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Research Article

Passive Smoker and Pregnancy Outcome: A Cross-Sectional Study in Benghazi - Libya

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Abstract

Introduction: Many women are exposed to tobacco smoke before or during pregnancy, because they inhale cigarette smoke from their environment (e.g. in a house where their partner is smoking). Smoking or being exposed to tobacco smoke, either before or during pregnancy is associated with a range of poor pregnancy outcomes, including reduced fertility, an increased risk of pregnancy complications and impaired infant and child development. Tobacco smoke exposure is considered one of the few, preventable causes of poor pregnancy outcomes in developed countries like Libya.

Objective: To study the effects of exposure to passive smoking on outcome in pregnancy.

Settings and Design: A cross-sectional study at a Aljomhoria Maternity Hospital Department of Obstetrics and Gynecology, Faculty of Medicine, Benghazi University, Benghazi, Libya during the period from Janunary 1, 2013 and December 31, 2013.

Methodology: Consecutive 500 non-smoking women delivering a singleton live baby were studied. A pre-designed structured questionnaire was used to record the details of exposure to passive smoking at home. The maternal and foetal variables were compared among those who were exposed to passive smoking and non-exposed.

Keywords: *Smoking; Pregnancy; Libya*

Introduction

Smoking during pregnancy is the most important modifiable risk factor associated with adverse pregnancy outcomes [1]. It is associated with 5 percent of infant deaths, 10 of preterm births, and 30 percent of small for gestational age infants [2]. In addition, smoking and secondhand smoke exposure increases the risk of infertility, placental abruption, preterm premature rupture of membranes (PPROM), and placenta previa.

Prenatal smoking remains one of the most common preventable causes of infant morbidity and mortality and is associated with 30% of small-for-gestational-age infants, 10% of preterm infants, and 5% of infant deaths [3,4]. Cigarette smoking before conception can cause reduced fertility and conception delay among women [4,5].

Maternal cigarette smoking during pregnancy increases the risk for pregnancy complications (e.g., placental previa, placental abruption, and premature rupture of the membrane) and poor pregnancy outcomes (e.g., preterm delivery, restricted fetal growth, and sudden infant death syndrome [SIDS]) [4,5]. Exposure to secondhand smoke after delivery increases an infant's risk for respiratory tract infections (e.g., bronchitis and pneumonia), ear infections, and dying from SIDS [4-8]. During 2000 - 2004, an estimated 174,000 women in the United States died annually from smoking-attributable causes, and an estimated 776 infants died annually from causes attributed to maternal smoking during pregnancy [9].

The aim of the present work is to study the effects of exposure to passive smoking on outcome in pregnancy.

Material and Methods

Consecutive 500 non-smoking women delivering a singleton live baby were studied. A pre-designed structured questionnaire was used to record the details of exposure to passive smoking at home. The maternal and foetal variables were compared among those who were exposed to passive smoking and non-exposed.

Results

In the present study, exposure to inside house passive smoking was positive in 63.2%. In Female age ranged between 19 years and 43 years, with mean age of 29.3 ± 5.3 years. Majority (87%) of mothers their age was less than 36 years in both groups. Mean age of exposed was 29.5 ± 5.1years, and mean age of non-exposed 29 ± 5.5 years and this slight difference was not statistically significant (p = 0.1795).

Majority of women were educated, 97.4% had preparatory education and higher. Iliteracy was recorded in exposed and, primary school was 3.5% of exposed while only 0.5% of non-exposed, University level was higher in non-exposed (27.7%), while 17.7% of exposed was University level, this difference was statistically significant (p = 0.024).

Distribution of fathers educational level was also significant, preparatory and higher was 99.6%. Majority (96.7%) of fathers of non-exposed had secondary or University level, while 87.7% in exposed group (p = 0.004).

House wife constitute to 44.2% and employee to 46%. Nearly half of exposed mothers was house wife, 40.5% was employee and 10.4% was student , in non-exposed group 35.9% was house wife, 55.4% employee and 8.7% student, this difference was statistically significant (p = 0.005).

Majority of fathers were employee 98%. Majority of fathers in both exposed and non-exposed group was employed 97.5% vs. 89.9%, and this small difference was not statistically significant (p = 0.266). Medium income constitute to 87.2%, while 11.6% had high income. Medium income in exposed 85.4% and in non-exposed 90.2%, high income in exposed was 12.7% and in non-exposed 9.8%, this difference was not statistically significant (p = 0.099). Only 2.8% had crowding in the houses, 3.8% of exposed mothers was living in crowding, while 1.1% of non-exposed group living in crowding, but this difference was not statistically significant (p = 0.076).

Mean gestational age was 38.9 ± 1.1 week, with minimum gestational age 37 weeks and maximum 42 weeks. Delivery at 37 weeks in exposed group was 12.7% and in non-exposed was 8.7%, delivery at 40 weeks was 16.1 %in exposed and 22.3% in non-exposed, the difference in the distribution was not statistically significant (p = 0.208).

Mean gestation age in exposed was 38.8 ± 1.2 weeks, and in non-exposed the mean was 39 ± 1.1 weeks, this difference in the mean was statistically significant (p = 0.016).

Gravida ≤ 5 constitute to 95.8 and more than 5 gravida only 4.2%, with mean 2.85 ± 1.4. Gravida ≤ 5 constitute in exposed mothers was 94.3% and in non-exposed was 98.4%, this difference was statistically significant (p = 0.010). Mean gravidity in exposed group was 2.85 ± 1.52 and in non-exposed group was 2.29 ± 1.2, this difference was statistically significant (p = 0.0001).

Nulliparity constitute to 28.2%, 1 - 5 constitute to 70.8%, with mean equal to 1.4 ± 1.3. Nullipara in exposed was 24.1% and in non-exposed 35.3% and para 1 - 5 constitute to 75% of exposure and 63.6% in non-exposed, this difference was statistically significant (p = 0.025). Mean parity of exposed was 1.6 ± 1.4, and in non-exposed was 1.2 ± 1.1, the difference in the means was statistically significant (p = 0.000).

History of abortion was positive in 18.6% of the mothers. -History of abortion was higher in mothers with history of passive exposure (22.8%) than mother without exposure (11.4%), and this difference was statistically significant (p = 0.0001).

Majority of mothers were booked 98.6%. Nearly all of exposed mothers were booked (97.8%) and all of non-exposed was booked, this difference was statistically different (p = 0.042). Iron and folic acid supplement was taking by 97.4%. Almost all the mothers were using h iron and folic acid supplement were 95.9% of exposed mothers were taking the supplement and 100% of non-exposed are using the supplement, but there were statistical difference between the two group were (p = 0.005).

Associated problems was present in 47.6%, hypertension was in 68.1%of them and abruption placenta in 12.9 and anemia in 12.6%. Associated problems present in 63.9% of exposed mothers and 19.5% of mothers non-exposed, and this difference was highly statistically significant were (p = 0.0001).

Majority of babies (95.8%) had birth weight ≥ 2.5 kg, while only 44.2% had birth weight < 2.5 kg, with mean birth weight 3.11 ± 0.53 kg, minimum weight was 1.90 kg. and maximum weight 4.6kg. -Mean birth weight for babies for exposed mothers was 2.9 ± 0.41 kg, while in non-exposed mother mean birth weight was 3.6 ± 0.40 kg, this difference between the means was highly statistically significant (p = 0.0001).

There was statistically significant negative correlation between the birth weight and number of cigarettes smoked by household members (r = -0.599, p = 0.000).

Male babies constitute to 51.6% and female to 48.4%. Mean birth weight of exposed male babies was 2.8 ± 0.39, an for non-exposed 3.6 ± 0.41, this difference in the means was highly statistically significant (p = 0.000). For female babies mean birth weight for exposed was 2.9 ± 0.41 and for non-exposed 3.6 ± 0.39, this difference was highly statistically significant (p = 0.000).

Majority of babies had good Apgar score 89%, only 0.2% had Apgar score one. Apgar score 7 and more for babies of exposed mothers was 99.7% and 99.5% for non-exposed.

The mean exposure time was 9.36 ± 2.2 hours, exposure for 3 - 7 hours was 11.8% exposed for 3 - 7 hours, 51.2% for 8 - 12 hours and 0.2% exposed to passive smoking for more than 12 hours per day, minimum duration was 3hours and maximum was 15 hours.

Only 0.6% of husband smoked ≤ 10 cigarettes, 28.2% smoke 11 – 20 cigarettes , 21 – 30 cigarettes in 45.3% and 25.9% for 31 - 40 cigarettes.

Mean number of cigarettes exposed was 18 ± 14.3 cigarettes, minimum number was 5 cigarettes and maximum was 40 cigarettes.

History of C/S was positive in 53.8% of patients. Delivery by c/s constitute to 22.4%, and normal delivery to 77.6%. C/S constitute to 29.4% in exposed mothers and 10.3% in non-exposed and this difference was highly statistically significant (p = 0.0001).

	n	%
Duration of exposure to passive smoking per day (hours)		
- Never exposed	184	36.8
- 3 - 7	59	11.8
- 8 - 12	256	51.2
- >12	1	0.2
Min-Max	3 - 15	
Mean ± S.D.	9.36 ± 2.2	
Median	10.0	

Number of cigarettes smoked by husbands per day		
- ≤ 10	2	0.6
- 11 - 20	89	28.2
- 21 - 30	143	45.3
- 31 - 40	82	25.9
Min-Max	5 - 40	
Mean ± S.D.	18.0 ± 14.3	
Median	20.0	
History of C/S	231	46.2
No		
Yes	269	53.8

Table 1: *Risk factors.*

	Exposure to passive smoking				**All cases**		**Significance** (Between exposed and non exposed)
	Yes (n = 316)		**No (n = 184)**				
	n	**%**	**n**	**%**			
Age (years)							
- ≤ 20	10	3.2	7	3.9	17	3.4	$X^2_{(df=5)} = 4.277$ p = 0.510 NS
- 21 - 25	60	19.0	47	25.5	107	21.4	
- 26 - 30	115	36.4	57	31	172	34.4	
- 31 - 35	90	28.4	49	26.6	139	27.8	
- 36 - 40	37	11.7	23	12.5	60	12.0	
- >40	4	1.3	1	0.5	5	1.0	
Min-Max	19 - 43		19 - 41		19 - 43		$t_{(df=498)}$=1.346 p=0.179 NS
Mean ± S.D.	29.5 ± 5.1		29.0 ± 5.5		29.3 ± 5.3		
Median	29.0		29.0		29.0		
Mother's level of education							
- Illiterate	1	0.3	0	0	1	0.2	$X^2_{(df=4)} = 11.217$ p = 0.024*
- Primary	11	3.5	1	0.5	12	2.4	
- Preparatory	92	29.1	45	24.5	137	27.4	
- Secondary	156	49.4	87	47.3	243	48.6	
- University	56	17.7	51	27.7	107	21.4	
Father's level of education							
- Primary	2	0.6	0	0	0	0.0	$X^2_{(df=4)} = 11.217$ p = 0.024*
- Preparatory	37	11.7	6	3.3	2	0.4	
- Secondary	195	61.7	115	62.5	43	8.6	
- University	82	26	63	34.2	310	62.0	
					145	29.0	

Mother's Occupation							
- House wife	155	49.1	66	35.9	221	44.2	$X^2_{(df=2)} = 10.567$
- Employee	128	40.5	102	55.4	230	46.0	
- Student	33	10.4	16	8.7	49	9.8	p = 0.005*
Father's Occupation							
- Employed	308	97.5	182	98.9	490	98.0	$X^2_{(df=1)} = 1.238$
- Unemployed	8	2.5	2	1.1	10	2.0	p = 0.226 NS
Income							
- Low	6	1.9	0	0	6	1.2	$X^2_{(df=2)} = 4.627$
- Medium	270	85.4	166	90.2	436	87.2	
- High	40	12.7	18	9.8	58	11.6	p = 0.099 NS
Crowding							
- Yes	12	3.8	2	1.1	14	2.8	$X^2_{(df=1)} = 3.139$
- No	304	96.2	182	98.9	486	97.2	p = 0.076 NS
Gestational age (week)							
- 37	40	12.7	16	8.7	56	11.2	$X^2_{(df=4)} = 5.880$
- 38	87	27.5	41	32	128	25.6	
- 39	106	33.5	69	37.5	175	35	p = 0.208 NS
- 40	51	16.1	41	22.3	92	18.4	
- >40	32	10.1	17	9.2	49	9.8	
Min-Max	37 - 42		37 - 42		37 - 42		$t_{(df=498)} = 2.428$
Mean ± S.D.	38.8 ± 1.2		39.0 ± 1.1		38.9 ± 1.1		p = 0.016*
Median	39.0		39.0		39.0		

Table 2A: *Relation of exposure to passive smoking to variable charactistics.*

	Exposure to passive smoking				**All cases**		**Significance** *(Between exposed and non exposed)*
	Yes (n = 316)		**No (n = 184)**				
	n	**%**	**n**	**%**			
Number of gravid							
Primi	60	19	55	29.9	115	23	
- 2 - 5	238	75.3	126	68.5	364	72.8	$X^2_{(df=3)} = 11.427$
- 6 - 9	17	5.4	3	1.6	20	4	
- ≥ 10	1	0.3	0	0	1	0.2	p = 0.010*
Min-Max	1.0 - 13.0		1.0 - 7.0		1 - 13		$t_{(df=498)} = 4.608$
Mean ± S.D.	2.85 ± 1.52		2.29 ± 1.20		2.6 ± 1.4		p = 0.000*
Median	3.0		2.0		2.0		

Parity							
Nulliparae	76	24.1	65	35.3	141	28.2	$X^2_{(df=2)} = 7.404$
- 1 - 5	237	75	117	63.6	354	70.8	p = 0.025*
- > 5	3	0.9	2	1.1	5	1.0	
Min-Max	0.0 - 8.0		0.0 - 6.0		1 - 8		$t_{(df=498)} = 5.313$
Mean ± S.D.	1.6 ± 1.4		1.17 ± 1.18		1.4 ± 1.3		p = 0.000*
Median	1.0		1.0		1.0		
History of abortion							
Yes	72	22.8	21	11.4	93	18.6	$X^2_{(df=1)} = 9.195$
No	244	77.2	163	88.6	407	81.4	p = 0.002*
Booking							
Yes	309	97.8	184	100.0	493	98.6	$X^2_{(df=1)} = 4.134$
No	7	2.2	0	0.0	7	1.4	p = 0.043*
Iron and folic acid supplement							
Yes	303	95.9	184	100.0	487	97.4	$X^2_{(df=1)} = 7.772$
No	13	4.1	0	0.0	13	2.6	p = 0.005*
Associated problems							
Yes	202	63.9	36	19.6	238	47.6	$X^2_{(df=1)} = 91.740$
No	114	36.1	148	80.4	262	52.4	p = 0.000*
Birth weight (kg)							
- < 2.5	21	6.6	0	0.0	21	4.2	$X^2_{(df=1)} = 12.764$
- >= 2.5	295	93.4	184	100.0	479	95.8	p = 0.000*
Min-Max	1.9 - 4.0		2.3-4.6		1.90 - 4.60		$t_{(df=498)} = 24.912$
Mean ± S.D.	2.9 ± 0.41		3.6±0.40		3.11 ± 0.53		p = 0.000*
Median	2.9		3.6		3.0		
Apgar score							
One	0	0	1	0.5	1	0.2	$X^2_{(df=4)} = 21.701$
7	1	0.3	0	0	1	0.2	p = 0.000*
8	32	10.1	2	1.1	34	6.8	
9	16	5.1	3	1.6	19	3.8	
10	267	84.5	178	96.8	445	89	
Mode of delivery							
Normal	223	70.6	165	89.7	388	77.6	$X^2_{(df=1)} = 21.417$
C/S	93	29.4	19	10.3	112	22.4	p = 0.000*

Table 2B: *Relation of exposure to passive smoking to variable charactistics.*

	Exposure to passive smoking				Significance
	Yes (n = 316)		No (n = 184)		
	n (%)	Mean ± S.D.	n (%)	Mean ± S.D.	
Baby's sex					
Males (n = 258)	170 (65.89%)	2.8 ± 0.39	88 (34.11%)	3.6 ± 0.41	t = 21.332, p = 0.000*
Females (n = 242)	146 (60.33%)	2.9 ± 0.41	96 (39.67%)	3.6 ± 3.9	t = 16.334, p = 0.000*
All Babies	316 (63.2%)	2.9 ± 0.41	184 (36.8%)	3.6 ± 0.40	t = 24.912, p = 0.000*

Table 3: *Neonatal birth weight in relation to sex of the baby and maternal passive smoking exposure.*

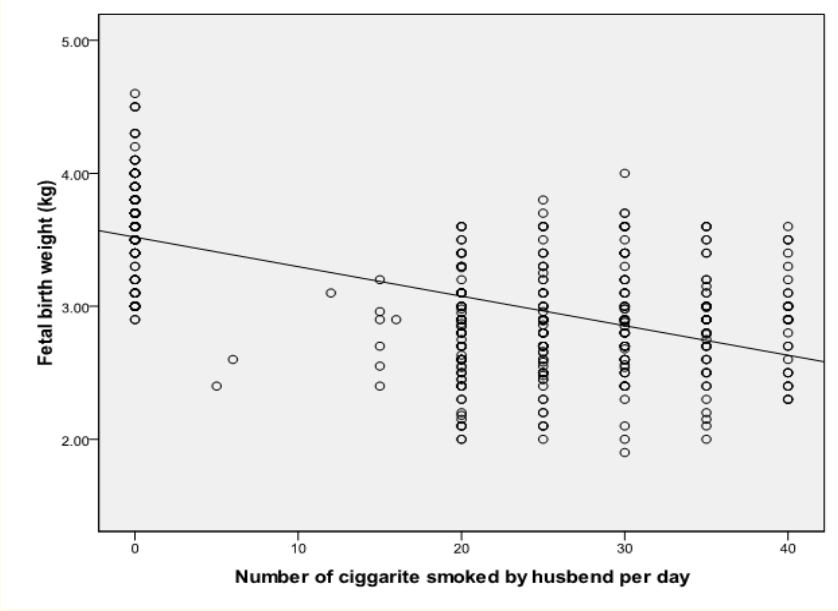

Figure 1: *Scatter plot showing significant negative correlation between number of cigarettes smoked by household per days and fetal birth weight (kg) (r = -0.599; P = 0.000 significant).*

Discussions

In the present study, exposure to inside house passive smoking was positive in 63.2%. In another study the result show that was 62.2% had been exposed passively to cigarette smoke for at least 1 min per day at home, in the work place, or in other places during pregnancy [10], Goel P., *et al*. (2004) reported only 24% of mothers whom were exposed to passive smoking [11].

Regarding female age, results is similar to Doll S., et al. [12] who reported no difference between exposed and non-exposed groups regarding maternal age. Goel P., *et al*. [11] reported also no significant difference in age of exposed (25.9 ± 4.27 years), and non-exposed (25.34 ± 3.62 years) (p = 0.131).

In agreement to our work, another study reported also a significant difference in distribution in relation to education, illiterate in exposed was 11.3%, University 16.3%, in non-exposed illiterate was in 4.8% and University 45.1% of non-exposed , this difference was statistically significant (p = 0.001) [11].

Mother occupation revealed statistically significant distribution among exposed and non exposed (p = 0.005). In another study 5.7% of exposed mothers were employed and 94.3% were not employed, while non-exposed 13.3% were employed and 86.7% were not employed, this difference was statistically significant (p = 0.0007) [11].

In the present study, exposed group showed lower mean gestational age when compared with non-exposed (p = 0.016), opposed to Goel P., *et al*. [11] who reported non statistically significant difference (p = 0.092) [11].

Despite significant difference in gravida in the present study (p = 0.010), another study reported non statistically significant difference [3]. But in similar study the mean gravidity in exposed was 2.08 ± 1.47 and in non-exposed 1.75 ± 0.25 and this difference was statistically significant (p = 0.0003) [11]. The same controversy in parity also existed, in another study there was no difference in parity [12]. History of abortion reported to be 0.33 ± 0.97 in exposed and 0.99 ± 0.97 in non-exposed, this difference in the means was not statistically significant (p = 0.240) [11].

Also, we found significant difference in distribution of associated problems in the present study (p = 0.0001), opposite to other study which reported nearly similar prevalence 58.9% in exposed and 51% in non-exposed [11].

Significant difference in fetal birth weight reported in the present study (p = 0.0001) is similar to that reported by Hegaard HK., *et al.* (p = 0.02) [13]. There was statistically significant negative correlation between the birth weight and number of cigarettes smoked by household members (r = -0.599, p = 0.000). Also in other study they found in exposed newborns, a significant inverse relationship was noticed between birth weight and the number of cigarettes smoked by household members (r = –0.27) [14].

In similar study the mean birth weight of the babies born to the mothers exposed to passive smoking was 138 g less than that of babies in the unexposed group (2632 + 577g vs. 2770 + 562g; respectively), (p = 0.014) [11]. But other study found non-significant dose-response association was seen between increasing daily exposure and reduction in birth weight [13]. Male babies constitute to 51.6% and female to 48.4%. Mean birth weight of exposed male babies was 2.8 ± 0.39, an for non-exposed 3.6 ± 0.41, this difference in the means was highly statistically significant (p = 0.000). For female babies mean birth weight for exposed was 2.9 ± 0.41 and for non-exposed 3.6 ± 0.39, this difference was highly statistically significant (p = 0.000). In other study there was no difference in birth weight [12], also in other study the difference in the birth weight in both groups was statistically different (p = 0.014) [11]. But in other study the mean birth weight of exposed newborns was significantly lower than non-exposed newborns [14].

Similar to our findings, Goel P., *et al*. (2004) reported a statistically significant lower Apgar score in babies of exposed (8.52 ± 1.07), compared to (8.73 ± 0.83), in non-exposed (p = 0.018) [11].

Mean number of cigarettes smoked per day in the present study is near to that reported by Ogawa H., *et al.* (1991), 19.6 per day [10], they also reported rate of passive exposure to cigarette smoke was 62 20o for at least 1 min per day, and 35 30, for at least 2h per day, as shown in table 1. Mean exposure time for the exposed women was 3 1h per day [10]. In contrast to our findings, another study reported no significant difference regarding type of delivery (p = 0.482) [11].

Conclusion

Nonsmoking pregnant women who were exposed to passive smoking at home gave birth to children with a 700 g reduction in mean birth weight compared to children of unexposed women. The fact that exposure to passive smoking has an effect on the birth weight is regarded as essential.

Recommendations

We recommend that pregnant women should not be exposed to passive smoking, by establishing health education programs to all the community in order to protect pregnant women against the adverse effects of passive smoking.

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