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## COTININE LEVEL AS A BIOCHEMICAL INDICATOR OF THE TOXIC EFFECTS OF PASSIVE SMOKING EXPOSURE ON INFANTS' ANTHROPOMETRIC MEASURES

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Egypt J. Forensic Sci. Appl. Toxicol. Vol 21 (1)

Date of submission: 13 April 2020

Revised at: 26 July 2020

Accepted at: 5 August 2020

### ABSTRACT

**Background:** Fetuses, infants and children seem to be the most susceptible populations to the harmful effects of Environmental Tobacco Smoke (ETS). Significant maternal and fetal exposure to ETS inside the home may affect fetal and child health. **The aim of the study** was to evaluate the toxic effects of perinatal exposure to Second-Hand Smoke (SHS) on the infant's anthropometric measures and nutritional status and assess the benefit of using serum cotinine level in early childhood as a measurable indicator to such toxic perinatal exposure. **Subjects & Methods:** an observational cross-sectional study including the mothers and their children (less than two years) attend Monfallout's Family Medicine Center from the period of October 2017 to October 2018. The questionnaire and serum cotinine of the infants were investigated along with the most important SHS determinants (socio-demographic and environmental). **Results:** The study included 400 mothers with their infants. The commonest site of SHS exposure was the home and the husband was the main responsible source. SHS infants were classified according to their serum cotinine level as active smokers (14.44%), non-smokers exposed to SHS (75.56%), and non-smokers not exposed (10%). There was a highly statistically significant difference between median birth weight, median birth length of regularly exposed babies to smoking and median birth weight, median birth length of non-exposed babies. There was a dose-dependent decrease in weight and length of babies at birth, as well as associated with reduced weight, length, and hemoglobin level in different stages later in their life with an increase in serum cotinine level. **Conclusion:** Regular Prenatal and postnatal ETS lead to a dose-dependent decrease in weight and length of babies at birth and later at early childhood stages. Mothers should take adequate precautions to avoid exposure to such SHS hazards as they and their children may be more susceptible to a series of negative health effects most mothers with their children were regularly exposed to SHS in various places during daily life especially at home and the main source of smoking was husband smoking.

**Keyword:** Nicotine toxicity; serum cotinine; smoke exposure; anthropometric measures

### INTRODUCTION

Passive exposure to smoke in the perinatal period involves exposure similar levels of tobacco smoke toxins expressed by active smokers but at lesser levels, so it is likely that perinatal exposure to tobacco toxins also causes similar complications caused by active smoking but with lower

levels of relative risk (**Blood & Rende, 2010**). Maternal secondhand smoke exposure in the prenatal period is associated with a high risk of miscarriage, stillbirth, congenital malformation, and long-term toxic health effects on the newborn infant (**Leonardi-Bee et al., 2011 and El-Banna et al., 2020**). Cigarette smoke contains

many toxins including nicotine, lead, cadmium, carbon monoxide in addition to other particulates that are of direct and indirect toxic effects and may affect the placental function and the fetal blood supply with subsequent adverse developmental effects. Nicotine derived from tobacco smoke is found to be deposited on household surfaces and dust; it is one of the key ingredients known to affect gravely the fetal growth. It readily crosses the placenta, with concentrations in the fetus research 15% more than maternal levels in addition to a decrease in the oxygen flow and other nutrients across the placenta, that may create neurotoxic effects on the fetal brain during the intrauterine developing process (Juarez & Merlo, 2013).

Infants' and children's exposure to SHS is higher than adolescents and adults due to closer sitting to their active smoking parents, which brings them closer to the source of smoke than other passive smoker parents. Infants' and young children are more susceptible to the toxic exposures as their detoxification ability differs from older children and adults (the immaturity of their enzyme systems an immaturity of clearance mechanisms), inhalation of much greater volumes of air/kg of their body weights than adults in addition to higher metabolic rates (Hwang et al., 2012). Cotinine is the gold standard biomarker of tobacco exposure as it is the primary metabolite of nicotine metabolism and. can be measured in the serum, saliva, hair, and meconium (Benowitz et al., 2009).

Low birth weight (LBW) is a worldwide problem in developing countries as well as in developed countries, with greater high occurrence in developing countries. LBW newborns are at high risk for adverse health effects such as growth retardation, infectious diseases, developmental delay, and represent the single most important risk factor for neonatal death (Sharma et al., 2019).

### **AIM OF THE STUDY**

The present study was designed to evaluate the possible toxic effects of infant's exposure to Second-Hand Smoke (SHS) on the infant's anthropometric measures follow the growth chart in the subsequent early childhood and assess the benefit of using serum cotinine level in early childhood as a measurable indicator to such toxic exposure.

#### **Subjects & Methods**

**Study Design:** The study design: an observational cross-sectional study with systematic random sampling technique including mothers and their children under two years attending Monfallout's Family Medicine Center for follow-up antenatal care during pregnancy, postnatal care, and child's scheduled immunization in the period of October 2017 to October 2018

**Study Site:** Monfallout's Family Medicine Center of Monfallout District, Assiut Governorate which provides services of antenatal care, postnatal care, immunization of children and family planning services.

#### **Eligibility Criteria**

##### **Inclusion Criteria:**

1- For women: were selected after labor within the first week with age between 20 and 35 years, uncomplicated pregnancy and post-delivery good health conditions were met,

2- For infants were: full-term babies, Apgar score is >7 at 1 min and >9 at 5 min, absence of any anomalies at routine external examination, and normal acceptable values of routine laboratory tests, including serum bilirubin concentration (Age was ranged from one week after birthing up to 18 months).

##### **Exclusion Criteria:**

1- Mothers with history of chronic disease as; hypertension, diabetes, heart respiratory and kidney diseases.

2- Mothers aged less than 25 years or more than 35 years. Major congenital malformation of the newborn fetus.

#### **Data Collection Tools**

##### **1- The study questionnaire**

A pretested structured questionnaire was filled through a face-to-face interview of the mothers to record socio-demographic and other relevant data. Data were collected from all mothers who met the enrollment criteria, were available during the specific period, agreed to participate and signed the study participation consent. The details of the questionnaire were explained to all participants before obtaining their consent for the interview. The questionnaire consisted of questions that covered.

1- Socio-demographic data of the participants; mother's age, type of delivery, age of baby, gender of the baby.

2- The socio-economic status (SES) of the mothers were calculated by using the socio-economic scale prepared by **Abd El-Tawab, 2010** that composed of four main domains (Father and mother education, Father and mother occupation, The total family income, The lifestyle of the family)

a) Smoking status of the participants; exposure of participants to secondhand smoke in the past week, and where the exposure occurs (at the home, car, work and social event). Presence of smoker at the home, the person who smokes. Smokers' behavior (smoke inside the home, smoke inside the home with precautions, smoke outside the home only). Type of smoking (cigarettes, shisha, cigarettes, and shisha), number of cigarettes smoked/day (1–10cigarettes, 11–20 cigarettes, >20cigarettes smoked/day at home), number of shisha sessions/day (1 session – 2sessions– 3sessions), duration of smoking at the home/day (<15 minutes, from 15 up to 30minutes, ≥30minutes)

## 2- Clinical Examination

Complete clinical examination of the children was conducted by the researcher to exclude any congenital anomalies, chronic or debilitating diseases and listening to the mothers to be recruited for the study.

### Anthropometric Measurements.

The data of weight and length of the babies at 6ms and 12ms were collected from their medical reports and were measured at 18 months. Children were weighed in

kilograms with minimal clothes on a pediatric scale with a maximum capacity of 20 kg and an accuracy of 10 gm. An anthropometric wooden ruler used to measure the length in centimeters with a fixed vertical part applied to the head and another mobile piece applied to the feet with the child in a supine recumbent position on a firm surface with knees extended.

### Laboratory Investigations

a) Measurements of babies' hemoglobin level at 12ms were obtained from the reports of the health unit and measured at 18ms (current age). A specimen of capillary blood was obtained from fingertips by using a sterilized blood lancet. Hemoglobin was determined by the cyano-met-hemoglobin method; the blood was immediately diluted and read using a spectrophotometer within 6 hours of being diluted.

b) Serum cotinine level analysis was carried out at the age of 18ms for infants whose mothers accepted the invitation, their No was 400 children. The procedure was to take 3 ml blood from the cubical vein and then centrifugation to separate the serum. Specimens were transferred to Clinical Toxicology and Forensic Chemistry Laboratory, Faculty of Medicine, Assiut University, where specimens were kept at 20 ° C until analysis. Cotinine levels were measured using ELISA kits with used cutoff-point (0.05 to <14 ng/l) to indicate the smoking status of the secondhand smoking children as the following: active smoker status with serum cotinine (≥14 ng/l), non-smoker exposed to SHS status with serum cotinine (0.05 to <14 ng/l), and non-smoker not exposed to SHS status with serum cotinine (<0.05).

### Statistical Analysis

Data analysis was carried out using SPSS version16. Descriptive statistics: quantitative variables were presented in terms of mean ± standard deviation (SD), median while qualitative variables were expressed as frequencies and percentages.

Test of normality (Kolmogorov-Smirnov) was done to determine the type of

distribution of data. Chi-squared tests and Fisher exact tests were used to assess differences between two proportions. Kruskal-Wallis and Mann-Whitney U tests were used to test the median differences of the data because it does not follow the normal distribution. Correlation analysis was used to test the association between variables (Spearman's rank correlation). The probability of less than 0.05 was used as a cut off point for all significant tests.

#### **Ethical Considerations:**

Ethical Approval was obtained from Institutional (IRB) of the Faculty of Medicine, Assiut University, Egypt. Written consent in clear form and indicated the purpose of the study was collected from the participant mothers.

### **RESULTS**

The current study included 400 women and their children (400) attended the Family Medicine Center at Bani Adi Al-Bahariyah Village, Monfallout District, Assiut Governorate conducted

over one year from October 2017 to October 2018. Both subjective (questionnaire) and objective (serum cotinine level) determination of the infants SHS status were investigated along with the

most important SHS determinants (socio-demographic and environmental) and adverse events of the baby.

Table (1) showed the socio-demographic profile of the studied sample with almost equally distributed over different age groups, the educational level of the mothers; (58.25%) had no or low education (42% illiterates and 16.25% read and write), about one-third had basic obligatory education (5.25% elementary, 13.75% preparatory and 18% high school education while those with university education represented less than (5%) of the sample. Concerning the socioeconomic status (SES) of the mothers; the mothers were classified into three classes. Low class (17.5%), middle class (68.75%), while high class (13.75%).

As regards the type of deliveries (51.8%) was by normal vaginal delivery NVD while (48.2%) was by cesarean section CS. Male babies were (51%) while (49%) were female babies. According to direct exposure to smoking at home, more than two-thirds of mothers were with direct exposure to smoking at their homes (68.8%) versus less than one third with indirect home exposure (31.2%).

**Table (1):** Socio-demographic characteristics of the participant mothers (n=400)

Variable	Category	N =400
Age of mother	• 20 – 24	123 (30%)
	• 25 – 29	141 (35.2%)
	• 30 – 35	136 (34.8%)
Socioeconomic status	• Low	70 (17.5%)
	• Middle	275 (68.75%)
	• High	55 (13.75%)
Gender of baby	• Male	204 (51%)
	• Female	196 (49%)
Exposure to Smoking	• Present	275 (68.8%)
	• Absent	125 (31.2%)

Table (2) showed that the husband was the smoking source at home in three-fourths SHS mothers (75.65 %) while the remaining one-fourth of the SHS mothers was exposed to smoke from persons other

than the husband (24.4%). Regarding the type of the smoke, (54.9%) were exposed to the smoke of cigarettes only, (29.1%) exposed to the smoke of shisha only, while (16%) exposed to the smoke of both

cigarettes and shisha. Concerning cigarettes smoked daily; more than half of the smokers (51.3%) smoked more than 20 cigarettes per day, (42.1%) smoked from 11 – 20 cigarettes per day while (6.6%) smoked from 1 – 10 cigarettes per day, while (66.9%) of shisha smokers had twice session per day, (19.4%) smoked more than

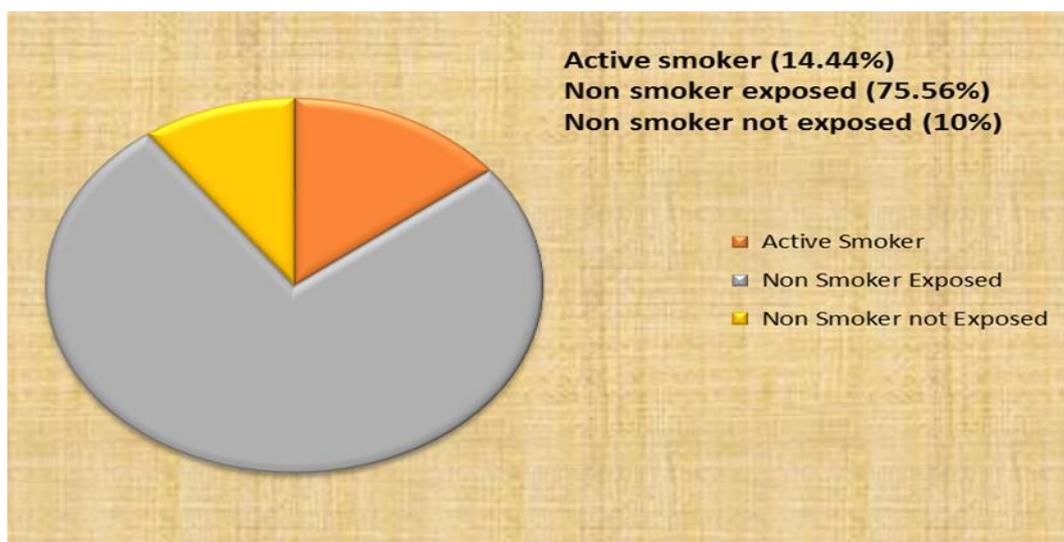
twice session per day, (13.7%) smoked once session per day. Concerning the duration of smoking at home (59.6%) of smokers smoked from 15 to < 30 minutes, (30.2%) smoked  $\geq$  30 minutes, while (10.2%) smoked Less than 15 minutes per day.

**Table (2): Smoking Exposure Characteristics of mothers in the studied group**

Variable	category	N = 275
Smoking person	Husband	208 (75.6%)
	Others than husband	67 (24.4%)
Type of the exposed Smoking	Cigarette	151 (54.9%)
	Shisha	80 (29.1%)
	Cigarette and Shisha	44 (16%)
Number of smoked cigarettes at home / day	(1–10)	13 (6.6%)
	(11–20)	82 (42.1%)
	(>20)	100 (51.3%)
Number of shisha sessions at home	Once	17 (13.7%)
	Twice	83 (66.9%)
	More than twice	24 (19.4%)
Duration of smoking at home / day	<15 min	28 (10.2%)
	15 to < 30 min	164 (59.6%)
	$\geq$ 30 min	83 (30.2%)

Figure:(1) according to traditionally worldwide serum cotinine cutoff for SHS; infants reported to be; active smokers (14.44%), non-smokers exposed to SHS (75.56%), and non-smokers not exposed

(10%). Regarding the SHS, the differences among the median values of the serum cotinine levels (10.4), (10.4), (10.2), of low, middle, and high SHS infants respectively were not statistically significant.



**Figure (1): Status of SHS Infants according to Serum Cotinine Level**

Table (3) showed that: At birth, there were highly statistically significant

differences between median birth weight (3), median birth length (50) of babies

regularly exposed to smoking from one side, and median birth weight (3.2), median birth length (51) of babies not exposed on the other side. As regards babies at 12 months the differences among median values of weight (9.2), length (71), of babies regularly exposed from one side and median values of weight (9.9), length (72), of babies not exposed on the other side were highly statistically significant. Lastly, at age of 18

months the difference in the median value of weight (10.8), of babies regularly exposed and the median value of weight (11) of babies not exposed was statistically significant, but the difference in the median values of length (78), (79) of babies regularly exposed and of babies not exposed respectively was not statistically significant.

**Table (3):** anthropometric measures of SHS regularly exposed and not exposed babies.

	<b>Babies Regularly Exposed to SHS</b> Mean $\pm$ SD Median (Range)	<b>Babies Not Exposed to SHS</b> Mean $\pm$ SD Median (Range)	<b>p- value</b>
<b>Weight/kg</b>			
<b>At birth</b>	• 3.06 $\pm$ 3.84	3.18 $\pm$ 0.40	= 0.002
<b>At age of 12ms</b>	• 9.2 $\pm$ 1.04	9.65 $\pm$ 1	< 0.001*
<b>At age of 18ms</b>	• 10.5 $\pm$ 1.13	10.98 $\pm$ 1.24	= 0.027
<b>Length/cm</b>			
<b>At Birth</b>	• 50.20 $\pm$ 1.26	50.56 $\pm$ 1.12	= 0.007
<b>At age of 12ms</b>	• 71.35 $\pm$ 1.73	72.27 $\pm$ 2.07	= 0.002
<b>At age of 18ms</b>	• 78.16 $\pm$ 2.23	78.23 $\pm$ 1.92	= 0.583

Mann-Whitney test

Table (4) revealed that highly significant differences between Hemoglobin levels of regularly exposed babies to SHS and

Hemoglobin levels of not exposed babies to SHS. HB level was measured at the age of 12ms and at the age of 18ms

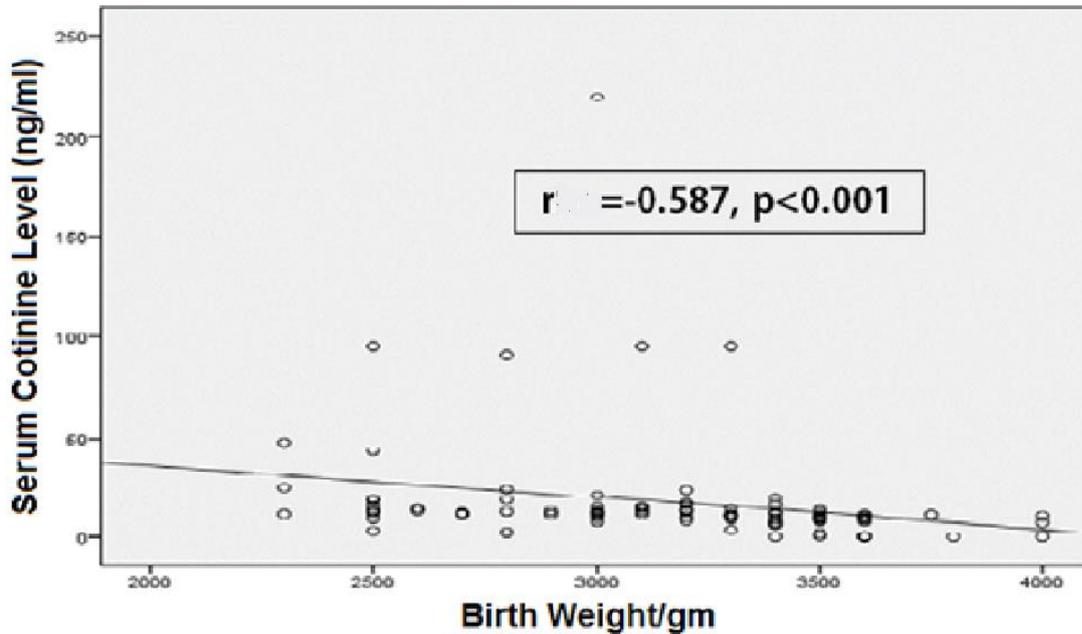
**Table (4):** Hemoglobin level of SHS Regularly Exposed and Not Exposed Babies

<b>Items</b>	<b>Babies Regularly Exposed</b> Mean $\pm$ SD Median (Range)	<b>Babies Not Exposed</b> Mean $\pm$ SD Median (Range)	<b>p- value</b>
<b>Hemoglobin (mg/dl)</b>			
<b>at age of 12ms</b>	10.12 $\pm$ 0.52 10.2 (9 - 11)	10.33 $\pm$ 0.69 10.5 (9 - 12)	= 0.008
<b>at age of 18ms</b>	10.59 $\pm$ 0.60 10.75 (9 - 12)	10.83 $\pm$ 0.60 11 (9.50 - 12)	= 0.001*

Mann-Whitney test

Figure (2) revealed a negative moderate spearman rank correlation between serum cotinine levels and birth

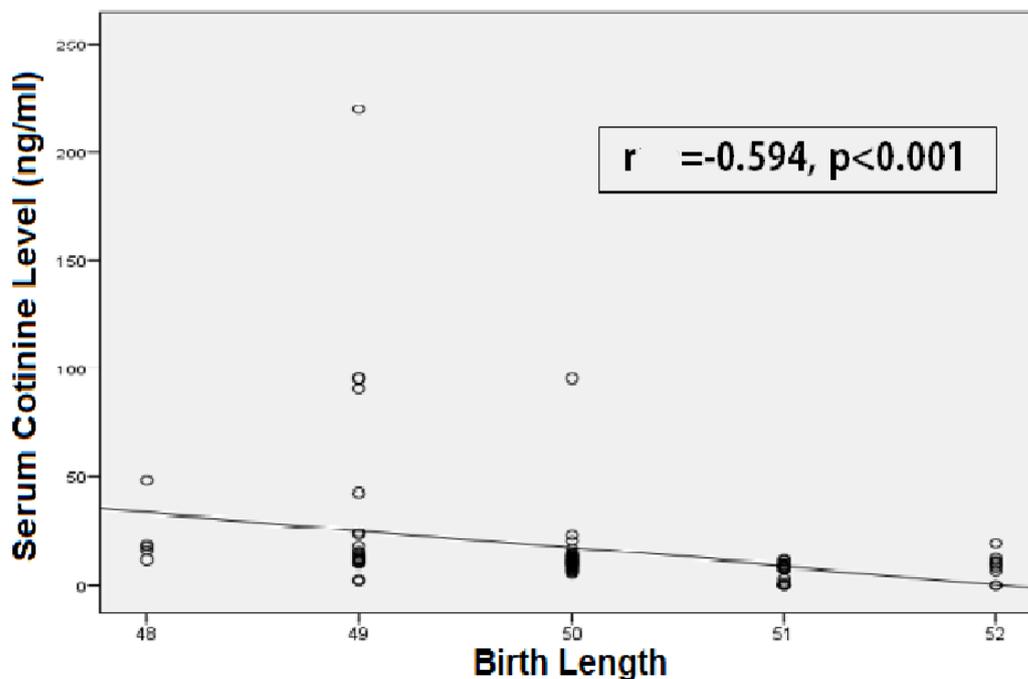
weights of babies ( $r = -0.587$ ) at a level of significance  $p < 0.001$



**Figure (2):** Correlation between Serum Cotinine Level at birth and Birth Weight

Figure (3) revealed a negative moderate spearman rank correlation between serum cotinine levels and birth

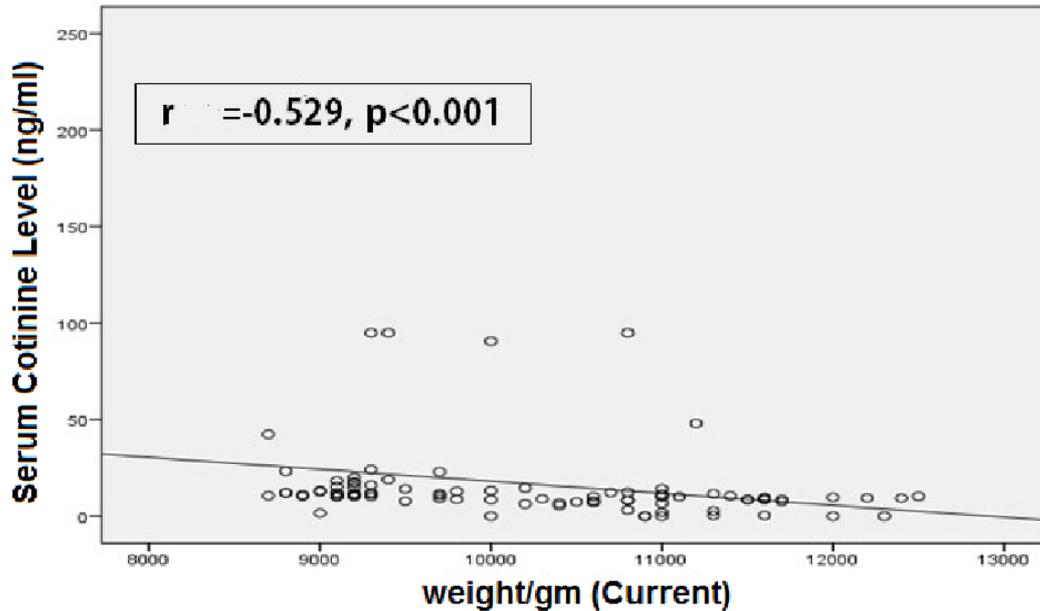
lengths of the babies ( $r = -0.594$ ) at a level of significance  $p < 0.001$



**Figure (3):** Correlation between serum cotinine level at birth and Birth Length

Figure (4) revealed a negative moderate spearman rank correlation between the serum cotinine levels and the

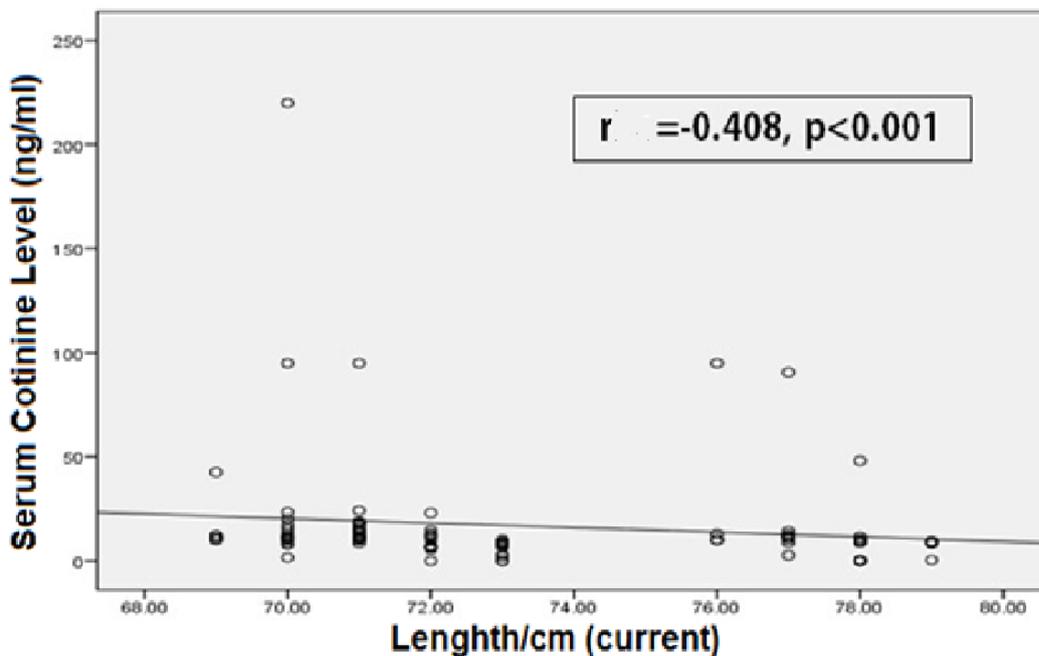
current lengths of the babies ( $r = -0.408$ ) at a level of significance  $p < 0.001$



**Figure (4):** Correlation between the serum cotinine level and the weight of babies at 18ms

Figure (5) revealed a negative moderate spearman rank correlation between the serum cotinine levels and the

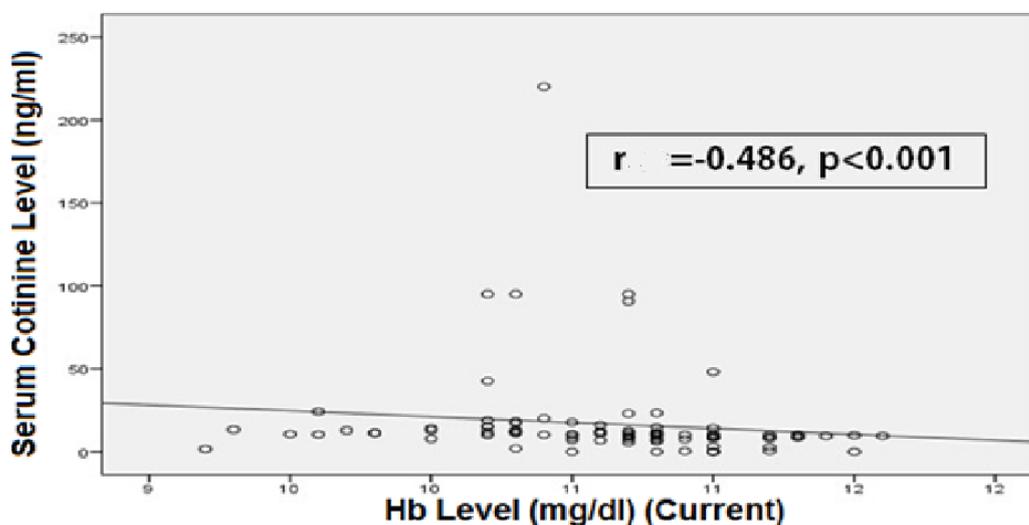
current weights of babies (18ms) ( $r = -0.529$ ) at a level of significance  $p < 0.001$



**Figure (5):** Correlation between the serum cotinine level and the length of babies at 18ms

Figure (6) revealed a negative moderate spearman rank correlation between the serum cotinine levels and the

current hemoglobin levels of babies ( $r = -0.486$ ) at a level of significance  $p < 0.001$



**Figure (6):** Correlation between Serum Cotinine Level and Hemoglobin Level

### **DISCUSSION**

Exposure to passive tobacco smoke significantly contributes to increase in childhood morbidity and mortality. Infants and children are the most susceptible age groups to the grave effects of tobacco smoke, in addition to paternal smoking inside the home leads to significant passive maternal exposure to ETS with subsequent fetal health hazards, including intrauterine growth retardation, perinatal mortality, respiratory illness, neurobehavioral impairments, and decreased intellectual performance (**Hwang et al., 2004**).

The current study included 400 mothers with their infants that were attending Family Medicine Center for immunization sessions, the participated mothers were housewives of low and middle socioeconomic status from rural areas, with the commonest site of exposure was at home, the husband was the main source of exposure, these results are in consistence with a study conducted by **Lin and his colleagues, 2010**, among mothers of pre-school children in Taiwan and also are in accordance with result of a study

conducted by **Reddy and his colleagues, 2018** in Sichuan Province of China. Simple explanation of these findings are the various social and cultural norms are present in rural communities that make them vulnerable to male dominance, furthermore, living in a rural area with lower level of education increase the risk of SHS exposure at home. Eexposure to smoke at home was the main source of exposure, this result was similar to result of a study conducted by **Hawthorne and his colleagues, 2008** and reported that 88% of the surfaces in both living rooms and infant bedrooms were contaminated by nicotine and other tobacco smoke particulates, this can be explained by the long stay periods of the parents at home due to early day hours work and lack of recreational activities in rural areas compared to urban areas.

In the current study SHS children are divided into three groups according to the level cotinine, nicotine is the widely used marker of tobacco smoke exposure as it is it is highly specific to tobacco smoke and easily measured. Assessment of passive smoking exposure by self-reported

measures is subjective so inaccurate while cotinine as a primary metabolite of nicotine and of high specificity and sensitivity, is the best available biomarker of tobacco exposure (Wang et al., 2014). Jeemon and his colleagues, 2010 reported through their study that serum cotinine is preferred than other serum markers such as carboxyhemoglobin (COHb) or thiocyanate. This is partly because cotinine is specific to tobacco smoke, whereas COHb and thiocyanate may be present because of exposure to environmental pollutants. Further, nicotine and COHb have a much shorter half-life as compared with cotinine (Jeemon et al., 2010). Serum cotinine is used to assess the severity of SHS exposure in the infancy period, the participant young children were divided into as active smokers in (14.44%), non-smokers exposed to SHS (75.56%), and non-smokers not exposed to SHS (10%) by using the worldwide traditional serum cotinine cutoff-point (14 ng/ml). this means relatively high exposure to SHS and can be explained by: high percentage of the smokers presence at home (68.8%), the source of smoking was the husbands by percentage (75.6%), in addition to (45%) of smokers smoke shisha either shisha only or with cigarettes at home, Since women often prepared shisha for men indoors where they smoked to try shisha and to make sure they work efficiently, they did not consider it as kind of smoking, or in other words they had underestimation of exposure to SHS. Regarding, relationship between the Growth parameters of children and serum cotinine level; there was a negative moderate spearman rank correlation between weight, length (currently and at birth) and serum cotinine level, this finding was in accordance with another study aimed to examine the relationship of birth outcomes to the timing and intensity of states of SHS and reported a significant inverse relationship between cotinine level and infant weight, length, and head circumference at birth, after adjustment variables known to influence

these birth outcomes (Windham et al., 2000).

Many studies reported association between regular maternal exposure to SHS and adverse effects on the anthropometric measures of their babies, one of these studies is of Leonardi and his colleagues (2008) and reported that; the infants of exposed women to SHS during pregnancy were on average of 33–40 g weight lesser than the infants whose mothers not exposed to SHS during pregnancy. Also, babies born to mothers exposed to SHS during pregnancy were found to be at 20-30% increased risk of being born at low birth weight (Leonardi-Bee et al., 2008). Furthermore, Salmasi and his colleagues (2010) found that infants of SHS exposed women were at increased risk of low birth weight, congenital anomalies and smaller head circumferences.

Regarding the effect of SHS exposure on height, a study on the effect of maternal exposure to passive smoke during pregnancy and preschool age on linear growth from birth to adolescence age that was in Brazil concluded that the exposure to tobacco smoke in the prenatal and postnatal periods had negative effect on height until adolescence; children who were exposed to prenatal and postnatal tobacco smoke were shorter since birth until adolescence compared with those who were not exposed (Muraro et al., 2014). These previous results were matched with our results which showed that, median weight and length of babies at birth whose mothers were exposed to SHS during pregnancy were about 200 gm, and 1 cm less than the median weight and length of babies whose mothers were not regularly exposed to SHS (not lived with smoker). Furthermore, another previous study revealed the reduction of mean weight and length were 251 gm and 1.73 cm respectively (Eftekhari et al., 2016), on the other side a study conducted in India aimed to determine exposure to SHS among pregnant women and their association with LBW, failed to show any association between exposure of mothers to

SHS during pregnancy and low birth weight of their infants (**Krishnamurthy et al., 2018**).

One of the most important findings on the present study is the reduction in weight and length of children at age of 12, 18 months in babies regularly exposed to SHS (lived with smoker) compared with babies not exposed to SHS and this difference was statistically significant, which may points to the long standing and chronic health hazards of exposure to SHS, these results were consistent with results of a prospective cohort study conducted in Iran which concluded that the exposure to SHS has adverse effects on height and weight, increase during the first four months of life, these effects emphasize the importance of enforcing a complete smoking ban during the infancy periods and not only during pregnancy (**Baheiraei et al., 2015**).

The present study showed that the exposed babies to SHS had hemoglobin level significantly lower than the babies not exposed to SHS and this difference, this finding was in agreement with finding of a study in Jordan, April 2007 to examine the effects of passive of smoking on anemia in children aged 0–35 months, concluded that there is highly statistically significant after association of passive smoking from both parents with anemia in children after adjusting the effects of risk factors and the other confounding factors (**Hong et al., 2007**). Multiple studies revealed that newborns and young children passively inhaling tobacco smoke experienced disorders of iron, hemoglobin, and red blood cell metabolism, leading to the early development of anemia, passive smoking also slows the rate of the replacement of fetal hemoglobin or carboxy-hemoglobin by normal hemoglobin causing red blood cell impairment and anemia (**Hong et al., 2007**).

### **CONCLUSION**

Tobacco smoking is considered a custom and addiction primarily of men, leaving mothers and children involuntary or

passive smokers. Regular Prenatal and postnatal ETS lead to a dose-dependent decrease in weight and length of babies at birth, as well as associated with reduced weight, length and hemoglobin level in different stages later on in their life. Cotinine as a primary metabolite of nicotine and of high specificity and sensitivity, is the best available biomarker of tobacco exposure and can be used for an accurate and measureable assessment of passive smoking exposure in children.

### **COMPETING INTERESTS**

The authors declare that there are no conflicts of interest.

### **FUNDING**

The author received no funding for this work.

### **LIST OF ABBREVIATIONS**

ADHD: Attention Deficit Hyperactivity Disorder  
 C S: Cesarean Section  
 ETS: Environmental Tobacco Smoke  
 HG: Hemoglobin  
 LBW: Low Birth Weight  
 NVD: Normal Vaginal Delivery  
 SHS: Second-Hand Smoke  
 SES: Socio-Economic Status  
 WHO: World Health Organization

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## السلبى للتدخين مستوى الكوتينين كمؤشر كيميائى للتأثيرات السامة للتعرض على تدابير قياس الجسم للرضع

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يعتبر تدخين التبغ أحد أهم عوامل الخطورة المرتبطة بالسلوك، ويرغم أنه يتناقص في جميع أنحاء العالم وفي العديد من البلدان، يبدو أن انتشار تدخين التبغ يتزايد في إقليم شرق المتوسط والمنطقة الأفريقية، ويعد تدخين التبغ من العادات الأكثر انتشاراً بين الرجال، تاركين الأطفال وأمهاتهم مجبرين على تنفس هواء ملوث بالدخان أو ما يعرف بالتدخين السلبى، وقد وجد أن أكثر الأماكن شيوعاً لتعرض الأطفال وأمهاتهم لدخان التبغ هي البيوت وأن ذلك هو بسبب تدخين الآباء وغيرهم من أفراد الأسرة. تهدف الدراسة إلى تقييم الآثار السامة للتعرض في الفترة ما بعد الولادة للدخان السلبى على القياسات الجسدية للرضيع وتقييم فائدة استخدام مستوى الكوتينين في مرحلة الطفولة المبكرة كمؤشر قابل للقياس لمثل هذا التعرض لفترة ما بعد الولادة. الدراسة الحالية دراسة مقطعية رصدية تشمل الأمهات وأطفالهن (أقل من عامين) اللاتي حضرن مركز طب الأسرة في منفلوط من الفترة من أكتوبر 2017 إلى أكتوبر 2018 اشتملت الدراسة على جمع بيانات من عدد 400 أم أثناء قدومها إلى الوحدة الصحية لتطعيم أطفالهن، وتم جمع معلومات عن حالة التدخين بالمنزل المشاركات تجاه التدخين السلبى، كما شمل جمع البيانات وزن وطول الرضع بعد الولادة، عند عمر 12 شهر، و عمر 18 شهر ومستوى الهيموجلوبين عند عمر 12 شهر، عمر 18 شهر، مأخوذة من سجلات مركز طب الأسرة، بالإضافة إلى عمل تحليل لمعرفة مستوى الكوتينين بالدم للأطفال على عمر سنة

وبناءً على ما ذكره الأمهات فإن نسبة (72,5%) منهن قد تعرضن للتدخين السلبى مقابل (27,5%) منهن لم يتعرضن خلال الأسبوع الماضى، وأن نسبة (81,7%) من الأمهات المعرضات للتدخين السلبى كان ذلك داخل بيوتهن، وأن المصدر الرئيسى لتعرضهن للتدخين السلبى كان الزوج بنسبة (75,65%)، وأن (68,8%) من المشاركات يعشن مع مدخن واحد على الأقل في بيوتهن، أما استناداً إلى مستوى الكوتينين بالدم فإن الأطفال تم تقسيمهم حسب نسبة الكوتينين بالدم عند الأطفال إلى (1,1%) يعتبرن يدخن، (89,9%) منهم غير مدخنين و لكن تعرضوا للتدخين السلبى خلال الأسبوع الماضى، وأن (10%) منهم فقط غير مدخنين ولم يتعرضوا للتدخين السلبى

1) واستناداً إلى تقرير الأمهات، فإن المقارنة بين الأطفال المعرضين للتدخين السلبى والأطفال غير المعرضين للتدخين السلبى فقد تبين وجود علاقة ذات دلالة احصائية بين تعرض الحوامل للتدخين السلبى وولادة اطفال أنقص في الوزن وأقل في الطول عن الأطفال المولودين لأمهات لم يتعرضن للتدخين السلبى أثناء فترة حملهن. كان هناك فرق معتد به إحصائياً للغاية بين متوسط الوزن ومتوسط الطول لعمر السنة عند الأطفال المعرضين بشكل منتظم للتدخين السلبى، بالإضافة إلى انخفاض متوسط الوزن والطول ومستوى الهيموجلوبين في مراحل مختلفة لاحقاً في حياتهم مع زيادة في مستوى الكوتينين في السيروم. وأوضحت النتائج أن الأطفال المعرضين للتدخين السلبى أنقص في الوزن وأقل في الطول عن الأطفال غير المعرضين عند عمر 12 شهر، وأنقص في الوزن فقط عند عمر 18 شهر وهذه العلاقة ذات دلالة احصائية. بالإضافة لوجود علاقة ذات دلالة احصائية بين ارتفاع مستوى الهيموجلوبين بالدم في الأطفال الغير معرضين للتدخين السلبى عن الأطفال المعرضين. وتوصى الدراسة بالحاجة إلى استراتيجيات للحد من تعرض الأمهات والأطفال للتدخين السلبى داخل المنازل والحاجة إلى مزيد من الدراسات لكشف الأضرار المرتبطة بالتدخين السلبى - خاصة فيما يتعلق بالحوامل والأطفال، وكذلك زيادة الوعي والتطبيق للإجراءات التي يمكن أن تتخذها الأمهات لحماية أنفسهن وأطفالهن من التعرض للتدخين