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Research Article

**A CASE CONTROL RESEARCH ON THE EFFECTS OF
CHEWABLE AND NON-SMOKED CHEWABLE TOBACCO
ON PLACENTAL MORPHOLOGY OF THE TOBACCO
USERS**¹Aroosa Saleem, ²Dr. Humna Umer, ³Dr Fareha Amin¹Mayo Hospital Lahore.²Jinnah Hospital Lahore.³MBBS, Sargodha Medical College Pakistan.**Abstract:**

Objective: The study is focused on assessment and relationship of morphological changes happening in the placenta of mothers who used to chew tobacco and placenta of non-tobacco users.

Methodology: This case-control study was carried out at Mayo Hospital, Lahore (Obstetrics, Gynecology and Anatomy Department) during the timeframe one year starting from June, 2016 to June, 2017. A total of sixty subjects were selected and divided into two groups. Group 'A' comprised of placenta of 30 non-smoked tobacco users whereas Group 'B' consisted of 30 placenta of tobacco users. The features considered during the evaluation were shape, site of attachment of umbilical cord, weight, and central and peripheral thickness of placenta of both groups.

Results: The average value for weight of placenta for Group A was (444.56 + 112) gm and for Group B was 437.8 + 61.94. The mean diameters of the placenta were: (17.50 + 1.8) cm (tobacco users); (17.94 + 1.2) cm (non-tobacco user). The cotyledons difference in the numbers was highly significant ($p < 0.001$). The cotyledons readings were (16.33 + 2.39) and (13.81 + 1.36) for Group 'A' and 'B' respectively. The central thickness of placenta was recorded as (1.94 + 0.59) cm in Group A and (2.49 + 0.47) cm in Group B. The average outer thickness of the placenta in both groups was almost the same; Group 'A' (1.75 + 0.41) cm and Group 'B' (1.74 + 0.44) cm.

Conclusion: Placental morphology is highly affected by the non-smoked use of tobacco and in turn has the potential of adverse affects on the outcome of the pregnancy. Smokers' placenta are even more complex as compared to non-smoked chewed form of tobacco users.

Keywords: Placenta, Non-Smoked tobacco, Tobacco and Morphology.

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INTRODUCTION:

The connection between mother and the unborn baby (fetus) for nutrient and gaseous interchange is maintained through Placenta. It has two parts, a fetal part and a maternal part. Human placenta is usually a ball or oval shaped flattened mass with a circular or oval outline, but it can be slightly different depending upon the villus and the chorionic sac [1]. Human placenta has two parts in the 4th month of the pregnancy; (a) fetal portion, consisting of chorion frondosum and (b) maternal portion, formed by the decidua basalis. The baby side of placenta is surrounded by the chorionic plate and the maternal side is surrounded by the decidua basalis. The nutrients and gases are interchanged at the feto-maternal barrier which keeps the mother blood away from the embryo in the inter-villous space. This barrier is composed of the fetal vascular endothelial cells and their basement membrane, connective tissue of villi, the sub-epithelial basement membrane, and it's covering of cyto and syncytio trophoblasts [2].

The trend of tobacco use has risen significantly in the recent years especially among adults and teenagers. It is used in different forms, it can be smoked in form of cigarettes, cigars etc. and it can be snuffed or chewed in powdered form. Regardless of its types, tobacco use is capable of transferring materials across the feto-placental membrane and adversely affect pregnancy outcome. Approximately, a total of 3000 active ingredients are available in tobacco smoke. Out of these ingredients, nicotine ensues to be the most dangerous constituent of smoke as it can easily pass through placental barrier due to its high fat solubility [3]. Nicotine effects are obvious in every trimester of pregnancy. Spontaneous abortions among lady smokers are higher during first three months of pregnancy as compared to non-smokers. Increased rate of premature deliveries, increased placental weights and decreased baby weights at the time of births are also associated with nicotine in the final three months. Carbon monoxide, another active ingredient found in tobacco smoke, helps in forming of carboxyhemoglobin. Carboxyhemoglobin creates hindrance in the release of oxygen into fetal tissues. Consequently, the quantity of oxygen required by the embryo is reduced which can lead to other complications during the deliveries [4].

Despite the fact that fetal concentrations are 15% higher than maternal concentrations, nicotine is easily passed through placenta to the fetal portion due to its high fat solubility. Cotinine, the main metabolite of nicotine, has serum concentrations ten times higher than nicotine and a higher half-life of (15 – 20) hours. Thus, cotinine features and interaction with placentae is considered to be a

better index of nicotine exposure due to longer half life and greater serum concentrations. Once nicotine is passed to the fetal portion, it mixes with fetal blood, fluid and breast milk. In this way, the effects of nicotine are not limited till the time of the birth but these continue after birth. Lady nicotine users are marked with elevated maternal plasma concentrations which contributes to increase the maternal blood pressure and reduces maternal and fetal vascular prostaglandin I₂ (PG I₂) particularly in the placenta and umbilical cord. The risen blood pressure along with reduced PGI₂ by nicotine will reduce the placental blood flow causing the chorionic villi suffer from hypoxia. All this will result in morphological changes in placental parts [5].

Pregnant non-smoke tobacco users are prone to Arecoline, another chemical contributing substance which affects placentae in females who uses smokeless tobacco like gutka (betel-quid with tobacco as an ingredient). Like nicotine and cotinine, Arecoline has the matching outcomes in connection with feto-placental circulation. In addition, arecoline affects the autonomic nervous system and endothelial function of umbilical vessels. In this study effects of non-smoked chewable tobacco (pan, gutka, patti etc) on placenta are brought to light. Also, the morphological changes due to use of such type of tobacco is the important part of the study [6].

MATERIAL AND METHODS

A total of 60 placentae after final trimester (full-term placentae) were obtained and divided into two groups. Each group was allotted 30 placentae. Placentae obtained from chewed tobacco users are placed in Group 'A' whereas those obtained from normal non-tobacco users were assigned Group 'B'. The placentae samples were acquired from the Mayo Hospital, Lahore (Obstetrics, Gynecology and Anatomy Department) during the timeframe one year starting from June, 2016 to June, 2017. The activity was carried out in the Postgraduate Laboratory of the said hospital where the samples were kept in labeled vessels. The samples were transferred to the Department of Anatomy. Placentae were washed with fresh water to remove the blood residuals from the maternal portion. Umbilical cords were cut well off the fetal vessels and pressed gently to clean the placentae. The placentae's cavities were detached from the placentae, initial parameters readings were observed. Placentae were then dipped into formalin 10% solution for five consecutive days. Patients were interviewed before obtaining placentae and were investigated about the use of tobacco. Patients whose placentae were included in the study were of comparable weight, height and apparent physique. All subjects were in the age range of 18 – 35 years.

The subjects suffering from associated gynecological diseases, heart diseases and jaundices were excluded from the study. All placentae obtained were of normal vaginal deliveries and elective C sections.

Group A (Full-Term Non-Smoked Chewing Tobacco User)

This group included thirty placentae from addicted mothers.

Group B (Normal Full-Term Placentae)

This group comprised of thirty normal full-term placentae of un-addicted mothers from gravidities that were not complicated by any disease. The apparent characteristics of all the placentae such as shape, weight, diameter, central thickness, spherical thickness, and attachment of umbilical cord were noticed in the beginning.

Statistical Analysis:

Students' t test was utilized to evaluate the statistical

implications of the mean difference for various parameters between both the groups. Statistical tool used for analysis and evaluation for this purpose was SPSS – 19.

RESULTS:

Comparative analysis of placentae from Groups 'A' and 'B' was conducted and statistical techniques were applied to better understand and evaluate the results. The key interpretations were made on the basis of shape, site of attachment of umbilical cord tissues, placenta weight (in grams) and central and exterior thickness of placenta (in centimeters).

Shapes of Placenta: Almost all of the placentae in both groups were spherical or ball shaped. The only exception was a bi-lobed placenta in Group 'A', with one large round portion and another small conical lobe (Figure I).



Figure – I: Bi-lobed placenta

Attachment of Umbilical Cord: Most of the placentae were centrally attached to the umbilical cord (Figure II) in both cases. However, 7 placentae in Group 'A' and 4 placentae in Group 'B' showed marginal attachment (Figure III, Table I).



Figure – II: Central Attachment of the Umbilical Cord

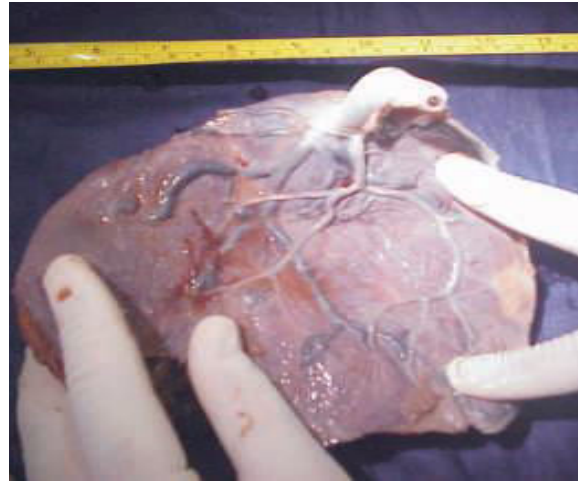
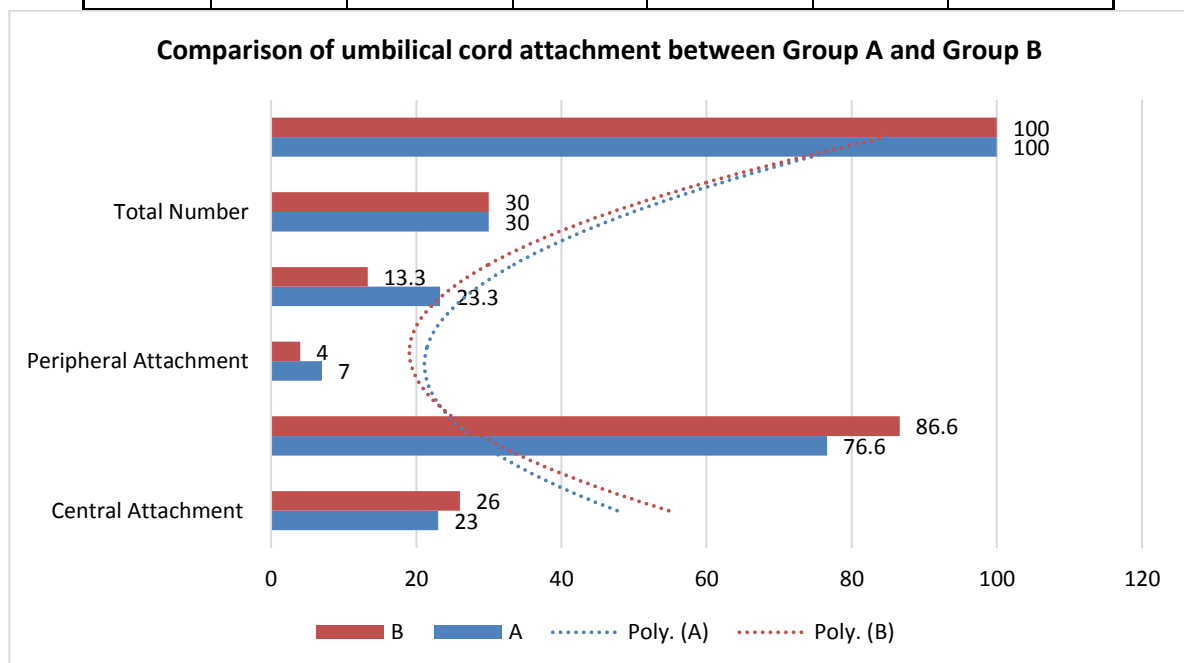


Fig – III: Peripheral Attachment of the Umbilical Cord

Table – I: Comparison of umbilical cord attachment between Group A and Group B (n = 60)

Groups	Central Attachment		Peripheral Attachment		Total Number	
	Number	Percentage	Number	Percentage	Number	Percentage
A	23	76.6	7	23.3	30	100
B	26	86.6	4	13.3	30	100



Attachment of Umbilical Cord

Placenta Weight: Except the bi-lobed placenta rest placentae weighed between 258 – 570 grams. Bi-lobed placentae weighed 770 grams. The average weight of placentae in Group A was (444.56 + 112) grams whereas in Group B, it was (437.8 + 5.61) grams with marginal difference ($p > 0.05$) between the addicted and un-addicted groups (Table – II).

Placenta Diameter: The average diameter readings were (17.50 + 1.8) cm and (17.94 + 1.2) cm for Groups ‘A’ and ‘B’ respectively. No significant ($p > 0.05$) difference was observed between two groups.

Number of Placenta Cotyledons: The numbers of cotyledons in Group A placentae were 16.33 + 2.39

as compared to Group B cotyledons which were calculated to be (13.81 + 1.36). A p-value of ($p < 0.001$) indicated the sufficient difference in the numbers of cotyledons between the normal and effected placentae.

Placenta Central Thickness: The mean value for central thickness of the placentae in cases was (1.94 + 0.59) cm and for controls the value was (2.49 + 0.47) cm, showing a significant difference ($p < 0.001$).

Placenta Peripheral Thickness: The outer thickness of the placentae of both groups showed marginal difference ($p > 0.05$) with Group ‘A’

reading as $(1.75 + 0.41)$ cm and group 'B' reading as $(1.74 + 0.44)$ cm.

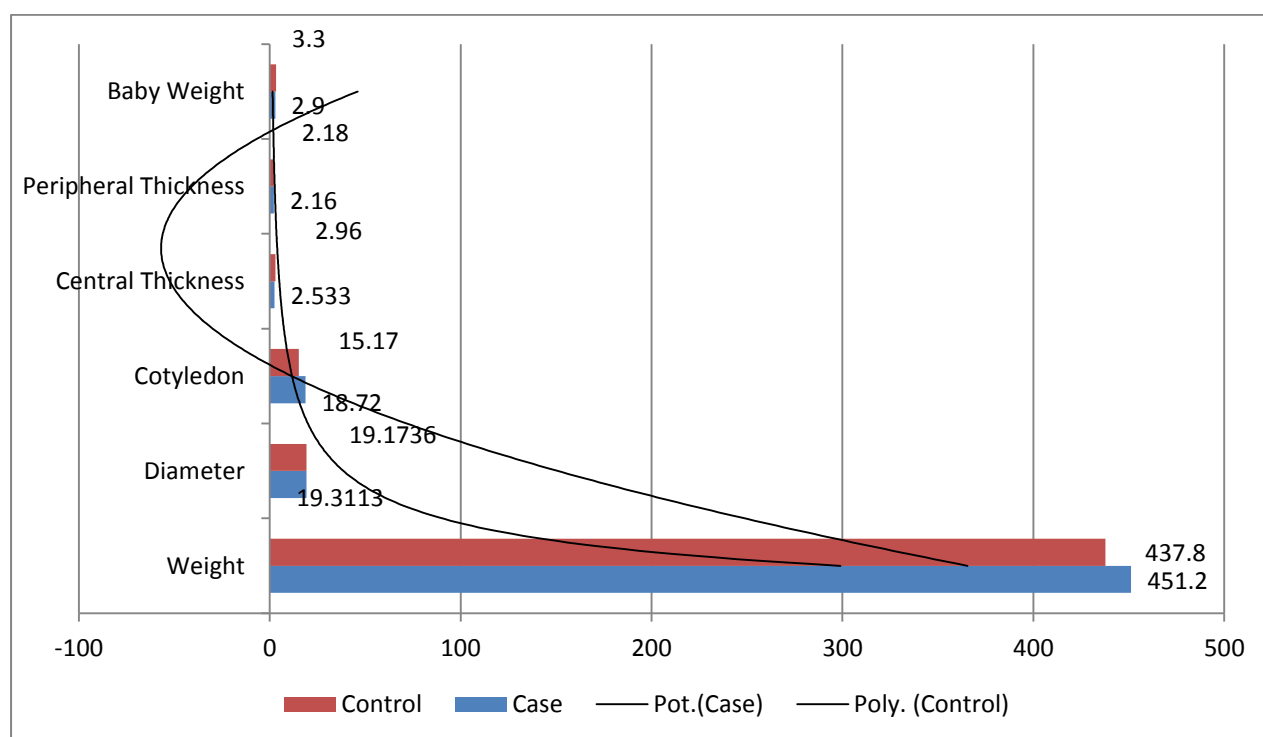
Baby Weight: The weight of the new born babies was directly related to the size of the placentae. In Group 'A', average female infants were weighed about $(2.566 + 0.45)$ kg and in Group 'B', $(3.002 +$

$0.38)$ kg. It was observed that the weight of the babies produced by tobacco addicted mothers was reduced by an average value of 0.44 kg i.e. 440 gm. This is a very significant difference ($p < 0.05$).

Results are expressed as Mean + SD, P value is statistically significant at the level < 0.05 .

Table – II: Comparison of weight, cotyledons, and diameter of placentae between Group A and Group B (n = 60)

Gross Observation	Case n = 30	Control n = 30	P value
Weight of placenta	451.2 + 125.61	437.8 + 61.94	0.6
Diameter of Placenta	17.508 + 1.8033	17.940 + 1.2336	0.28
Cotyledon	16.33 + 2.39	13.81 + 1.36	<0.001*
Central Thickness	1.943 + 0.59	2.490 + 0.47	<0.001*
Peripheral Thickness	1.75 + 0.41	1.74 + 0.44	0.98
Baby weight	2.5+ 0.4	3.0+ 0.3	<0.001*



Placental Parameters in Both Groups

DISCUSSION:

Use of tobacco in chewed form (pan, gutka, betel-quid etc.) is one of the leading factors causing placental changes during pregnancy. It can result in underweight babies as well as premature deliveries with other complications. Nicotine, which is a major ingredient of the tobacco, is readily absorbed in fetal circulation after passing through the concentrations. The situation is even worse in the cases of smoked tobacco because of carbon monoxide. The morphological changes in placentae of chewed and smoked tobacco users are alarming [7, 8]. The key features evaluated in this study were placenta shape, diameter, central and outer thickness, weight of placentae, cotyledons, umbilical cord attachment and baby weights. All the results were almost same

except two categories, number of cotyledons and central thickness of placentae ($p < 0.05$).

The results were matched with the previous available research and material on the subject and found alike. The existed studies argue that the placenta weight increase by the use of any form of tobacco. No such case was observed in this study and upon a deeper investigation it was revealed that it might occur if the subjects use chewed tobacco for almost seven years. Many studies [9] support the argument that placental weight is not commonly increased by the use of non-smoked chewable tobacco. However, mean baby weights of cases in this study were somewhat lower than the mother with normal unaffected placentae.

CONCLUSION:

Continuous use of tobacco in women certainly affects the placental morphology which can cause trouble at the time of baby birth. Smokers are at a greater risk as compared to non-smoked (chewed) tobacco consumers. This is due to the toxic carbon monoxide present in smoke. Awareness and information to the users and potential users of tobacco may be disseminated to curtail the use of tobacco in general and especially among gravid women. The need is to conduct more researches on this topic and explore the adverse effects of other active ingredients on placenta and the morphological changes occurring due to use of tobacco in any form.

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