

## Exposure to Passive Smoking during Pregnancy and Its Adverse Effects on Pregnancy, and Neonatal Outcomes in Sohag Public Hospital

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**Abstract:** Passive smoking during pregnancy doubles the risk of having a low-birth weight and small for gestational age infants and significantly increases the rate of perinatal morbidity and several other adverse pregnancy and neonatal outcomes. The aim of this study was to assess the effects of exposure to passive smoking during pregnancy on pregnancy and neonatal outcomes. A cross-sectional study design was selected to collect the data in the postpartum ward (delivery and postpartum room) of Sohag public Hospital- Sohag City. The sample included 300 neonates and their mothers (over a six month's period from January to June 2014). A questionnaire sheet were designed by the researchers according to literature review was used to collect the necessary data. The main results in this study were (32.3%) of the mothers who exposed to passive smoking had placenta previa and abrupt placenta, (34.3%) of them had premature rupture of membrane, (48.3%) were caesarean section delivery, also (24.0%) of the mothers had premature infants, (37.0%) of newborns were less than 7 APGAR score at 1 minute, and (19.3 %) had respiratory distress. The study concluded that, passive smoker's pregnant women are exposed to many negative adverse effects on their pregnancy and newborns outcomes. Based on the study results it was recommended that obstetric and pediatric nurses should educate the new, prospective parents and pregnant women about the risks of exposure to passive smoking during pregnancy.

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**Key words:** passive smoking, pregnancy, postpartum and newborn outcomes.

### 1. Introduction:

The term "passive smoking" usually refers to the inhalation of smoke that is either exhaled by a smoker or released as side stream smoke from a burning cigarette. Another name for passive smoking is "involuntary smoking," because the person who inhales it often has no choice in the matter (Hadayat *et al.*, 2012). Prenatal exposure of human fetus to tobacco smoke through maternal passive smoking has been epidemiologically linked to reduced birth weight, enhanced susceptibility to respiratory diseases and changes in immune system (Jodscheit and Guo, 1999).

A non-smoking pregnant woman if she was exposed to continuous secondhand smoking during her pregnancy period, this causes fetal hypoxia and vasoconstriction decreasing maternal blood supply to the placenta and less functioning placenta. Nicotine will cross the placenta and decreases the blood flow to the fetus. This will affect the fetal cardiovascular system, gastrointestinal system and central nervous system. One of the most common problems that secondhand smoking brings is the premature birth of the fetus. This will affect the normal development of the baby creating further health complications in future (Das, 2013).

There is strong evidence that exposure to tobacco smoke during pregnancy negatively affects pregnancy

outcomes. When a pregnant woman is exposed to tobacco smoke, either from her own, or another person's cigarette, her fetus is also exposed. There is strong evidence that such exposure is harmful for the fetus, both in the immediate and long term. In the short term, fetal tobacco exposure increases the risk of pregnancy complications (e.g. premature birth) and impairs fetal growth. In the long term, infants born to women who smoked during pregnancy have higher rates of infant and childhood illness and death. The more a woman smokes, the greater the risk of poor pregnancy, infant or childhood health outcomes (Leonardi-Bee, *et al.*, 2008).

Exposures to tobacco smoke during pregnancy, whether as active smoking or by exposure to secondhand smoke (SHS), are associated with adverse pregnancy outcomes. A well-recognized and documented adverse effect of maternal tobacco exposure is that on birth weight and anthropometric measurements of the newborn leading to high prevalence of low birth weight (LBW) and small for gestational age infants (Wahabi *et al.*, 2013). Maternal smoking during pregnancy is associated with detrimental effects on the mother and the fetus including; impaired fetal growth, low birth weight, preterm delivery and increased neonatal and infant mortality rate (Hackshaw *et al.*, 2011).

**Aim of the study:**

The aim of this study was to assess the effects of exposure to passive smoking during pregnancy on pregnancy and neonatal outcomes.

**Hypothesis:**

Exposures to passive smoking during pregnancy are associated with negative adverse effects on pregnancy, and neonatal outcomes.

**2. Subjects and Methods:**

**Research design:** A cross-sectional research design was selected for this study.

**Setting:** The study was conducted in the postpartum ward (delivery and postpartum room) - Sohag Public Hospital- Sohag City.

**Subject:** The target population of this research was included 300 women (who exposed only to passive smoking) and their newborns that were delivered over a six months period from January to June 2014.

**Inclusion criteria:**

- All pregnant women who exposed to passive smoking at any stage of pregnancy and aged between 20-35 years were included in the study.

- Full term, Preterm deliveries were included in the study.

**Exclusion criteria:**

- Mothers who not exposed to smoking during pregnancy or active smoker were not included in the study.

- The studied women were selected purposively to be free from any chronic diseases as (diabetes mellitus, anemia and pregnancy induced hypertension).

- Women who had a multiple pregnancy were excluded.

- Mothers younger than 20 and older than 35 years old were excluded to eliminate age related complications of pregnancy.

**Tool of the study:** One tool was designed to collect the necessary data about the effects of exposure to passive smoking during pregnancy on pregnancy and neonatal outcomes.

- A questionnaire sheet was designed by the researchers according to literature review to collect the necessary data about the effects of exposure to passive smoking during pregnancy on the pregnancy and neonatal outcomes:

*The questionnaire consists of three parts as follow:*

**Part (1):** Consists of socio-demographic data of the family (age of the mothers, sex of the newborn, mothers' and fathers' educational level, mothers' occupation and residency).

**Part (2):** Consists of obstetrical data (gravity, parity, abortion and other variables related to antenatal health problems and perinatal complications).

**Part (3):** Includes newborn assessment (birth weight, length, head and chest circumference), associated abnormalities, and assessment of neonatal APGAR score.

**Method of data collection:**

- After obtaining the written permission from the hospital and oral permission from the women for data collection, the women were interviewed face to face by the researchers as soon as possible after birth, and before leaving the hospital.

- The researchers were visited each women and explained the purpose of the research briefly and the importance of the reliability of their answers.

- All women were asked about if there is any exposed to passive smoking during pregnancy or not.

- The questionnaire sheet was self-administered by the researchers to only women who exposed to passive smoking (300 women).

- Items in the questionnaire were explained when necessary to each woman and administered at one sitting.

- Each questionnaire sheet were took about 30-40 minutes to collect the data (15-20 minute at the delivery room to assess the APGAR score at 1 and 5 minutes to evaluate the neonatal condition and the anthropometric measurements of the newborn as birth weight, length, chest and head circumferences and another 15-20 minutes at postpartum room to collect part 1 and part 2 of the questionnaire sheet). Data were collected daily at the morning and afternoon for a six months period.

- Validity of tool one was estimated by 5 experts in pediatric field and its result was 89%.

- Reliability was estimated by Alpha Cronbach's test for tool one and its result was R=0.80.

- The fetal heart rate and fetal movement were determined from the medical record.

- The duration and the time of exposure to passive smoking during pregnancy were determined based on maternal self-reporting, and passive smoke was defined if she was closely exposed to tobacco smoke by people such as her husband, family members, transports and co-workers.

**Ethical Consideration:**

To carry out this study, official approval was obtained from of the Manager of Sohag Public Hospital and the chair man of the Obstetric Department and informed consent was obtained from each woman orally before filling the questionnaire.

**Limitation:**

- The estimation of smoking prevalence (duration and the time of exposure) during pregnancy was based on mothers' self-reported information.

**Statistical analysis:**

- Data was collected and entered using Microsoft Excel 2010. Statistical analysis was done by

using SPSS 20.0 statistical package. Categorical variables were descriptive using number and percentage. Comparisons of categorical variables were compared using chi-square test. *P* values of less than 0.05 were regarded statistically significant.

### 3. Results

**Table (1) showed distribution of the study sample according to demographic data.** This table showed that, nearly two third (64.7%) of the study sample were in the age group (26-30 years) and more than half (53.0%) of the mothers were illiterate, read and write. The majority of mothers (81.7%) were housewives. and (66.3%) from study sample lives in rural area compared to (33.7%) in urban area. As regards the father's education more than two third (71.3%) of them had basic and secondary education. Regarding to the previous abortion more than half (52.7%) of mothers had experienced abortion from one to third times.

**Regarding to distribution of the study sample according to pregnancy outcome figure (1) showed that,** nearly one third (32.3%) of the study sample having placenta previa and abrupt placenta. Also (34%) of mothers had premature rupture of membrane and (25.0%) had breach fetal presentation. Near half (48.3%) of study sample had caesarean delivery. As regard to gestational age (24.0%) of study sample had prematurely birth and (54.0%) increase fetal heart rate. **Table (2) presented distribution of newborns according to their growth measurement at birth,** (28.3%) of the newborns had birth weight less than or equal 2.5kg. Only (20%) of the newborns their length and chest circumference were at the normal average and only (18%) of them their head circumference at the normal average.

**Figure (2) showed distribution of the study sample according to neonatal outcome.** Regarding to Apgar score (37.0%) of the newborns at 1 minute were less than 7 compared to (15.0%) at 5 minute were less than 7, also (24%) of the newborns were pre-term and furthermore (19.3%) of them were suffered from respiratory distress.

**Table 3: showed the correlation between duration of exposure of pregnant women to passive smoking and pregnancy outcomes.** This table reported that, pregnant women who exposed less than two hours to smoking, more than two thirds (72, 1%) of them not had placenta previa and abrupt placenta, while women who exposed four hours and more (66. 7%) of them had placenta previa and abrupt placenta. Also women who exposed less than two hours to passive smoking (26.1%) had pre mature rupture of membrane compared to women who exposed more than four hours (75%) had pre mature rupture of membrane. As regard the type of labor, women exposed less than two

hours (58.8%) of them had induced labour but who exposed more than four hours (75%) had induced labor. Excessive fetal movement were present in women who exposed less than two hours (58,4%) but who exposed more than four hours the percentage increased to (66.7%).

Highly statistical significant differences were found between the duration of exposure of pregnant women to passive smoking and placenta previa and abrupt placenta, rupture of membrane, and type of labor ( $P=0.004$ ,  $0.003$ , and  $0.002$ ) respectively. Also statistical significant differences were found between the duration of exposure of pregnant women to passive smoking and fetal presentation, mode of delivery, and excessive fetal movement ( $P=0.29$ ,  $0.017$ , and  $0.028$ ) respectively and no statistical significant differences between fetal heart rate.

**Table 4: showed correlation between duration of exposure daily to passive smoking and neonatal outcome.** As regard the Gestational age, women who exposed to passive smoking less than two hours/day (84%) had full term infants but who exposed more than four hours (75%) had pre term infants. Women who exposed more than four hours (66.7%) of their newborns had less than seven Apgar score at one minute. As regard the infants' weight at birth, women exposed to passive smoking less than two hours only (22,6%) of their newborns had less than or equal 2.5 kg compared to (66.7%) who exposed more than four hours. Also women exposed to passive smoking less than two hours only (13, 7%) of their newborns had respiratory distress compared to (83. 3%) who exposed more than four hours.

Highly statistical significant differences were found between the duration of exposure daily to passive smoking and gestational age, Apgar score at 1 minute, Apgar score at five-minute, newborns' weight at birth, and respiratory distress ( $P=0.001$ ,  $0.006$ ,  $0.001$ ,  $0.001$  and  $0.001$  respectively). Also statistical significant differences were found between the newborns' head circumference ( $P=0.038$ ). No statistical significant differences were found between the length and chest circumference of the newborns ( $P=0.243$  and  $0.528$  respectively).

**This table 5: showed correlation between the time of exposure to passive smoking during pregnancy and the pregnancy outcomes.** This table reported that, women who exposed to passive smoking at the first trimester only (10, 4%) of them had placenta previa and abrupt placenta compared to (43, 1%) who exposed the length of pregnancy. Only (9, 1%) had pre mature rupture of membrane in women who exposed to passive smoking at the first trimester compared to (50, 3%) in women who exposed the length of pregnancy. The induced labor was (50, 9%) in who exposed in the first trimester but at the length

of pregnancy was (64, 1%). Caesarean section delivery increased if the exposed to passive smoking increased as well as excessive fetal movement.

Highly statistical significant differences were found between the time of exposure to passive smoking during pregnancy and placenta previa and abrupt placenta, rupture of membrane, fetal presentation, type of labor, and mode of delivery ( $P=0.001, 0.001, 0.001, 0.004,$  and  $0.001$  respectively) respectively, also statistical significant differences were found between the fetal movements, no statistical significant differences were found between fetal heart rate.

**Table (1): Distribution of the study sample according to demographic data:**

demographic data	No. (n=300)	%
<b>Sex of newborn</b>		
Male	178	59.3
Female	122	40.7
<b>Age of mothers</b>		
20 - 25 years	72	24.0
26 - 30 years	194	64.7
31 - 35 years	31	10.3
>35 years	3	1.0
<b>Mother's education</b>		
Illiterate + Read and write	159	53.0
Basic and secondary	93	31.0
High education	40	13.3
Others	8	2.7
<b>Father's education</b>		
Illiterate + Read and write	31	10.4
Basic and secondary	214	71.3
High education	51	17.0
Others	4	1.3
<b>Mother's occupation</b>		
House wife	245	81.7
Employed	55	18.3
<b>Residency</b>		
Rural	199	66.3
Urban	101	33.7
<b>The number of previous abortion</b>		
No abortion	99	33.0
1-3 Time	158	52.7
4 and more	43	14.3

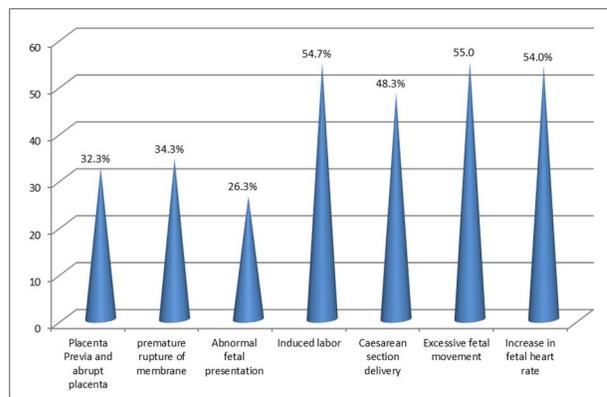
**This table 6: showed correlation between the time of exposure to passive smoking during pregnancy and neonatal outcomes.** This table reported that, (60.0%) of women who exposed to passive smoking at the first trimester had pre term infants compared to (68. 0%) in women who exposed the length of pregnancy, also (18, 2%) of newborns had less than 7 apgar score at 1 minute when exposed at first trimester but who exposed the length of pregnancy (48, 4%) of them had less than 7 apgar score. As regard the

infants' weight at birth, women who exposed to passive smoking at first trimester only (10, 9%) of their infants had less than or equal 2.5 kg compared to (39.2%) in who exposed the length of pregnancy. Also women exposed to passive smoking at first trimester only (5, 5%) of their newborns had respiratory distress compared to (29. 4%) who exposed the length of pregnancy.

Highly statistical significant differences were found between the time of exposure to passive smoking during pregnancy and Apgar score at 1 minute, Apgar score at five-minute, newborns' weight at birth, newborns' chest circumference and respiratory distress ( $P=0.001, 0.001, 0.001, 0.005$  and  $0.001$  respectively), also statistical significant differences were found between the newborns' length and head circumference ( $P=0.023$  and  $0.035$ ), and no statistical significant differences were found between the gestational age ( $P=0.060$ ).

**Table (2): Distribution of newborn according to their growth measurements at birth:**

Newborns' growth measurements	No.(n=300)	%
<b>The weight/kg</b>		
less than or equal 2.5 kg	85	28.3
More than 2.5 kg	215	71.7
<b>The length /cm</b>		
40 - < 45	105	35.0
45 - <47	135	45.0
47 - 50	60	20.0
<b>Chest circumference/cm</b>		
29 - <30	99	33.0
30 - < 31	141	47.0
31 - 33	60	20.0
<b>Head circumference/cm</b>		
30 - <32	111	37.0
32 - < 34	135	45.0
34 - 36	54	18.0



**Fig (1): Distribution of the study sample according to pregnancy outcome**

**Table (3): Correlation between duration of exposure of pregnant women to passive smoking and their pregnancy outcomes.**

Pregnancy outcomes	The duration of exposure to passive smoking / day for pregnant women in hours						P. value
	Less than two hours (n = 226)		From 2 hours to less than 4 hours (n = 62)		4 hours and more (n = 12)		
	N	%	N	%	N	%	
<b>Placenta Previa and abrupt placenta</b>							
Yes	63	27.9	26	41.9	8	66.7	0.004**
No	163	72.1	36	58.1	4	33.3	
<b>Rupture of the membrane</b>							
Rupture during childbirth	167	73.9	38	61.3	3	25.0	0.003**
premature rupture of membrane	70	26.1	24	38.7	9	75.0	
<b>Fetal presentation</b>							
Cephalic	174	77.0	50	67.7	5	41.7	0.029*
Breach	50	22.1	19	30.7	6	50.0	
Other	2	0.9	1	1.6	1	8.3	
<b>Labor</b>							
Spontaneous	93	41.2	40	64.5	3	25.0	0.002**
Induced	133	58.8	22	35.5	9	75.0	
<b>Delivery Type</b>							
vaginal	107	47.3	42	67.7	6	50.0	0.017*
Caesarean section	119	52.7	20	32.3	6	50.0	
<b>Excessive fetal movement</b>							
No	94	41.6	37	59.7	4	33.3	0.028*
Yes	132	58.4	25	40.3	8	66.7	
<b>Increase fetal heart rate</b>							
No	97	42.9	33	53.2	8	66.7	0.254
Yes	129	57.1	29	46.8	4	33.3	

**Table (4): Correlation between duration of exposure daily to passive smoking and neonatal outcomes:**

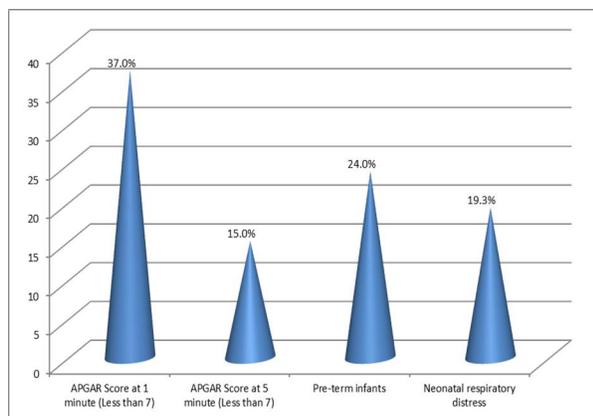
Neonatal outcomes	The duration of exposure to passive smoking a day for pregnant women in hours						P. value
	Less than two hours (n = 226)		From 2 hours to less than 4 hours (n = 62)		4 hours and more (n = 12)		
	N	%	N	%	N	%	
<b>Gestational age</b>							
Pre-term	36	15.9	27	43.5	9	75.0	0.001**
Full term	190	84.1	35	56.5	3	25.0	
<b>Apgar score at 1 minute</b>							
Less than 7	73	32.3	30	48.4	8	66.7	0.006**
7 and more	153	67.7	32	51.6	4	33.3	
<b>Apgar score at five-minute</b>							
Less than 7	22	9.7	17	27.4	6	50.0	0.001**
7 and more	204	90.3	45	72.6	6	50.0	
<b>Newborns' weight at birth/kg</b>							
less than or equal 2.5 kg	51	22.6	26	41.9	8	66.7	0.001**
More than 2.5 kg	175	77.4	36	58.1	4	33.3	
<b>length of the newborns /cm</b>							
40 < 45	76	33.6	27	43.5	2	16.7	0.243
45 < 47	102	45.1	27	43.5	6	50.0	
47-50	48	21.2	8	12.9	4	33.3	
<b>Newborns' chest circumference/cm</b>							
29 < 30	70	31.0	25	40.3	4	33.3	0.528
30 < 31	109	48.2	25	40.3	7	58.3	
31-33	47	20.8	12	19.4	1	8.3	
<b>Newborns' head circumference/cm</b>							
30 < 32	86	38.1	21	33.9	4	33.3	0.038*
32 < 34	92	40.7	37	59.7	6	50.0	
34 - 36	48	21.2	4	6.5	2	16.7	
<b>Newborns' respiratory distress</b>							
No	195	86.3	45	72.6	2	16.7	0.001**
Yes	31	13.7	17	27.4	10	83.3	

**Table (5): Correlation between the time of exposure to passive smoking during pregnancy and the pregnancy outcomes.**

Pregnancy outcomes	The time of exposure to passive smoking during pregnancy								P. value
	The first trimester of pregnancy (n = 55)		The second trimester (n = 40)		The third trimester (n=40))		The length of pregnancy (n=153)		
	N	%	N	%	N	%	N	%	
<b>Placenta Previa and abrupt placenta</b>									
Yes	6	10.9	11	21.2	14	35.0	66	43.1	<0.001**
No	49	89.1	41	78.8	26	65.0	87	56.9	
<b>Rupture of the membrane</b>									
Rupture during childbirth	50	90.9	40	76.9	27	67.5	76	49.7	<0.001**
premature rupture of membrane	5	9.1	12	23.1	13	32.5	77	50.3	
<b>Fetal presentation</b>									
Cephalic	52	94.5	46	88.5	30	75.0	93	60.8	<0.001**
Breach	3	5.5	5	9.6	9	22.5	58	37.9	
Other	0	0.0	1	1.9	1	2.5	2	1.3	
<b>Labor</b>									
Spontaneous	27	49.1	33	63.5	21	52.5	55	35.9	0.004**
Induced	28	50.9	19	36.5	19	47.5	98	64.1	
<b>Delivery Type</b>									
vaginal	37	67.3	33	63.5	26	65.0	59	38.6	0.001**
Caesarean section	18	32.7	19	36.5	14	35.0	94	61.4	
<b>Excessive fetal movement</b>									
No	29	52.7	30	57.7	21	52.5	55	35.9	0.014*
Yes	26	47.3	22	42.3	19	47.5	98	64.1	
<b>Increase fetal heart rate</b>									
No	34	61.8	27	51.9	27	67.5	78	51.0	0.191
Yes	21	38.2	25	48.1	13	32.5	75	49.0	

**Table (6): Correlation between the time of exposure to passive smoking during pregnancy and neonatal outcomes.**

neonatal outcomes	The time of exposure to passive smoking for pregnancy								P. value
	The first trimester of pregnancy (n = 55)		The second trimester (n = 40)		The third trimester (n=40)		The length of pregnancy (n=153)		
	N	%	N	%	N	%	N	%	
<b>Gestational age</b>									
Prematurely	33	60.0	25	48.1	22	55.0	104	68.0	0.060
Full term	22	40.0	27	51.9	18	45.0	49	32.0	
<b>Apgar score at 1 minute</b>									
Less than 7	10	18.2	13	25.0	14	35.0	74	48.4	<0.001**
7 and more	45	81.8	39	75.0	26	65.0	79	51.6	
<b>Apgar score at five-minute</b>									
Less than 7	2	3.6	2	3.8	5	12.5	36	23.5	<0.001**
7 and more	53	96.4	50	96.2	35	87.5	117	76.5	
<b>Newborns' weight at birth</b>									
less than or equal 2.5 kg	6	10.9	8	15.4	11	27.5	60	39.2	<0.001**
More than 2.5 kg	49	89.1	44	84.6	29	72.5	93	60.8	
<b>length of the Newborns/cm</b>									
40 < 45	22	40.0	26	50.0	10	25.0	47	30.7	0.023*
45 < 47	24	43.6	21	40.4	24	60.0	66	43.1	
47 – 50	9	16.4	5	9.6	6	15.0	40	26.1	
<b>Newborns' chest circumference/cm</b>									
29 < 30	20	36.4	25	48.1	10	25.0	44	28.8	0.005**
30 < 31	27	49.1	20	38.5	14	35.0	80	52.3	
31 – 33	8	14.5	7	13.5	16	40.0	29	19.0	
<b>Newborns' head circumference/cm</b>									
30 < 32	15	27.3	21	40.4	12	30.0	63	41.2	0.035*
32 < 34	31	56.4	25	48.1	14	35.0	65	42.5	
34 - 36	9	16.4	6	11.5	14	35.0	25	16.3	
<b>Newborns' respiratory distress</b>									
No	52	94.5	48	92.3	34	85.0	108	70.6	0.001**
Yes	3	5.5	4	7.7	6	15.0	45	29.4	



**Fig (2): Distribution of the study sample according to neonatal outcome**

#### 4. Discussion

Passive smoking involves exposure to the same range of tobacco toxins experienced by active smokers; the chemicals in cigarettes are known to significantly increase the risk of serious pregnancy complications. Pregnant non-smokers who breathe in the second-hand smoke of other people are at an increased risk of delivering stillborn babies or babies with defects (Leonardi-Bee, *et al.*, 2011).

Regarding to demographic data of study revealed that, more than two third (64.7) of mothers were at age group 26-30 years and more half of mothers were illiterate, read and write. The majority of mothers (81.7%) were housewives. and (66.3%) from study sample lives in rural area. These results agree with study by (Hadayat *et al.*, 2012) who reported that most of passive smoker women were less educated, unemployed.

Our study reported that, more than half (52.7%) of mothers had experienced abortion from one to third times. This result agrees with study by Polanska and Hanke reported that maternal smoking during pregnancy increase the risk of spontaneous abortion (Polańska and Hanke, 2004) and also this finding is similar to another study by (Hadayat *et al.*, 2012) which reported that (19.1%) of mothers exposed to passive smoking during pregnancy had experienced abortion from one to third times.

Our study showed (32.3%) of the study sample had placenta previa and abrupt placenta, more than one third (34.0%) of study sample had premature rupture of membrane and (25.0%) were breach fetal presentation. Near half (48.3%) of study sample had caesarean section delivery. These results agree with other studies by (Goel *et al.*, 2004 & Polańska and Hanke, 2004) which reported that maternal exposed to smoking during pregnancy increase the risk of placenta previa, abruption placenta and increases the risk of premature rupture of membranes.

As regard to the effect of duration of exposure to passive smoking and pregnancy outcomes the present study showed the increase duration of exposure to passive smoking during pregnancy significant increase in Placenta Previa and abrupt placenta, premature rupture of membrane, preterm birth, breach fetal presentation and caesarean section delivery. Also found that strong relation between exposure to passive smoking for length of pregnancy and Placenta Previa and abrupt placenta, premature rupture of membrane, breach fetal presentation and caesarean section delivery. These results agreement with (Blomberg *et al.*, 2005 & Hadayat *et al.*, 2012) whom reported that exposure to smoking increases the risk of preterm birth, premature rupture of membranes, and more caesarean births. Also these findings is similar to another studies by (Wisborg *et al.*, 2001 & Fantuzzi *et al.*, 2007) whom founded that increase risk of placenta previa, abruption placenta, premature rupture of membrane preterm birth and fetal distress associated with maternal exposed to smoking.

Regarding the effect of passive smoking on neonatal outcomes, the present study showed that (37.0%) of newborns their APGAR score at 1 minute was less than 7 compared to (15.0%) at 5 minute. Also the present study revealed that, (28.3%) of newborns their weight at birth were less than or equal 2.5kg. Furthermore (19.3%) of the newborns were suffer from respiratory distress. these results agreed with (Wdowiak, *et al.*, 2009) who stated that, A statistically significant correlation was noted between the maternal exposure to passive smoking during pregnancy and evaluation of the babies according to the APGAR Scale, also agreed with (Karl, 2001) who reported that, a positive association between maternal smoking with pre-term birth, low birth weight, and a low Apgar score at 5 min. One of the biggest risks from the effects of smoking during pregnancy low birth weight and premature delivery. 10% of these babies has Infant Respiratory Distress Syndrome.

The present study revealed that, the increase in duration of exposure to passive smoking during pregnancy results in a highly significant increase the fetal distress, poor APGAR score at first and fifth minutes ( $P < 0.001$ ). Also the study founded that, highly significantly differences between exposure to passive smoking at the length of pregnancy and increase fetal distress and low APGAR score at first and fifth minutes ( $P < 0.001$ ). These results is agreement with many studies (Vielwerth, *et al.*, 2007 & Hadayat *et al.*, 2012) which confirmed that, smoking during pregnancy results in a significant increase in fetal distress, poor APGAR score at first and fifth minutes. Growth deficit of neonates of smokers was found to persist in their postpartum life,

affecting their physical development until 1 year of age (Andres and Day, 2000).

The current study founded that, highly significantly differences between the duration of exposure to passive smoking during pregnancy and the birth weight of the newborns. Also were found statistically significant relations between exposure to passive smoking at the length of pregnancy and birth weight, the length of the infant, infant head circumference and infant chest circumference. This found attributed to passive smoking causes placental vasoconstriction, resulting in diminished utero-placental blood flow which contributes to the lower birth weight associated with passive smoking. Also, fetal growth is retarded by the direct toxic effects of nicotine, carbon monoxide and other substances generated by burning cigarettes. Similarly, a study by (Wadi and Al-Sharbatti, 2011) that showed that strong dose-effect relationship was observed between amount of mother's exposure to passive smoking and birth weight. Also another studies by (Hassan *et al.*, 2011 & Hadayat, *et al.*, 2012) concluded that, exposure of the fetus to passive smoking involved a reduction of most anthropometric measurements. On the other hand, Chen *et al.*, found a non-significant birth weight difference between newborn infants of mothers exposed and not exposed to passive smoking (Chen *et al.*, 1989).

#### Conclusion:

The study concluded that, passive smoker's pregnant women are exposed to many negative adverse effects on their pregnancy and newborns outcomes.

#### Recommendations:

Based on the study results it was recommended that obstetric and pediatric nurses should educate new, prospective parents, and pregnant women about the risks of exposure to passive smoking during pregnancy.

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