

ENVIRONMENTAL TOBACCO SMOKE (ETS) AMONG PREGNANT WOMEN VISITING PRIMARY HEALTH CARE (PHC) IN MAKKAH

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ABSTRACT

Background: Passive smoking is defined as involuntary exposure to environmental tobacco smoke¹. Passive smoking, environmental tobacco smoke (ETS) or second hand smoke (SHS) all carry the same meaning. The problem of passive smoking in pregnancy remains underappreciated by both healthcare workers and the public. It is important to detect SHS among pregnant ladies and educate the women about it during the antenatal care visit which may lead to better outcome on future babies and it is found that there are limited researches in Saudi Arabia to assess SHS among pregnant women.

Aims & Objective: To assess the prevalence, associated factors and knowledge of ETS exposure among Saudi pregnant women in Makkah.

Materials and Methods: Cross sectional study was carried out among primary health care centers (PHC), Makkah region, in Saudi Arabia in 2012. A sample of 400 participants was selected randomly. The tool of the study was self-administered questionnaire.

Results: The prevalence of passive smoking among studied population was 45.8% and the associated significant factors were smoker husbands, low education, low income, resident in governmental houses and lack of knowledge about passive smoking hazards.

Conclusion: This study revealed that prevalence of SHS among pregnant women was relatively in the average as compared to reported rates in other non-Saudi population. This study raised the importance of education about passive smoking hazards and their implication on occurrence of SHS among pregnant ladies. Both pregnant women and their husbands are in need for educational programs regarding passive smoking hazards.

Key Words: Environmental Tobacco Smoke; Passive Smoking; Pregnancy; Saudi Arabia

Introduction

Passive smoking is defined as involuntary exposure to environmental tobacco smoke.^[1] Passive smoking, environmental tobacco smoke (ETS) or second hand smokes (SHS) all carry the same meaning. The problem of passive smoking in pregnancy remains underappreciated by both healthcare workers and the public. Many pregnant women know that their own cigarette smoking may have ill effects on the fetus, but limited information is available to pregnant women on the potential harm of their inhaling the cigarette smoke of others.^[2]

Meconium analysis indicated that nicotine metabolite concentrations in infants of passive smokers are not significantly different from those in infants of active light smokers.^[3] However, passive smoking affect both the mother and the fetus. These highlight the fact that passive exposure to ETS causes result similar to smoking.^[1,4-6] Fetal exposure to tobacco smoke may therefore be substantial even as a result of maternal passive smoking.^[2]

There is strong evidence to indicate that active smoking

during pregnancy is associated with increased risk of preterm labor, intrauterine growth retardation, premature rupture of membranes, placental abruption, and placenta praevia. All of which, carry a high risk of prenatal loss.^[1] Also ETS increase sudden infant death syndrome^[2], and has been linked to increase asthma symptoms among children^[7]. A metanalysis published in 2009 showed that passive smoking is associated with reduced fetal weight.^[8]

Not only are most of the constituents of main stream smoke also present in the side stream smoke but some of the cytotoxic substances and poisonous gases such as nicotine, benz(a)pyrene, carbon monoxide and carbon dioxide are 2-10 times higher in the side stream smoke. Which component of tobacco smoke contributes to the reduction in fetal birth weight is not clear but it is believed that nicotine and carbon monoxide cause uteroplacental vasoconstriction. In addition, carboxyhemoglobin (carbon monoxide having strong affinity for fetal haemoglobin) reduces the delivery of oxygen load to fetal tissue.^[1]

In UK, Dominique, et al.^[2] conducted a study on 113 women attending a public antenatal clinic, 81 women

were exposed to passive smoking during pregnancy (72%). In 2007, a large study included 18297 children born in UK in 2000-2001 showed that 13% of UK infants were exposed to environmental tobacco smoke (ETS) and 36% to maternal smoking antenatal and that ETS exposure lowers infants' birth weights.^[9] Another study carried out in Poland in 2004 showed the prevalence of passive smoking during pregnancy in 2 cities (Wroclaw and Opole) as 25.5% and 16.4 % respectively.^[10] In Spain, a study of 775 adult non-smokers (years 2004–2005) showed that 75% of them were exposed to ETS.^[11] An investigative survey of women in 9 developing nations included 7961 pregnant women showed that second hand smoke (SHS) exposure was common: between 91.6% (Pakistan) and 17.1% (Democratic Republic of the Congo).^[12]

In Saudi Arabia (SA), reports of the prevalence of active smoking varied from different studies. A study included 8310 persons in three regions of SA showed that the prevalence of current smoking was 21.1% for males and 0.9% for females.^[13] WHO reported that the overall prevalence of smoking in Saudi Arabia between (1996 - 2001) was 13.4%. In males, it was 19.1%, and in females, it was 8.3% and in the male youth, it was 20.2%.^[4]

The prevalence of passive smoking among pregnant women is not well known, but in a study done in Riyadh by Rashid et al. in 2003, the prevalence was 54% among pregnant women.^[1] Educational strategies are required, in order to implement the recommendations that pregnant women should be aware of and know all hazards of ETS on herself and her baby to reduce the risk of complications. Such strategies are particularly important in the KSA as the incidence of ETS is high, and the complications are not known by the society. In addition, smoke free areas are needed and especially for pregnant ladies.

This study aimed to assess the prevalence, associated factors and knowledge of ETS exposure among Saudi pregnant women in Makkah, Saudi Arabia.

Materials and Methods

This is a cross sectional study conducted in Makkah. It is considered as the Islam's most sacred city. It is located at the West of Saudi Arabia. It is located in the Mecca Province of Saudi Arabia. It has a population of 1700000 (2007 census). This study was conducted at antenatal care (ANC) clinics in primary health care (PHC) centers

in Makkah.

The study population consists of all pregnant Saudi females visiting antenatal care (ANC) clinics in PHC center in holy Makkah, during 2013. The estimated number of the population is 6934. This figure was obtained from the following facts: The number of deliveries in 2006 at Ministry of Health was 14753, 45% were excluded as not followed on PHC centers, 8% were excluded as non-Saudi.^[14]

Using EPI info version 7 (stat calc – epi calculator), the sample size of the population was determined from the following data: Size of population from which the sample was selected (pregnant female, non-smoker, and fellow ANC in Makkah in 2013) are estimated to be 6934. Expected frequency of having ETS exposure is 54%.^[15] Worst acceptable result is 59%. Using 95% confidence interval, the sample size was founded to be 362 pregnant women. In order to account for non-response and achieve reliable and precise result, we increased the sample size to 400 pregnant women.

In Makkah, there are 74 PHC centers.^[14] Four PHC centers were randomly selected by multistage random sampling technique. In the first stage, Makkah was divided into four regions North, South, East and West. In the second stage, by simple random method, one PHC center was chosen from each region. In the last stage, from each recruited PHC center, which had been chosen, 100 participants were chosen to get a total of 400 participants.

The minimum frequency of ANC clinics was twice per week. Ten participants from each ANC clinic were invited to participate in the study. Every second or third participant depends on the total number attending the clinic on that day. So we got from 4 centers 80 pregnant per week. Over 5 working weeks we got our required sample.

A pre-designed Arabic self-administered questionnaire was given to all participants. The questionnaires were distributed by trained nurses of the same clinic. The participants answered the questionnaires in the waiting room. It consists of three sections. The first section inquires about the socio-demographic data of the pregnant women. The second section assesses the prevalence of ETS exposure and the associated factors. The third section is to explore their knowledge regarding ETS exposure and its complication on both them and on

pregnancy.

The questionnaire was given to four consultants of different specialties (family medicine, community medicine, pediatrics and obstetrics & gynecology) who are experts and having interest regarding the subject and some corrections were done.

A pilot study was done on 20 pregnant females from one of the selected PHC centers. The pilot study helped to test the understanding of the participants of the questionnaires and correcting them accordingly, select the relevant variables suitable for the statistical methods to be used, determine the time needed to answer questionnaire (average 8 minutes) and giving an actual situation of the main study.

The study proposal has been approved by the Regional Research and Ethics team in Taif Armed forces Hospitals. Written consent was obtained from each PHC center administration before starting the study. The aim of the study was explained to them. Leaflets and posters about the hazards of the ETS exposure were distributed to the pregnant ladies after collecting the questionnaire. Consent was obtained from each participant to voluntarily participate in the study.

Statistical Package for Social Sciences (SPSS) software version 19.0 was used for data entry and analysis. Descriptive statistics (e.g. number, percentage, range, standard deviation, arithmetic mean and median) and analytic statistics (chi Square tests (χ^2) to test for the association and/or the difference between two categorical variables) were applied. P-value equal or less than 0.05 was considered statistically significant.

Results

Table 1 shows that age of the studied participants ranged between 15 and 47 years with a mean of 28.96 (\pm 7.54 SD) years. Almost 40.8 % of them had secondary education, followed by 29.5 % had intermediate education whereas 23% of them were university educated. More than 70 % of the participants were house wives, 16.5 % were students and 8.3 % were teachers. About 76 % of the participants have enough income but cannot save, 18 % have enough income and can save. About 70 % of the participants had rented houses compared to 23.3% had owned houses and 6.3% had governmental houses. The range of pregnancy number including abortion was 1 to 12 with a median of 3

pregnancies while number of deliveries ranged from 0 to 11 with a median of 2 deliveries. The abortion number ranged between 1 to 7 abortions. The current mean gestational age was about 5 months.

Table-1: Socio-demographic characteristics of the studied population

Variable	Value	
	Mean (\pm SD)	Median
Age (Years)	28.96 (\pm 7.54)	28
		15 - 47
		9 (2.3)
Education; N (%)	Do not read \ write	18 (4.5)
	Primary school	118 (29.5)
	Intermediate	163 (40.8)
	Secondary	92 (23)
Job; N (%)	University and above	284 (71)
	House wife	33 (8.3)
	Teacher	66 (16.5)
Income; N (%)	Student	17 (4.3)
	Other	72 (18)
	Enough and save	303 (75.8)
House; N (%)	Enough but not save	25 (6.3)
	Not enough	93 (23.3)
	Owned house	282 (70.5)
No. of Pregnancy including abortion	Rented house	25 (6.3)
	Governmental house	3.37 (\pm 2.07)
	Mean (\pm SD)	3
No. of Delivery	Median	1-12
	Range	2.22 (\pm 1.96)
	Mean (\pm SD)	2
No. of Abortion	Median	0-11
	Range	1.16 (\pm 0.52)
	Mean (\pm SD)	1
Gestational Age (Months)	range	1 - 7
	Mean (\pm SD)	4.77 (\pm 1.81)
	Median	5
	Range	1 - 9

Table-2: Smoking status of the participants, husbands' smoking and smoke exposure status

Variables	Number (%)	
Self-smoking status	Current smoker	7 (1.8)
	X smoker	6 (1.5)
	Never smoke	387 (96.8)
Husband smoking	current smoker	158 (39.5)
	none smoker	242 (60.5)
Smoke exposure	Yes	183 (45.8)
	No	217 (54.3)

Table-3: knowledge regarding side effects, harms and complications from smoke exposure and receiving education about hazards of smoke exposure among the studied population

Variables	N (%)	
Do you know about presence of side effects, harms or complications from passive smoke exposure?	Yes	347 (86.8)
	No	12 (3.0)
	don't know	41 (10.3)
Known side effects, harms or complications	Dyspnea & bronchial asthma	202 (50.5)
	Lung cancer	175 (43.8)
	Headache	48 (12)
	Environmental pollution	37 (9.3)
Receiving education about side effects, harms or complications of passive smoking	Yes	87 (21)
	No	313 (78)

Table-4: Socio demographic characteristics associated with passive smoking among the studied population

Variables	Exposed N (%)	Non exposed N (%)	χ^2	p-value	
Age (Mean \pm SD)	29.60 \pm 7.75	28.42 \pm 7.33	1.55	0.12	
Education	Not-read/ Primary school	17 (63.0)	10 (34.0)	10.58	0.01
	Intermediate school	64 (54.2)	54 (45.8)		
	Secondary school	68 (41.7)	95 (58.3)		
	University and above	34 (37)	58 (63.0)		
Job	House wife	133 (46.8)	151 (53.2)	1.48	0.63
	Teacher	12 (36.4)	21 (63.6)		
	Student	29 (43.9)	37 (56.1)		
	Other	9 (52.9)	8 (47.1)		
Income	Enough and save	25 (34.7)	47 (65.3)	12.74	0.002
	Enough but not save	139 (45.9)	164 (54.1)		
Housing	Not enough	19 (76)	6 (24)	1.75	0.19
	Owned/ Governmental	60 (50.8)	58 (49.2)		
	Rent	123 (43.6)	159 (56.4)		

Table-5: Effect of passive smoke exposure on incidence of abortion among the studied population

Status	Abortion	No abortion	χ^2	p-value	
Smoke Exposure	N	14	169	7.25	0.007
	%	7.70%	92.30%		
Non smoke Exposure	N	36	181		
	%	16.60%	83.40%		

Table-6: Relationship between receiving health education about hazards of passive smoking and passive smoking exposure among the studied population

Receiving Education	Exposed N (%)	Non exposed N (%)	χ^2	p-value
Yes	52 (59.8%)	35 (40.2%)	8.8	0.002
No	131 (41.9%)	182 (58.1%)		

Table-7: Effect of Patient education about passive smoke hazards and prevalence of passive smoke among the studied population

Clinic Education	Exposed N (%)	Non exposed N (%)	χ^2	p-value
Yes	52 (59.8%)	35 (40.2%)	8.8	0.003
No	131 (41.9%)	182 (58.1%)		

Table-8: Association between receiving education about passive smoke hazards and smoke exposure duration among the smoke exposed participants

Clinic Education	Exposure Duration (Hours)			χ^2	p-value
	< 2	2-4	≥ 4		
Educated, N (%)	21 (40.4%)	10 (19.2%)	21 (40.4%)	12.30	0.002
Non educated, N (%)	21 (16.2%)	34 (26.2%)	75 (57.7%)		

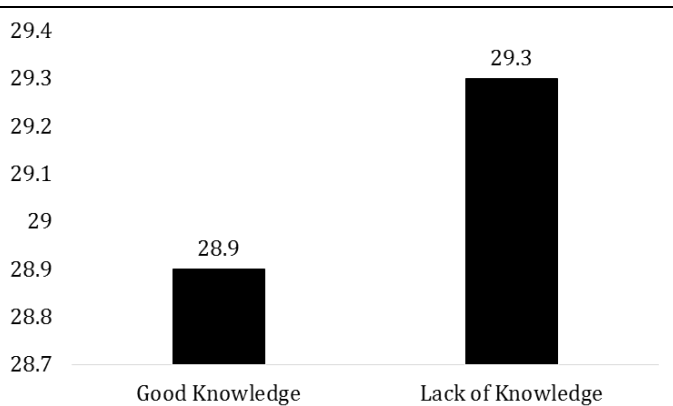


Figure-1: Participants' knowledge about side effects of passive smoking and age of participants among studied population

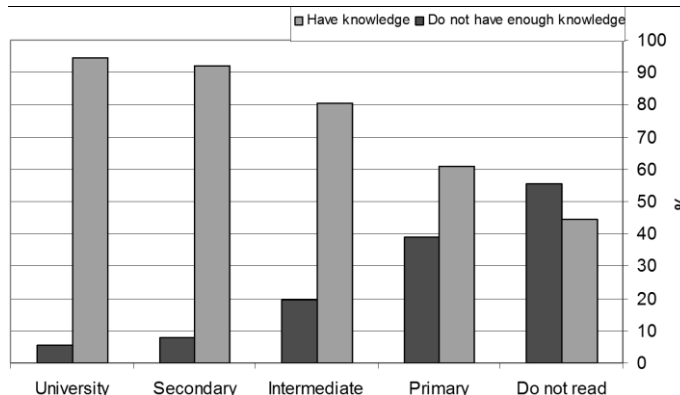


Figure-2: Relationship between level of education among participants and reporting of having knowledge about hazards of passive smoking

As shown in table 2, most of the participant (96.8%) reported they never smoke, while 1.8 % are current smoker and 1.5 % were ex- smoker. 40 % of the participants were married to current smoking husbands, while 60.5 % of the husbands were not smoker. About 45.8% of the participants reported they were exposed to smoke. Most of smoke exposure was from husbands (85%) followed by relatives 55%, friends and neighbours 23 %, respectively. More than half of the smoke exposed participants were exposed for more than 4 hours daily, 23% were exposed to less than 2 hours daily while the remaining 24 % were exposed from 2 to 4 hours daily.

Table 3 shows that more than 86.8 % of the total participants have knowledge about passive smoking hazards, while 10.3 % don't know and 3% reported there is no hazards related to passive smoking. Among those who have knowledge about hazards of passive smoking, 50.5% reported that passive smoking cause dyspnoea and bronchial asthma, 43.8 % reported lung cancer, 12% reported headache and 9.3 % causing environmental pollution. Only 20 % of the total participants reported they received health education about hazards of passive smoking during their visit to the clinic.

Table 4 shows that passive smoking is significantly decreasing as level of education increasing. Smoking exposure is higher among participants who reported that their income is not enough. However, no significant difference between exposed and non-exposed participants as regards their job categories or type of the house.

That there was no significant difference between passive smoking exposures and non-exposed participants regarding pregnancy number, delivery number and abortion number. As illustrated in table 5, 7.7% of

women who reported passive smoking exposure had abortion compared to 16.6% among non-exposed women. There was no significant association between duration of passive smoking exposure and occurrence of abortion among passive smoke exposure.

Slightly more than half (52.8%) of the participants who do not know whether there are side effects associated with exposure to passive smoking compare to 44.7 % among those who know that. However, the difference was not statistically significant.

As obvious from figure 1, no significant association between participants' age and knowledge regarding side effects of passive smoking was detected. Table 6 shows that 59.8% of participants who receive education about passive smoke hazards have been exposed to passive smoke, in comparison to 41.9 % among those who did not receive health education ($p=0.002$).

As evident from figure 2, there is a significant association between participants' level of education and their reporting of having knowledge regarding passive smoke hazards. Table 7 demonstrates that 59.8% of those who reported receiving education about passive smoke hazards have been exposed to smoke compared to 41.9% of non-educated participants ($p=0.003$).

Table 8 shows that 40.4% of the educated participants were exposed to more than 4 hours compare to 57.7% among non-educated group. However, for less than 2 hr exposure duration, (40%) of the educated participants were exposed to smoke more than non-educated participants (16.2%), ($p=0.002$).

Discussion

This is the first report of its kind on passive smoking prevalence among pregnant ladies in Western region of Saudi Arabia, a society in which women smokers are uncommon.

The overall prevalence of passive smoking among Saudi pregnant women in the current study is 45.8%. This percentage is considered relatively not far away when compared to a previous study conducted in Riyadh^[4] by Rashid et al. in 2003 who showed that the prevalence was 54% among pregnant women. However, when the current prevalence is compared to that reported in the developing countries (17% to 91%) it is considered in the average range.^[16] In contrary, in the united kingdom,

the prevalence of passive smoking was 36% which is relatively lower than our study.^[12]

Passive smokers in the current study have lower income and lower education level compared to non-exposed participants. Lower educational level may be attributed to increased exposure to passive smoking among the exposed participants. This could be supported by absence of significant differences between exposed and non-exposed participants regarding their level of knowledge on side effects of passive smoking. However, those who reported receiving education about passive smoking were significantly more among those exposed to passive smoking. This may raise queries about type and methods of education which have been used and apparently not effective in reducing exposure to passive smoking among the studied group. More efforts should be conducted to improve health education programs in order to increase their effectiveness in reducing exposure to different health hazards.

Moreover, focusing on educating students during their early education years, for example in the primary and intermediate education, is very important in improving their knowledge about hazards of smoking and passive smoking. Simultaneously, the current study did not show any statistical significant association between parity and age from one side and the passive smoking on in the other side.

Rashid et al showed that passive smokers in Riyadh city were relatively younger with low parity and income. Low income is usually associated with low level of education which is consequently associated with low level of knowledge regarding side effects of smoking and passive smoking. However, this study did not show significant association between parity and exposure to passive smoking.

Our study shows that more than half of smoke exposed participants were exposed for more than 4 hours daily, 23% were exposed to less than 2 hours daily and 24% from 2 to 4 hours daily, while in Riyadh, the mean time of passive smoking per day was 5.76 hours with a minimum of 2 hours and maximum of 8 hours.

Saudi Arabia is a conservative country and smoking among females is very uncommon. Few recent studies reported smoking among secondary school and university female students in Saudi Arabia. The difference between our study and Riyadh study in the

prevalence of smoking among pregnant women, where none of Riyadh participants reported being smokers compared to 3.2% in the current study, may be attributed to the increasing smoking among female in the recent years. Smoking prevention programs should be established to combat this hazardous behaviour among female students in their primary, intermediate and secondary schools.

Findings among British women were totally different where 55% of pregnant women reported they are current smokers.^[2] Further studies are required to assess nicotine metabolites in the urine and blood of pregnant women and to correlate these measurements to the pregnancy outcomes. The response rate in the current study (70%) was lower compared to the British study (100%). Future studies should encourage women to participate as all the information they report are confidential and will not be released for any cause except for the benefit of research. Increasing response rate is very important in empowering the validity of the research studies.

Our study shows that most of passive smoking was from husbands (85%) followed by relatives 55%, Friends and neighbors 23% while in British (the study of passive smoking in pregnancy by Dominique) shows that 50% being exposed at home only, 22% at work only, and 28% at home and at work.^[2]

Our study showed that 85% of the passive smoking women were exposed at home, compared to 50% among British women. Still health education campaigns are required to prevent smoking at homes and indoors as general. Both husbands and wives should be aware of hazards of indoor smoking on their health and on the health of their children.

Health education provided to pregnant women is not enough and required to be reviewed in terms of effectiveness and efficiency. Twenty percent of our participants reported they received health education about smoking compared to about 74% of the British women.^[2] Healthcare workers including physicians and nurses in primary health care centers should receive training programs on methods of health education, communication and counselling skills. Role of media is also very important in raising awareness of the community towards hazards of smoking.^[17-19]

Meanwhile the current study failed to show any

association between passive smoking and miscarriage, more wide scale studies are recommended. However, other health effects on the pregnancy outcomes should be extensively studied including effects on brain functions and child behaviours. Long term longitudinal studies may be the next step for future studies.

Study limitations included the following items: This study relied on a questionnaire as a measure of maternal passive smoking. This may lead to under or over estimate of the extent of exposure because of recall bias. Assaying a biochemical marker for tobacco smoke, for example, serum or urine cotinine levels have not been done in this study. Cotinine is a major metabolite of nicotine and has been satisfactorily used to assess and monitor cigarette smoking in pregnancy. Using such assessment could improve the accuracy of the findings. In addition, relatively low response rate may be a limitation; future studies should work to enhance the participation of women in such studies which help to assess the impact of hazardous exposures on their health.

Conclusion

Conclusively, smoking husbands, lack of knowledge and lower education, were identified as risk factors for increased exposure to passive smoking in the current study. Therefore, There is a need to highlight the risks of environmental tobacco smoke and should be discussed with all pregnant women at booking and during their first visit to Primary Health Centers.

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References

1. Rashid M, Rashid H. Passive maternal smoking and pregnancy outcome in a Saudi population. *Saudi Med J* 2003;24(3): 248-253
2. Dominique SC. Passive smoking in pregnancy. *BMJ* 1998; 316(7149):1981
3. Ostrea E, Jr, Knapp D, Romero A, Montes M, Ostrea A. Meconium analysis to assess fetal exposure to nicotine by active and passive maternal smoking. *J Paediatr* 1994;124:471-476.
4. Sexton M, Hebel JR. A clinical trial of change in maternal smoking and its effect on birth weight. *JAMA* 1984; 251: 911-915.
5. Xepapadaki P, Manios Y, Liarigkiovinos T, Grammatikaki E, Douladiris N, Kortsalioudaki C, et al. Association of passive exposure of pregnant women to environmental tobacco smoke with asthma symptoms in children *Pediatr Allergy Immunol*

- 2009;20(5):423-9
6. Voigt LF, Hollenbach KA, Krohn MA, Daling JR, Hickok DE. The relationship of abruptio placenta with maternal smoking and small-for-gestation age infants. *Obstet Gynaecol* 1990;75:771-774.
 7. Kramer MD, Taylor V, Hickok DE, Daling JR, Vaughan TL, Hollenbach KA. Maternal smoking and placenta praevia. *Epidemiology* 1991; 3: 221-223.
 8. Adams JD, OMara-Adams KJ, Hoffmann D. Toxic and carcinogenic agent in undiluted mainstream smoke and sidestream smoke of different types of cigarettes. *Carcinogenesis* 1987; 8: 729-731.
 9. Iwase A, Aiba M, Kira S. Respiratory nicotine absorption in non smoking females during passive smoking. *Int Arch Occup Environ Health* 1991; 63: 139-143.
 10. Pirogowicz I, Jezowiecka M, Pomorski M, Masztalerz-Migas A, Zachara M, Bury A, et al. Active and passive exposure to tobacco smoke of pregnant women: two-center study. *Przegl Lek* 2004;61(10):1016-9.
 11. Hadidi KA, Mohmmmed FI. Nicotine content in tobacco used in hubble-bubble smoking. *Saudi Med J* 2004;25(7):912-917
 12. Ward C, Lewis S, Coleman T. prevalence of maternal tobacco smoke and environmental tobacco smoke exposure during pregnancy and impact on birth weight. *BMC public health* 2007;7:81
 13. Xianglan Z, Xiao S, Gong Y. Association of Passive Smoking by Husbands with Prevalence of Stroke among Chinese Women Nonsmokers. *Am J Epidemiol* 2005 ;161(3):213-218
 14. Taylor R, Najafi F, Dobson A . Meta-analysis of studies of passive smoking and lung cancer: effects of study type and continent. *Int J Epidemiol* 2007;36(5):1048-59.
 15. Liu T, Chen W. Meta-analysis of effects on maternal passive smoking during pregnancy on fetal low birth weight. *Wei Sheng Yan Jiu* 2009 ;38(6):677-81
 16. Michele B, Onyamboko M, Kaseba C. Tobacco Use and Second hand Smoke Exposure During Pregnancy: An Investigative Survey of Women in 9 Developing Nations. *Am J Public Health* 2008;98: 1833-1840.
 17. Chazeron ID., Pierre-Michel L., Sylvie U., Francois C. Occult maternal exposure to environmental tobacco smoke exposure. *Tob Control* 2007;16:64-65
 18. Martínez-Sánchez JM, Fernández E. Assessment of exposure to secondhand smoke by questionnaire and salivary cotinine in the general population of Barcelona, Spain (2004-2005). *Preventive Medicine* 2009;48: 218-223.
 19. El-Mohandes AA, Kiely M, Blake SM, Gantz MG, El-Khorazaty MN. An intervention to reduce environmental tobacco smoke exposure improves pregnancy outcomes. *Pediatrics* 2010; 125:721.

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