

The Health Effects of Exposure to Secondhand Smoke on Labor Outcome and Neonates Parameters: A prospective study

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Abstract

Background: Many people are aware that smoking is a serious to the health of smokers but the minimal concern is given to those around smokers who are known as passive smokers. Passive smoking during pregnancy is a significant social problem and a major health problem globally. In Egypt, it is estimated that approximately 80% of females are exposed to passive smoking in their homes. This study was aimed to assess labor outcomes among passive smoking pregnant women. Subject and method: A descriptive Correlational design was used in this study to assess labor outcomes among passive smoking pregnant women. The study was carried out at the delivery room in Al-Azhar University Hospital in New Damietta city. The study subjects consisted of 216 pregnant women at labor which were categorized into 2 groups: exposed to passive smoking, and not exposed to passive smoking. An interview schedule was designed and utilized to collect the necessary data.

The results of this study revealed that out of 108 women (76.9%) of them were exposed to passive smoking in their homes and (57.4%) the smokers were their husbands, (54.6%) of them had preterm birth, (68.5%) PROM, (40.7%) had breech and other presentations and (50.9%) cesarean section. A significant relation was found between the PS and related independent variables among the studied pregnant women. It was concluded that exposure to PS in pregnancy may be more common than many conditions for which women are routinely screened or evaluated in the period of pregnancy these results, indicate that exposure to environmental cigarette smoke, during pregnancy is associated with increased maternal and fetal complications. Therefore, the study recommended the development and dissemination of training courses and education programs for the decision makers, workers in health care settings and antenatal clinics to raise awareness of the seriousness of exposure to PS among pregnant women and their families.

I. Introduction

Secondhand smoking (SHS) is respiration in other people's cigarette smoke. Secondhand smoke, also called "environmental or involuntary tobacco smoke", comprises "side stream" smoke from the distal burning tip of the cigarette and "mainstream" smoke which is smoke that has been inhaled and then exhaled by the smoker people⁽¹⁾.

Globally, an estimation of 33% of male non-smokers, 35% of female non-smokers and 40% of children are exposed to SHS.⁽²⁾ It is prevalent in smoking area such as offices, restaurants, and other enclosed spaces when people burn tobacco products as cigarettes and water pipes⁽³⁾. Centers for Disease Control and Prevention (CDCP). 2012 there is about 14.1 million smokers, representing 16.6% of the total population. The phenomenon of smoking in Egypt is mainly masculine, as 33.3% of males are smokers compared to only 0.2% of females are smokers. Only 6 million smokers are in an urban compared to 8.1 million in rural. In spite of more than 20 million individuals are non-smokers but exposed to passive smoking inside the family, because of the presence of one or more smoking family member. 85% of males and females are exposed to passive smoking.^(4,5) Pregnant women who don't smoke, can also be at hazard, from SHS in their environment such as: home, the work place, and others. Like to smoking, through the pregnancy, being exposed to passive smoking, results in serious risks for both, the mother and the embryo. There is a theory that, expose the mother to products of cigarette smoking during pregnancy, can be harm for baby as her mother smoking during pregnancy.⁽⁶⁾

Exposure to nicotine substances like and carbon monoxide is associated with a varieties of very serious complications during pregnancy.⁽⁷⁾ Several chemical compounds in SHS, can be passed through the placenta in pregnant women to the embryo.^(8,9) For example, Nicotine in the blood of pregnant women can decrease the blood flow to the fetus which has adverse effect on embryo's central nervous system, lung, heart, and digestive system, and also, Carbon monoxide, cause to low birth weight.⁽¹⁰⁾ We can measure nicotine in body as it degrades to cotinine, which it is a good marker of exposure to SHS, before birth. We can measure it, in

umbilical cord blood, urine, amniotic fluid and meconium. ⁽¹¹⁾ Pregnant women passive exposure to tobacco smoke during pregnancy are examples of the most modifiable risk factors which has long been known to influence the birth outcome and the condition of infants at birth as preterm labor, placental complications low birth weight (LBW), and Perinatal mortality. ⁽¹²⁾

So assessing all pregnant women as early as possible in the pregnancy, at every antenatal care visit about their tobacco use (past and present) and exposure to passive smoking. Health-care providers should provide pregnant women, their partners and other house- hold members with advice and information about the risks of PS exposure as well as strategies to reduce PS in the home. Their role should be directed for the prevention and management of tobacco use and passive smoking exposure in pregnancy. Assessing all pregnant women as early as possible in the pregnancy, at every antenatal care visit about their tobacco use (past and present) and exposure to passive smoking. ⁽¹³⁾ SHS during pregnancy has received limited research attention in Egypt, therefore this study was carried out to draw the attention of maternity nurses to the causes and consequences of this problem and to the related role she can play in practice, research and health care policy formulation. The goal of our study is to examine the relationship between pregnant women who expose to SHS, and some maternal and neonatal complications. divided into two groups: passive smoking-exposed and control groups and outcomes of maternal and neonatal complications, (Preterm Delivery, gestational age, rupture of membranes before the onset of labor, or up to 37 weeks of gestation (PROM), Stillbirth, Baby's head circumference, birth weight and length) in two groups were compared.

I. Aim

To assess the health effects of exposure to secondhand smoke on labor outcome and neonates parameters

II. Subjects And Methods

II.1. Study Design: A descriptive correlational design utilized in the conduction of this study to assess labor outcomes among passive smoking pregnant women.

II.2. Study Setting: This study was accomplish in the delivery room at Al-Azhar University Hospital in Damietta Governorate. It is one of Al-Azhar University Hospitals. This setting receives more than 100 women monthly through 24 hours per day from Damietta and neighboring provinces, where it is the only university hospital in new Damietta.

II.3. Subjects: The total subjects were 216 divided equally into two groups: 108 passive smoking women. and 108 no passive smoking women. They were selected from the above mentioned setting according to the following criteria: Age ranged between 18 -35 years, at second trimester of pregnancy, should be free from chronic diseases (diabetes mellitus and pregnancy induced hypertension,.....etc). Both primi and multigravida women, and having a live- born singleton fetus. The passive smoking group were exposed to passive smoking by a smoking husband or any relative or one of work colleagues, for the second group to be away from direct exposure to passive smoking by smoking husband or relative or one of work colleagues.

II.4. Sampling and Sample size: A purposive sample of women fulfilling the foregoing criteria was recruited from the study setting until the required sample size (216) were obtained. The sample size was determined by using the following equation (Dobson, 1984):

$$\text{Sample size (n)} = \frac{Z^2}{\Delta^2} P (100 - P)$$

n : Sample size.

P : Prevalence of prenatal passive smoking complication (preterm labor) = 15%.

Z : A percentile of the standard normal distribution by 95% confidence level = 1.96.

Δ : The width of the confidence interval = 5.0.

The calculated sample size were 196 women. Due to the expected non-participating rate (10%), the final sample size were 216 women.

II.5. Sample Technique: The total sample divided equally into two groups: 108 passive smoking women. and 108 no passive smoking women, the both groups were followed until delivery.

II.6. Tools of Data Collection: Following tools were used to collect the necessary information to achieve the purpose of the study, they were:

Tool- 1 Structured Interview Sheet structured interview sheet was adapted and constructed by the investigator after reviewing the related literature and expertise' opinions. The sheet was designed in Arabic form to avoid misunderstanding. It included:

Part I: women's' socio- demographic characteristics: Items related to socio - demographic data of the woman and her husband such as "age, education, occupation, residence, number of persons live in their home, the number of rooms inside their home, and monthly family income. It consists of 7 questions covering the previous items.

Part II: Patients' medical history: This part included items related to obstetric history such as "gravidity, parity, number of living children, as well as information about present pregnancy as; when woman starts antenatal visits, regularity of antenatal visits, number of antenatal visits and data about passive smoking were also included as type of smoking, smoker person, place of exposure to passive smoking and number of cigarettes exposed per day".

Tool II : It consisted of three parts as the following: The First Part (Delivery Data Sheet):This part was adapted by the investigator to collect the necessary data about maternal condition during labor such as "Presentation, gestational age, mode of delivery, duration of labor, fetal and maternal complication".

The second part (Neonatal Assessment Sheet): It was developed to collect the needed data such as "neonatal weight, length, head, and chest circumference immediately after birth and Apgar score (Virginia Apgar, 1952) and any complications occurred after birth".

Finally (Postpartum Assessment Sheet):This part included data related woman's condition immediately after birth such as" assessing vital signs, an incision (episiotomy/C.S), fundal height, the amount of lochia and mode of feeding and any maternal complication may arise ".

II.7.Operational design: It was include phase of preparation , content validity, reliability, pilot study and field work and limitation of the study.

A- Phase of preparation: It includes reviewing of literature, different studies and theoretical knowledge of various aspects of the problems using books, articles, internet, periodicals and magazines.

B-Content validity: It was approved by a jury consisted of five experts in the field of maternity and gynecology of nursing to make sure of the clarity and completeness of the tools.

C-Reliability: Cronbach's alpha coefficient was calculated to assess the reliability of the developed tool through their internal consistency.

II.8.Pilot Study: It was accomplished after the development of the study and before embarking on the actual study (data collection). It was conducted during august 2015 in order to test applicability & feasibility of the tools of data collection, and to estimate the time required for filling the required forms. It was carried out on 10% of the study subjects, from to evaluate the content of tools to determine whether or not the items were understood by the women and they was expelled out from the entire sample of the study . The pilot results were as follows:

They indicated to some items needed to be modified; rephrasing, omission, can be measured through others: whether these items stay as they were or by adding some words or elements.Needed modification was done based on pilot results and further researcher refining of each tool, each item in the same part, parts to each other and tools to each other were done Finally, making an assurance that each tool as a whole achieved the aim of the study.

II.9.Field of Work:

- The data collection were started from August 2015 to the end of January 2016. This period consumed for data collection was governed by the availability time for both the investigator and the study respondents.
- Before conducting the study, women under study were assured that the data collected for the questionnaire remained confidential and that no personal identification was needed by any means.
- They also were informed that they could refuse to participate in the study, to withdraw from it at any time.
- The woman participated in a 10 - 20 minute, face to face, structured interview , 30 - 40 minute, observation and 5 – 10 minutes for observing the neonate conducted by the researcher. Each woman was interviewed separately to give her chance to talk freely about passive smoking.

II.10.Ethical consideration. Showing the aim and objective of the research to the director of the hospital to take his permission to accomplish this study. Explain the objective of the study to each subject to ensure their consent to be involved in the study. A brief explanation of the study was given assured to the children that the information obtained was confidential and used only the purpose of the study and will maintain their privacy.

II.11.Statistical analysis: Data were coded and transferred into specially designed formats for data entry then data were analyzed and computed. The collected data were organized, categorized, tabulated in tables using numbers and percentage, mean percentage and standard deviation. Chi-square (χ^2) test was used to test the associations among the under studied qualitative variables, the statistical package for social sciences (SPSS version 16.0) was used for statistical analysis. Statistical significance was considered at p-value < 0.05.

II.12.Limitation of the study

Five subjects were dropped from the study during labor assessment: two of them died and two were changed delivery place. Three of them withdrawal in postpartum period.

III. Results

The results of the current study were presented in the following sequence:

Table (1): Distribution of the studied women as regards their socio-demographic characteristics (n=216).

Socio-demographic characteristics	Pregnant women exposed to PS (n=108)		Pregnant women are not exposed to PS (n=108)	
	No.	%	No.	%
Age (years)				
18-25	32	29.6	53	41.7
26-30	60	55.6	45	49.1
31-35	16	14.8	10	9.3
Mean	27.1±4.9		24±4.9	
Residence				
Urban	44	40.7	65	60.2
Rural	64	59.3	43	39.8
Marital status				
Married	104	96.3	105	97.2
Divorced	2	1.9	2	1.9
Widow	2	1.9	1	.9
Occupation				
Housewife	94	87.0	89	82.4
Working	14	13.0	19	17.6
Level of education				
Illiterate	11	10.2	10	9.3
Basic education	77	71.3	7	6.5
Secondary education	12	11.1	70	64.8
University education	7	6.5	17	15.7
Post graduate education	1	.9	4	3.7
Crowding index				
Mean	1.5±0.5		1.36±0.48	
Monthly family income				
Not enough	76	70.4	6425	59.3
Enough	28	25.9	25	23.1
More than enough	4	3.7	19	17.6

Table (1): illustrates the distribution of the studied sample according to their socio-demographic characteristics. The mean age of women exposed to PS to the comparison group was (27.1±4.9; 24±4.9 respectively). Nearly two-thirds (59.3%) of women exposed to PS were from rural origin, while (60.2%) of non exposed women were of the urban origin. The great majority of women of both groups were a housewife. In relation to educational level, more than three-quarters of women exposed to PS (71.3%) was basic education but(64.8%) of comparison group had secondary education. The mean crowding index for women exposed to PS was 1.5±0.5 while it was 1.36±0.48 for women not exposed to PS. Regarding monthly family income of exposed group to the comparison group (70.4% : 59.3%) reported that it wasn't enough .

Table (2): Socio-demographic characteristics of women's husbands.

Socio-demographic characteristics of husbands	Pregnant women exposed to PS (n=108)		Pregnant women are not exposed to PS (n=108)	
	No.	%	No.	%
Age (years)				
20-34	45	41.7	64	59.3
35-50	61	56.5	43	39.8
<50	2	1.9	1	.9
Mean	35.2±5.7		33.5±5.0	
Level of education				
Illiterate	19	17.6	14	13.0
Basic education	7	6.5	6	5.6
Secondary education	73	67.6	18	16.7
University education	8	7.4	68	63.0
Post graduate education	1	.9	2	1.9
Occupation				
Work	102	94.4	106	98.1
Not work	6	5.6	2	1.9

Table (2): Reveals that mean age of the husbands age of women exposed to PS group was 35.2±5.7 while for the non-exposed group was 33.5±5.0. The educational level of husbands for more than two-thirds of exposed group (67.6%) was secondary education while about two-thirds of non-exposed group (63.0%) was university

education. Only a few husbands of exposed group and the comparison group (5.6%: 1.9% respectively) were not employed at the time of the study.

Table (3): Distribution of the studied sample according to their obstetric history.

Obstetric history	Pregnant women exposed to PS (n=108)		Pregnant women not exposed to PS (n=108)		Significance	
	No.	%	No.	%	X ²	P
Gravidity						
1-3	60	55.6	98	90.7	34.03	.000
>3	48	44.4	10	9.3		
Parity						
1-3	88	81.5	99	91.7	4.82	.028
>3	20	18.5	9	8.3		
Number of abortions						
None	49	45.4	98	90.7	53.6	.000
1-2	31	28.7	9	8.3		
>2	28	25.9	1	0.9		
Number of living children						
1-3	94	87.0	99	91.7	.306	.580
>3	14	13.0	9	8.3		
No. of dead children						
No	94	87.0	106	98.1	9.7	.002
Yes	14	13.0	2	1.9		

Table (3): clarified that the distribution of the studied sample according to their obstetrical history. The table shows that more than half of exposed group to the comparison group (55.6%: 90.7% respectively) had 1-3 pregnancies. Almost one fifth of exposed sample 18.5% while 8.3% of non-exposed sample had more than three deliveries. More than one quarter of exposed group 25.9% compared to 0.9% of non-exposed group had more than two abortions. Almost 13.0% of women exposed to PS compared to 3.7% of non-exposed women had dead children

Table (4): Distribution of the studied sample according to their ante-natal care.

Ante-natal care	Pregnant women exposed to PS (n=108)		Pregnant women not exposed to PS (n=108)	
	No.	%	No.	%
Time of beginning antenatal care:				
1 st trimester	81	75.0	94	87.0
2 nd trimester	17	15.7	11	10.2
3 rd trimester	10	9.3	3	2.8
Regularity of visits:				
Regular	27	25.0	77	71.3
Irregular	81	75.0	31	28.7
No. of visits:				
<4	10	9.25	11	10.2
4-8	88	81.5	23	21.3
9-16	10	9.25	74	68.5

Table (4): shows that three-quarters of women exposed to PS (75.0%) while the majority of non-exposed women (87.0) began ante natal visits during their first trimester. Only one-quarter of exposed group (25.0%) compared to three quarters of the comparison group (71.3%) had regular ante natal visits.

Table (5): Distribution of women exposed to PS according to smoking status

Smoking status	Pregnant women exposed to PS (n=108)	
	No.	%
Type of smoking:		
Cigarettes	105	97.2
Shisha	3	2.8
Smoker person:		
Husband	62	57.4
Husband's family	22	20.4
Husband and his family	24	22.2
Place of exposure to PS		
House	83	76.9
Work place	7	6.5
other	18	16.7
No. of cigarettes exposed per day:		
Less than 5	22	20.4
5-10	62	57.4
More than 10 or Shisha	24	22.2

Table (5): illustrates that 97.2% of women exposed to cigarette passive smoking. More than half of them (57.4%) the smoker were their husband, three-quarters of them exposed to PS at home. Regarding frequency of exposure more than half of them (57.4%) exposed to 5-10 cigarette smoking per day.

Table (6): Relation between passive smoking and maternal condition during labor.

Items	Pregnant women exposed to PS (n=108)		Pregnant women not exposed to PS (n=108)		Significance	
	No.	%	No.	%	X ²	P
Gestational age:						
-Preterm birth(<37 weeks)	59	54.6	5	4.6	64.747	.000
-Full term birth (37-42 weeks)	49	45.4	103	95.4		
Rupture of membrane:						
-PROM	74	68.5	39	36.1	22.734	.000
-Mature	34	31.5	69	63.9		
Fetal presentation:						
-Cephalic	64	59.3	95	88.0	22.904	.000
-Others	44	40.7	13	12.0		
Labor:						
-Spontaneous	81	75.0	100	92.6	12.309	.000
-Induced	27	25.0	8	7.4		
Mode of delivery:						
-Vaginal	53	49.1	87	80.6	23.468	.000
-Cesarean section	55	50.9	21	19.4		
Cesarean Section:					.356	.551
-Planned	17	15.7	8	7.4		
-Emergency	38	35.2	13	12.0		
Complications during labor:						
-Yes	29	26.9	3	2.8	24.799	.000
-No	79	73.1	105	97.2		
Complications occurred:					2.019	.155
-Precipitated labor	2	1.9	0	.0		
- Prolonged labor	8	7.4	1	.9	5.681	.017
-Laceration	3	2.8	1	.9	1.019	.313
-Intra-partum bleeding	12	11.1	1	.9	9.904	.002*
-Reaction to anesthesia	4	3.7	0	.0	4.075	.044*

X²:Chi-Square test *significant at P≤0.05

Table (6): shows the distribution of women according to maternal condition during labor. The table shows that more than half of women exposed to PS (54.6%) had preterm labor (< 37 weeks) while only 4.6% of non-exposed group had preterm labor. Women exposed to PS to the comparison group (68.5% - 36.1% respectively) had PROM. About two fifths of the exposed group (40.7%) while only 12% of non- exposed group had other presentations. Regarding mode of delivery half of the exposed sample (50.9%) had cesarean section delivery while near one fifth of the non-exposed group (19.4%) had cesarean section delivery. lately, there was high statistical significance between exposure to PS and preterm birth (P=.000), PROM (P=.000), breech and other presentations (P=.000) and cesarean section (P=.000).

Table (7): Relation between passive smoking and maternal condition post-partum.

Items	Pregnant women exposed to PS (n=108)		Pregnant women not exposed to PS (n=108)		Significance	
	No.	%	No.	%	X ²	P
Vital signs:						
Temperature						
-Hypothermia	22	20.4	0	.0	27.0	.000
-Normal	84	77.8	108	100.0		
-Hyperthermia	2	1.9	0	.0		
Pulse:						
-Bradycardia	2	1.9	0	.0	26.467	.000
-Normal	82	75.9	107	99.1		
-Tachycardia	24	22.2	1	.9		
Respiration						
-Brady apnea	22	20.4	0	.0	28.262	.000
-Normal	81	75.0	107	99.1		
-Tachypnea	5	4.6	1	0.9		
Blood pressure						
-Hypotension	22	20.4	0	.0		

-Normal	84	77.8	108	100.0	27.0	.000
-Hypertension	2	1.9	0	.0		
Assessing uterine condition:						
Uterine consistency	86	79.7	108	100.0	24.495	.000
-Normal						
-Abnormal	22	20.4	0	.0		
Fundal level						
-Normal	86	79.7	108	100.0	24.495	
-Abnormal	22	20.4	0	.0		.000
Assessing vaginal discharge:						.000
Amount of lochia	86	79.7	108	100.0	24.495	
-Normal						
-Abnormal	22	20.4	0	.0		
Feeding method:					18.107	.000
-Breast feeding	71	65.7	97	89.8		
-Artificial	37	34.3	11	10.2		
Reasons of artificial feeding:					3.520	.061
-Maternal exhaustion	15	13.9	8	7.4		
-No production of breast milk	22	20.4	3	2.8		

X²:Chi-Square test *significant at P<0.05

Table (7): shows that about three quarters of women exposed to passive smoking had normal vital signs while the majority of non- exposed women had normal vital signs. More than one-fifth of exposed group had abnormal uterine consistency, fundal level and the amount of lochia. More than one third of women exposed to PS (34.3%) compared to 10.2% of women not exposed to PS fed their newborns artificially. Regarding post-partum complications, women exposed to PS to the comparison group (25.2%: 0.9% respectively) experienced a post-partum complication. The same table reveals that there was a high statistically significance between exposure to PS and women general well-being and post-partum complications (P=.000).

Table (8): Relation between passive smoking and maternal condition post-partum.

Items	Pregnant women exposed to PS (n=108)		Pregnant women not exposed to PS (n=108)		Significance	
	No.	%	No.	%	X ²	P
Post- partum complications:						
- Yes	33	30.6	5	4.6	25.036	.000
- No	75	69.4	103	95.4		
Complications occurred:						
-Post-partum hemorrhage	18	54.5	0	.0	18.076	.000*
-Pain	3	9.1	1	20.0	1.019	.313
-Breast tenderness	3	9.1	1	20.0	1.019	.313
- Constipation	4	12.1	1	20.0	1.0843	.175
-Sleep deprivation	5	15.2	2	40.0	1.329	.249

X²:Chi-Square test *significant at P<0.05

Table (8): shows that about one-third (30.6%) of women exposed to passive smoking had Post- partum complications while most (95.4%) of non- exposed women had not Post- Partum complications. More than one half of exposed group had Post-partum hemorrhage. 9% had Pain and Breast tenderness 15%and 12% had Constipation and Sleep deprivation respectively.

Table (9): Relation between passive smoking and neonatal condition after birth.

Items	Pregnant women exposed to PS (n=108)		Pregnant women not exposed to PS (n=108)		Significance	
	No.	%	No.	%	X ²	P
Apgar score at 1st minute:						
-Less than 7	63	58.3	8	7.4	63.468	.000
- >7	45	41.7	100	92.6		
Apgar score at 5th minute:						
-Less than 7	19	17.6	2	1.9	15.244	.000
- >7	89	82.4	106	98.1		
Birth weight (gm):						
-Low birth weight	55	50.9	6	5.6		
-Normal	51	47.2	96	88.9	55.136	.000
-Over birth weight	2	1.9	6	5.6		
Min-Max	1100-5000		2350-5000			

Means	2.5±8.6		3.4±5.4			
Crown-heel length(cm):						
-Less than normal	33	30.6	4	3.7		
-Normal	75	69.4	101	93.5	29.571	.000
-Over than normal	0	.0	3	2.8		
Min-Max	38-52		43-55			
Means	46.7±4.4		49.2±1.9			
Head circumference(cm):					68.422	.000
- Less than normal	61	56.5	5	4.6		
-Normal	47	43.5	103	95.4		
- Over than normal	0	.0	0	.0		
Min-Max	27-35		30-35			
Means	31.3±2.25		33.5±0.93			
Chest circumference(cm):					64.747	.000
- Less than normal	59	54.6	5	4.6		
-Normal	49	45.4	103	95.4		
- Over than normal	0	.0	0	.0		
Min-Max	25-33		28-33			
Means	29.3±2.25		31.5±0.93			
Complications after labor:					18.037	.000
-Yes	29	26.9	6	5.6		
-No	79	73.1	102	94.4		
Complications type :						
-RDS	20	18.5	6	5.6	2.67	.003*
-still birth	6	20.7	0	.0	6.171	.013
-Congenital anomalies	3	2.8	0	.0	3.042	.081

X²:Chi-Square test *significant at P≤0.05

Table (9): shows the distribution of neonate's condition after birth. The table shows that two-thirds of newborns whose mothers exposed to PS 58.3% while only 7.4% of newborns of non-exposed mother their Apgar score at first minute were less than 7. One-fifth of newborns whose mothers exposed to PS 17.6% compared to only 1.9% of newborns of non-exposed mothers their APGAR score at fifth minute were less than 7. Half of newborns of exposed group 50.9% while 5.6% of whose mothers not exposed had low birth weight. One third of newborns of exposed sample 30.6% while only 3.7% Of newborns of non- exposed sample had crown- heel length less than normal. Head circumference for newborns of passive smoke to those of compared mothers (56.5%-4.6% respectively) less than normal. Regarding chest circumference for newborns whose mothers exposed to PS compared to whose mothers not exposed was (54.6%-4.6% respectively) less than normal. More than one fifth 21.3% of newborns whose mothers exposed to PS compared to 5.6% of newborns of non-exposed mothers had complications after birth. The same table reveals that there was statistical significance between maternal exposure to PS during pregnancy and newborn Apgar score (P=.000), neonatal anthropometrics (P=.000) and newborn complications after labor (P=.000).

IV. Discussion

The results of our study indicated an adverse effect of PS exposure on length, weight, baby's head circumference, PROM and pre-mature birth. However, PS exposure in mothers during pregnancy causes to decrease of birth weight, length, baby's head circumference but, increase the risk of PROM and pre-mature birth. In this study, 108 of mothers were PS exposure during pregnancy. But in numerous studies this percentage, has been reported, 35.9% in Brazil,⁽¹⁴⁾ 14% in Iran 13% in U.K , 24.4% in Indian and 69.1% in China.⁽¹⁵⁾ There is a lack of robust data on SHS in pregnant women, its reasons and outcome in Egypt. Thus the the present study was to assess labor outcomes among pregnant women who exposed to passive smoking PS, identify patterns, and problems encountered among women who were exposed during pregnancy .

Exposure to SHS in pregnancy has adversely affect the developing fetus. Maternal smoking during pregnancy is known to be associated with negative adverse pregnancy outcomes, including low birth weight, intrauterine growth retardation, premature delivery, spontaneous abortion, placental abruption, placenta previa, perinatal mortality, and ectopic pregnancy, especially in older mothers. There is also increased postnatal morbidity and mortality relating to deficits in lung function and neurocognitive development.^(16,17)

In the present study results, there was a statistical significance between exposure to PS during pregnancy and preterm birth. Our results showed, odds of preterm delivery in the exposed to SHS group was 50%, more than control group, These results are consistent with several studies **Fantuzzi G, et al.** expressed that, Smoking throughout pregnancy, was powerfully relation to preterm delivery with a dose-response effect and pregnant women exposure to second hand smoke.^(18,19) Also the results of a study conducted in the US in 2010, cleared that the risk of preterm delivery in women who expose to cigarette smoke, is 2.3 times more than others^(20, 21) , This is consistent with a case-control study conducted on pregnant Italian women also showed a

relationship between active and passive smoking during pregnancy and preterm delivery.⁽²²⁾ Other studies of PS exposure and Prematurity have found varying results, from no effect to significant negative association. Han et al. concluded that women exposed to passive smoking at home or in the workplace face the risk was not significantly face the risk of preterm delivery (< 37 gestational weeks).⁽²³⁾ However; the results of a few studies showed that PS exposure during pregnancy is not associated with an increased risk of preterm birth.^(24,4)

Our results showed, premature rupture of membranes, in maternal exposed to SHS, was 32.4% times more than maternal non-exposure. there was a statistical significance between exposure to PS during pregnancy and PROM These results consistent with several studies. This is supported by a case-control study on all very preterm births in two regions of Stockholm 1988–1992, **Kyrklund-Blomberg et al., 2005**⁽²⁵⁾ found that smoking increases the risk of premature rupture of membranes,. Also in a study of **Amasha H, et al.2012** indicated that maternal smoking and exposure to cigarette smoke during pregnancy significantly increases the risk of premature rupture of the membranes.⁽²⁶⁾

In the present study results, there was a statistical significance between exposure to PS during pregnancy and caesarean deliveries. This is supported by **Amasha.H,et al 2012**⁽²⁶⁾ who reported higher rates of caesarean deliveries among women exposed to PS. Contrary the literature *by Negahban, et al* did not observe a significant difference in the incidence of caesarean deliveries.⁽²⁷⁾ Regarding maternal condition post-partum a statistically significant relation was found between maternal condition post-partum and their exposure to passive smoking. Thus women exposed to PS were significantly more likely to have abnormal vital signs (p=0.000).

As regard fetal assessment after labor there was a statistical significant relation between maternal exposure to PS during pregnancy and poor APGAR score at first and fifth minutes. In the same line with Amasha H, et al.2012. **et al,2012**⁽²⁶⁾ She confirmed that the smoking active or passive during pregnancy results in a significant increase in congenital neonatal malformation, fetal distress, poor APGAR score at first and fifth minutes. contrary no difference in APGAR score at 1st , 5th minutes. (**Wahabi H A et al, 2013**).⁽²⁸⁾ regarding **anthropometric** parameters of neonates as reported by **Roquer et al.** exposing a pregnant woman to cigarette smoke had a similar effect on the anthropometric parameters of neonates (birth weight, crown-heel length and head and chest circumference) as smoking<10 cigarettes a day. The study showed a reduction in body length, in the babies of passive smoker mothers by 1 cm compared with those of mothers who did not smoke (**Faruque M. O., et al,1995**).⁽²⁹⁾ Also, a number of studies confirmed that exposure of pregnant women to SHS, cause to reducing the birth length and decrease of head circumference .In the present results, finding showed that exposure to PS in pregnant women was significantly associated with a higher cause of lower anthropometrics parameters (birth weight, crown-heel length, head circumference and chest circumference). Tobacco toxins interfere with the trophoblastic and biological functions of fetal cells that regulate protein metabolism and enzyme activity, leading to an impact on fetal growth, with a reduction of weight, body fat, and many other anthropometric parameters.⁽³⁰⁾

On the other hand, babies of mothers who were passive smokers also had lower anthropometric indices, but the differences were not statistically significant. Smoking during pregnancy causes symmetrical restriction of intrauterine growth. In our study neonates of mothers who were passive smokers achieved a 95 g lower birth weight and 1 cm lower head circumference than neonates of mothers who did not smoke, but the differences were not statistically significant⁽³¹⁾

A recent systematic review and meta-analyses of 76 studies that included 50,000 mothers exposed to PS and 100,000 non-exposed mothers concluded that mothers who are exposed to PS have an increased risk of giving birth to babies that are between 40 –80g lighter than non-exposed mothers, with a further trend toward low birth-weight.^(12,32)

Our study, our results showed, infant's weight of maternal exposure to SHS during pregnancy was 251.26 gr. lower than non- exposure to SHS. There is a hypothesis that maternal exposure to SHS purposely to nicotine, may cause to low birth weight during a pathway of fetal hypoxia.⁽³³⁾ Elevated nucleated red blood cell counts is a marker of fetal hypoxia, and some studies have reported that this marker occurs among infants of maternal who exposure to SHS during pregnancy . It is estimated that, mean weight reduction is about 30 to 60 grams. However, some finding confirmed that, maternal exposure to SHS was not associated with low birth weight.⁽³⁴⁾ On the other hand, the effect of passive maternal smoking during pregnancy is less clear and has not been extensively studied **Lee , et al, 2012**,⁽³⁵⁾ found no association between prenatal PS exposure and birth weight among babies after taking into account the effects of known predictors of birth weight In the present results, finding showed that there was a significant relation between maternal exposure to PS and neonatal adverse outcomes as respiratory distress, congenital anomalies, and stillbirth. So, it is in an agreement with **Leonardi-bee et al,(2011)**⁽³²⁾ who found that Pregnant women who are exposed to second hand smoke are estimated to be 23% more likely to experience stillbirth and13% more likely give birth to a child with a congenital malformation.

Exposure to substances like nicotine and carbon monoxide is associated with a number of serious complications during pregnancy, increased rates of growth restriction, premature rupture of membranes, miscarriage and stillbirth are some of the consequences of PS exposure and may result in increased perinatal morbidity and mortality⁽³⁶⁾ Similarly, a review of 76 studies published in 2010 found that the infants of SHS-exposed women were at increased risk of low birth weight, congenital anomalies, and smaller head circumferences.⁽¹²⁾ A further review of 19 studies that examined SHS exposure during pregnancy specifically among non-smoking women found significantly increased risks of stillbirth and congenital malformation.⁽³²⁾

The strong finding of a significant increase in NICU admission in women exposed to PS in the prenatal period is noteworthy. These women were 2–4 times more likely to experience complications than nonsmoking mothers. The most reported complications in the infant medical records were respiratory distress syndrome.⁽³⁷⁾

A Swedish study of women who gave birth during 1983-1996 found that maternal smoking was significantly associated with adverse outcome (intrauterine growth retardation, a small head circumference, a low Apgar score at 5 min and stillbirths and neonatal deaths)⁽³⁸⁾ Though not conclusive, some studies have argued that maternal passive smoking may increase fetal and perinatal mortality and increase the risk of some congenital abnormalities.⁽³⁹⁾ The home remains an important source of second-hand smoke exposure. In a study that explored the motivators and barriers to smoke-free homes among 22 disadvantaged caregivers, found that knowledge and understanding of the dangers of second-hand smoke were incomplete and confused.⁽⁴⁰⁾

Decreasing smoking among parents and careers is the most effective way to prevent SHS exposure in houses. Legislation relating to tobacco control policies, including tax increases, mass media campaigns, health warnings, cessation services and smoke-free policies has contributed to an overall reduction in smoking prevalence among all adults in the UK, from 40% in 1978 to 21% in 2007 (Office for National Statistic).⁽⁴¹⁾ Therefore, increasing the knowledge and skills necessary to decrease the exposure of pregnant women exposed to environmental smoke, is a practical approach, which, certainly would be, more effective implementation of programs for prenatal care.

V. conclusion

It was concluded that exposure to PS during pregnancy may be more common than many conditions for which women are routinely screened or evaluated during pregnancy these results, indicate that exposure to PS, during pregnancy is associated with increased maternal and fetal complications.

VI. Recommendations

The following recommendations are required to be implemented:

- Maternity nurses should recognize that screening should be a part of antenatal care; questions about PS should be routinely included when taking social history, they may be effective in detecting cases exposed to PS.
- Development and dissemination of training courses and education programs for *the decision makers, workers in health care settings and antenatal clinics to increase awareness of the seriousness of exposure to PS among pregnant women and their families.*
- Providing husbands and family members with advice and information about the risks and the adverse effect of PS exposure on pregnancy outcome also strategies to reduce PS in the home.
- Further research by use interventional design of the study on a larger sample with different age groups, in different seasons, and in different clinical setting.

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