Original Article

APGAR Score and Neonatal Growth Parameters in Neonates of Mothers Passively Exposed to Cigarette

APGAR Score & Neonatal Parameters in Mothers Exposed to Passive Smoking

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ABSTRACT

Objective: To observe the relationship of low birth weight, head circumference, length and APGAR Score in different groups of different exposure to smoking with control group of non-exposed mothers.

Study Design: Cross-sectional comparative study

Place and Duration of Study: This study was conducted at the Physiology Department of Sheikh Zayed Postgraduate Medical Institute, and Gynecology & Obstetrics Department of Sheikh Zayed Hospital, Lahore for one year from October 2018 to August 2019.

Materials and Methods: This was a cross-sectional comparative study in which neonatal were measured and compared in 120 subjects divided in four groups i.e. non-exposure, 1-5 cigarette exposure, 6-10 cigarette exposures, more than 10 cigarettes per day.

Results: Mean APGAR score and birth weight were significantly different in the study groups. Neonatal head circumference of group 1 was statistically significant as compared to group 4 while mean length of the neonates was not statistically significant.

Conclusion: Passive or second hand smoking have an effect on APGAR score and neonatal growth parameters.

Key Words: APGAR Score, Cigarette Smoking, Fetal length.

INTRODUCTION

Second-hand smoking (SHS), also known as passive smoking, is the outcome of exposing a nonsmoker to tobacco smoke, often in a confined space.[1] Passive smoking has a detrimental impact on neonatal health, birth weight, and other factors. Passive smoking poses a significant risk for respiratory illnesses[2].

The development of the fetus during the intrauterine period affects the birth weight of the fetus in humans. Infant mortality and birth weight are hypothesized to be negatively associated[3].

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Obstetricians are worried about the development of the growing fetus since it is linked to various morbidities that may have long-term effects in addition to stillbirth. The second most significant factor to cause low birth weight in the human fetus is intrauterine growth restriction (IUGR). Normal birth weights should range between 2500 and 4200 grams when a baby is born at term.

Infants born to moms who smoke have a higher likelihood of low birth weight than those born to mothers who don't smoke. Second-hand smoke exposure (SHS), raises the risk for low birth weight[4,5] and is a significant contributing factor. There are an alarmingly high number of Low birth weight instances in Pakistan, estimated to be 12–25%[6].

Virginia Apgar, a physician and anesthesiologist, created the Apgar score, a technique for assessing a newborn's health at delivery. It is measured at one minute and then at five minutes after birth. It is evaluated against a scale from one to ten; out of which two scores for each clinical signs i.e. heart rate, muscle tone, reflex irritability, color and respiratory efforts. Low Apgar at five minutes is associated with increased incidence of mild to moderate adverse neurological outcomes[7].

The baby's length influences how tall he or she will be as an adult. This association is more evident in kids born between 39 and 41 gestational weeks than Preterm births[8].

One of the other parameter that is measured at birth is the Head Circumference (HC). Measurement of the HC lies in the fact that it can be used as a reference for monitoring growth of central nervous system, child health and conditions like microcephaly and megacephaly[9].

One of the risk factors that is modifiable to reduce the likelihood of adverse pregnancy outcomes is exposure to tobacco smoke during pregnancy. According to studies, smoking during pregnancy has a number of negative impacts on the mother's and the unborn child's health. Some of them include improper placental implantation, early rupture of the amniotic sac membrane, placental rupture, premature birth, stillbirth, low birth weight and sudden infant death syndrome[10,11].

MATERIALS AND METHODS

The cross-sectional comparative study was conducted in Physiology Department of Sheikh Zayed Postgraduate Medical Institute, in collaboration with Gynecology and Obstetrics Department of Sheikh Zayed Hospital, Lahore and Emergency Labor Room of Sir Ganga Ram Hospital, Lahore. Study was carried out after permissions from the respective head of departments.

Study Population: The population of my study included 120 neonate born to females between 20 to 35 years of age All females were full term i.e. 38+ week

Inclusion criteria:

The study comprised the following neonatal mothers:

- Normal pregnancy of 37 to 40 weeks with no family history of gynecological issues.
- 20 to 35 years of age.
- Single pregnancy.
- Women belonging to same socioeconomic class.
- Control group: pregnant female who weren't exposed to passive smoking
- Study group: pregnant female who were exposed to tobacco smoke by indoor smoking.

Exclusion criteria:

Following were excluded from the study,

- Diabetes
- Hypertension
- Respiratory, Cardiovascular disease
- Smoking mothers
- Drugs and alcohol addicts
- Pregnancy complications like anemia, poor weight gain, IUGR.

Sample Size: Using a 90% power of the test and a 95% confidence level, the size of the sample was computed. Its size was estimated to be 120. The sample was then split into four groups, each with 30 subjects.

Sample Technique: Convenient sampling/ non-probability sampling was done.

Data Collection: The total sample size was then divided up into four groups based on the rate of smoking exposure.

- Non-exposed i.e. control group (Group 1) n = 30
- SHS exposure of less than 05 cigarette per day (Group 2)   n = 30
- SHS exposure of 05 to 10 cigarette per day (Group 3)   n = 30
- SHS exposure of more than 10 cigarette per day (Group 4)   n = 30

The Ethical Committee's approval was obtained before the study was carried out. In order for their newborns to participate in this research project, pregnant women who met the inclusion criteria were requested for written informed permission.

In order to collect information, a questionnaire was developed. It was self-administered and answered by the subjects in the postnatal ward. Personal data which included name, age and weight at first visit was recorded from the antenatal cards. Height, education and employment status was also noted.

Height was determined using a stadiometer, and weight was determined in kilograms using a baby weighing equipment available in the labor and delivery department. Following information was obtained through questionnaire:

- Demographic data of mother (her age, education)
- Exposure of cigarettes smoked daily (on average)
- Medical history
- Baby examinations like measuring weight, height and head circumference.

A thorough history and examination were conducted, and the Performa was utilized to record the birth weight.

Statistical Analysis: Data was analyzed by using SPSS version 20.0. Data for length, weight, HC and APGAR for fetus was described by using Mean ± SD if normally distributed and Median with inter quartile range otherwise. One way ANOVA followed by Tukey's test were used to compare the groups. P-value ≤0.05 was regarded as statistically significant.

RESULTS

Neonatal Birth Weight: 3.31 ± 0.50 was Mean birth weight (kg) in group 1, 3.00 ± 0.28 in group-2, 2.92 ± 0.48 in group-3 and 2.66 ± 0.41 in group-4 (Table 1). Neonatal mean birth weight and their mothers' secondhand smoke exposure were inversely correlated.. Comparison of neonatal birth weight was made by using one way ANOVA which showed statistically significant difference between different study groups as p-value is less than 0.05. Post Hoc Tukey test showed that neonatal birth weight of group 1 was statistically significant as compared to other groups as p-value with

group 2, group3 and group 4 were 0.024, 0.003 and 0.000 respectively.

Table No.1: Showing comparison of neonatal weight (kg) among groups 1, 2, 3 and 4

		Mean	S.D	Min.	Max.	p-value
Weight (kg)	G-1(n=30)	3.31	0.50	2.30	4.40	
	G-2(n=30)	3.00	0.28	2.40	3.50	
	G-3(n=30)	2.92	0.48	2.00	4.00	0.001*
	G-4(n=30)	2.66	0.41	2.00	3.50	
	Total(n=120)	2.97	0.48	2.00	4.40	

* The mean difference is significant at the 0.05 level

Neonatal Head Circumference: Mean head circumference (cm) of neonates in was 34.63 ± 1.63, 34.00 ± 1.41, 33.87 ± 1.71 and 33.03 ± 1.03 in group respectively (Table 2). Mean head circumference of newborns likewise revealed a inverse relationship with mothers' SHS exposure. Comparison of neonatal head circumference was made by using one way ANOVA which showed statistically significant difference between different study groups as p-value is less than 0.05. Post Hoc Tukey test showed that value of neonatal head circumference of group 1 was statistically significant when compared to group 4 as p-value was less than 0.05.

Table No.2: Comparison of Mean neonatal head circumference (cm) in study groups

		Mean	S.D	Min.	Max.	p-value
HC (cm)	G-1(n=30)	34.63	1.630	31.00	39.00	
	G-2(n=30)	34.00	1.410	31.00	37.00	
	G-3(n=30)	33.87	1.710	31.00	38.00	0.001*
	G-4(n=30)	33.03	1.030	31.00	35.00	
	Total(n=120)	33.88	1.562	31.00	39.00	

* The mean difference is significant at the 0.05

Neonatal Length: Neonates in groups 1, 2, 3, and 4 had mean lengths of 49.30 1.70 cm, 48.77 1.47 cm, 49.40 2.12 cm, and 48.53 1.65 cm, respectively. It was observed that newborns belonging to various groups did not differ in length significantly.

Comparison of Apgar score: Mean Apgar score of neonate at 1 minute in group-1 was 6.43 ± 0.935, in group-2 was 6.40 ± 0.674, in group-3 was 6.27 ± 0.944 and in group-4 was 5.57 ± 0.897 (Table 3). It was seen that there was significant difference in Apgar score of neonates at 1st minute belonging to different groups as p-value was less than 0.05.

Table No.3: Comparison of Apgar score in all study groups

		Mean	S.D	Min.	Max.	p-value
APGAR score at 1 minute	G-1(n=30)	6.43	0.935	4.00	8.00	
	G-2(n=30)	6.40	0.674	5.00	7.00	
	G-3(n=30)	6.27	0.944	5.00	8.00	0.001*
	G-4(n=30)	5.57	0.897	5.00	8.00	
	Total(n=120)	6.17	0.928	4.00	8.00	

* The mean difference is significant at the 0.05 level

DISCUSSION

Passive smoking is one of the health risks that is prevalent worldwide and affects many individuals inadvertently. In our society, additional household members besides the smoking spouse expose pregnant women to cigarette smoke. Because we are combined families and usually sharing common sitting area. However, studies proved that SHS exposure is contributed mostly by the husband.

Secondhand smoke exposure during pregnancy affected 31% of Saudi women, who gave birth to babies with lower birth weights and shorter length [12]. A study by Sobh et al.[13] showed that newborns of mothers exposed to passive smoking had a statistically significant low weight at birth. Prince et al., also reported lower mean weight, length and head circumference in the newborns of SHS exposed group [14]. These results are in agreement to the results of our study. Anorexia is caused by either active or passive nicotine exposure of fetus during pregnancy. [15].

Present study revealed that head circumference was significantly different in different groups. There was inverse correlation between head circumference and cotinine level but this correlation was statistically insignificant. Soesanti et al. [16] also stated a lower increment in head circumference in SHS exposure (≥ 23 cigarettes) group. Our study does not find association of length of baby with SHS exposure and cotinine levels.

A recent study in Jordan [17] demonstrated lower first minute APGAR score in accordance with our results which showed statistically significant difference of APGAR score among groups. All these parameters are indicative of the effect of SHS on neonatal growth.

CONCLUSION

Passive or second hand smoking have an effect on APGAR score and neonatal growth parameters.

Recommendations: The general public should be made aware of the risks associated with SHS, and pregnant women in particular should be counseled to avoid both active and passive smoking.

Author's Contribution:

Concept & Design of Study:	Wardah Anwar
Drafting:	Masooma Ahmad, Maria Ilyas
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Revisiting Critically:	Wardah Anwar, Masooma Ahmad
Final Approval of version:	Wardah Anwar

Conflict of Interest: The study has no conflict of interest to declare by any author.

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