



Original Research Article

## Association of Environmental Tobacco Smoking with Pulmonary Functions among Pregnant Women: A Prospective Cohort Study

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Received: 23/01/2014

Revised: 18/02/2014

Accepted: 24/02/2014

### ABSTRACT

**BACKGROUND:** Environmental tobacco smoking is the exposure of a nonsmoker to tobacco smoke in the environment. Prolonged exposure to Environmental tobacco smoking during pregnancy significantly increases the risk for pregnancy & also fetal life. During pregnancy maintaining pulmonary status is of great importance & this was shown to be associated with significantly affect pulmonary function.

**OBJECTIVE:** To determine the effect of environmental tobacco smoking on pulmonary functions in 2<sup>nd</sup> trimester pregnant women.

**PURPOSE:** To highlight the hazardous effect of environmental smoking among pregnant women thereby creating awareness in general population in order to minimize unwanted outcomes in pregnancy.

**METHODS:** The study included 100 pregnant women & divided into two groups- Group A involved 50 individuals who were not exposed to environmental smoking and Group-B who were exposed to it.

**RESULT:** Significant difference was got in FVC, FEV<sub>1</sub>, FEV<sub>1</sub>/FVC, PEFR and Rate of perceive exertion scale between both the groups.

**CONCLUSION:** The study shows that pulmonary functions were affected among ETS exposed pregnant women compare to non exposed pregnant women.

**KEY WORDS:** Environmental Tobacco Smoking, Pregnant Women, Pulmonary functions.

### INTRODUCTION

Environmental tobacco smoking (ETS) is define as inhalation of smoke in the form of either exhale by smoker or released as side stream smoke from the burning cigarette. <sup>(1, 2)</sup> It is also known as passive smoking, involuntary smoking or second hand smoking. <sup>(1, 3)</sup> Among both the types of smoking, side stream smoke consider as more injurious compare to mainstream smoke, because it contains about 85% of the smoke present in the room and many

potentially toxic gases in higher concentrations. <sup>(2,4,5)</sup> According to WHO due to ETS annually six lakh death occurs world widely. <sup>(6)</sup> Prevalence of passive smoking in India is 52% in adults, and in women its higher than men. <sup>(7)</sup>

Pulmonary status of women during pregnancy is of great importance. Their efficacy should be assessed for both maternal & fetal well being. <sup>(8)</sup> The effects of smoking is numerous on pregnant women and their developing fetus and it remain

with the fetus for the rest of life. <sup>(1)</sup> Exposure of ETS during pregnancy may lead to unsuccessful pregnancy outcome or in newborns poor physiological, sensory, motor and attention responses. <sup>(8-10)</sup>

There is a biological plausibility that ETS can affect the pulmonary functions similar to the effects of active smoking. <sup>(5)</sup> ETS significantly affects Spirometric indices (Forced vital capacity (FVC), Forced expiration volume in one second (FEV<sub>1</sub>), FVC/FEV<sub>1</sub> ratio and Peak expiratory flow rate) in pregnant women. <sup>(5,8,9,11)</sup>

Occasionally the adverse health effects of ETS have been studied in developing and underdeveloped countries. Most of the studies from India are on the pulmonary effects of ETS done over healthy school going children and adult women. <sup>(5)</sup> In the study conducted by Goel P. et al, examined the effects of exposure to ETS on the maternal and fetal outcome in pregnancy, but not over the pulmonary function. <sup>(3)</sup> So, this study is focusing on to see the effect of ETS over pulmonary function during pregnancy.

## MATERIALS AND METHODS

A prospective cohort study was conducted among 100 healthy 2nd trimester pregnant women between 20-32 years of age for excluding age related complications; delivering singleton live baby & sign consent form were included in the study. Women with pre eclampsia, still birth, anemia, cognitive dysfunction, any systemic diseases and more than 3 parity were excluded.

After getting ethical clearance from C.U. Shah Physiotherapy institutional ethical committee, the study was conducted at Cardio pulmonary OPD at C.U. shah hospital Campus during the period of April to December 2013. Participant were collected at obstetrics & gynecology department through the method of sample of

convenience. The selected group participants were identified through the assessment of WHO smoking questioners. Participants who found prone to ETS were assigned in group B & the participants who found no related factors to ETS through the questioners were assigned in Group A.

Spirometric measurements included FVC, FEV<sub>1</sub>, FEV<sub>1</sub>/FVC & PEFR were taken in seated position through the computerized spirometer (SCHILLER). (As shown in Figure 1) RPE was measured through the six minute walk test.

All the measurement values were taken for both the groups by the well trained physiotherapist according to ATS guideline.



Figure: 1. Patient performing PFT.

## Statistical Methods

Obtained data were analyzed by using Z test for comparing FVC, FEV<sub>1</sub>, FEV<sub>1</sub>/FVC ratio, peak expiratory flow rate and RPE values between Group A & B at significant level of p<0.05. Descriptive analysis was used to calculate Mean and Standard deviation.

## RESULTS

Table: 1. Demographic Detail.

Groups	Age (yrs)	Height (cm)	Weight (kgs)	BMI (kg/m <sup>2</sup> )
Group A	27.28±4.78	157.02±15.52	61.66±7.52	25.015
Group B	27.48±4.40	156.59±15.07	61.3±6.33	24.55
P value	0.19	0.7	0.52	0.42

Demographic details shown both the groups were homogenous (age, height, weight,

BMI, gender) at significance level of 5%.

(As shown in Table 1)

Table: 2 Comparing Group A & B.

PARAMETER	GROUP A MEAN	GROUP A SD	GROUP B MEAN	GROUP B SD	Z VALUE	P VALUE
FVC (Liters)	2.49	0.230	2.11	0.236	-8.46	0.000
FEV1(Liters)	2.31	0.262	1.99	0.115	-8.20	0.000
FEV1/FVC (%)	92.16	0.505	87.39	1.079	-29.06	0.000
PEFR(Liters/second)	5.32	0.400	4.01	0.327	-18.12	0.001
RPE	7.34	1.002	11.30	1.644	14.55	0.003

All outcome measures followed normal distribution curve. So, parametric Z test was done to analyze all parameters between group A and B ( $p < 0.05$ ). P values for FVC (Liters), FEV1 (Liters) & FEV1/FVC (%) were 0.000, indicated highly significant difference between both the groups A & B. Comparison of P value for PEFR (Liters/second) (0.001) & RPE (0.003) of both the groups, shown significant difference. ( $p < 0.05$ ) Mean values of both groups for PFT parameter has shown more reduction in group B compare to group A, while RPE value is higher indicates that breathlessness more affect group B compare to group A. (As shown in Table 2)

## DISCUSSION

Pulmonary status of women is very important during pregnancy. Physiological changes during pregnancy disturb normal pulmonary functions. Smoking during pregnancy is recognized as the most important preventable risk factor. Any form of smoking either active or passive having negative influences on pulmonary functions. Their efficacy in pregnant women should be assessed for maternal as well as fetal well being. (8, 9, 12-14)

In 1<sup>st</sup> & 2<sup>nd</sup> trimester the lung functions are relatively normal, while in 3<sup>rd</sup> trimester the pulmonary function gets compromised. (8) In this study for excluding this physiological changes, pregnant subjects with 2<sup>nd</sup> trimester were only included.

Result of this study shows significant difference among group A & B for all the PFT parameters. ( $p < 0.005$ ) while comparing the mean values indicating that FVC, FEV<sub>1</sub>, FEV<sub>1</sub>/FVC & PEFR values were more decrease among Group B compare to A. These are strongly supported by study of Mohammad-Reza et al, conducted on 163 men & 108 women & concluded that because of ETS significant reduction noted in FVC, FEV<sub>1</sub>, FEF<sub>25-75%</sub> & adversely affects pulmonary function of adults. Studies done by Frank D et al & others also concluded that ETS during childhood and utero exposure to maternal smoking were associated with adverse effects on lung growth and development & reduced PEFR, FEF<sub>75</sub> & FEV<sub>1</sub> values. (10, 14-16)

Jaakkola and colleagues examined the relationship between exposure to ETS and development of dyspnea, in a 117 subjects who had never smoked and who were reexamined eight years later. A significant increase in the risk of developing dyspnea was observed in connection with ETS exposure. (17) In this study RPE was taken as one of the outcome measure & RPE values were less among group A subjects. That shows that complain of breathlessness is more common among group B. This study indicated that due to ETS pulmonary functions were more affected during pregnancy. These result was supported by a study conducted by D Gupta et al, on 50 healthy non smoker women & concluded that ETS can lead to a poor lung function, small airway dysfunction, and increased

bronchial hyper-responsiveness in asymptomatic nonsmokers. (5)

Though various studies were there in discussing the ETS & its effects on pulmonary functions among various individuals, for the 1<sup>st</sup> time the present study focuses only on the pulmonary functions of pregnant women through this it intended to highlight the hazardous effect of ETS among pregnant women thereby creating awareness in general population in order to minimize unwanted outcomes. Due to lack of feasibility randomized control trial with large sample size was not possible. Further study can be done to see the effect of ETS other than pulmonary functions & can be check effect of any treatment which can reduce the hazardous effects of ETS.

## CONCLUSION

Environmental tobacco smoking affects the pulmonary functions of the individuals, where it gets more involved in pregnant women. This study results also concluded that ETS affected participants found more decreased in pulmonary functions.

## ACKNOWLEDGEMENT

We acknowledge the immense help received from the scholars whose articles are cited & included in references of this manuscript. We are also grateful to authors/ editors/ publishers of all those articles, journals & books from where the literature for this article has been reviewed & discuss.

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How to cite this article: Chaiti J, Shanmugunanth E, Nambi G et. al. Association of environmental tobacco smoking with pulmonary functions among pregnant women: a prospective cohort study. Int J Health Sci Res. 2014;4(3):78-82.

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