of cooking smoke and environmental tobacco smoke on acute respiratory infections in young Indian children. Popul Environ. 2005;26(5):375-96.
19. Gordon SB, Bruce NG, Grigg J, Hibberd PL, Kurmi OP, Lam K, et al. Respiratory risks from household air pollution in low and middle income countries. The Lancet Respiratory Medicine. 2014;2(10):823-60.
20. Baker RJ, Hertz-Picciotto I, Dostál M, Keller JA, Nožička J, Kotěšovec F, et al. Coal home heating and environmental tobacco smoke in relation to lower respiratory illness in Czech children, from birth to 3 years of age. Environ Health Perspect. 2006;114(7):1126-32.
21. Simoni M, Baldacci S, Puntoni R, Pistelli F, Farchi S, Lo Presti E, et al. Respiratory symptoms/diseases and environmental tobacco smoke (ETS) in never smoker Italian women. Respir Med. 2007;101(3):531-8.
22. Smoking NRC (US) C on P. Environmental Tobacco Smoke [Internet]. Environmental tobacco smoke: measuring exposures and assessing health effects. 1986. Available from: http:// www.ncbi.nlm.nih.gov/ pubmed/ 25032469
23. Ng TP, Tan WC. Epidemiology of chronic (perennial) rhinitis in Singapore: prevalence estimates, demographic variation and clinical allergic presentation. Ann Acad Med Singapore. 1994;23(1):83-8.
24. Kauffmann F, Dockeryt DW, Speizer FE, Jr BGF. Respiratory symptoms and lung function in relation to passive smoking: a comparative study of American and French women. Iran J Public Health. 1989;18(2):334-44.
25. Department of Health and Human Services. The health consequences of involuntary exposure to tobacco smoke a report of the surgeon general. Public Health. 2006.

Cite this article as: Sreevishnu S, Mohammedali JM, Haveri SP. Association between passive smoking and respiratory illness: a case control study. Int J Community Med Public Health 2017;4:764-8.