

Original Article

A Comparative Study on the Weight of Post-Mature and Normal Placentae Not Complicated by Diseases

Fatima Sherin<sup>1</sup>, Ejaz Afzal<sup>2</sup>, Zahid Irfan Marwat<sup>3</sup>, Hamza Sattar Khan<sup>4</sup>

1. Department of Anatomy, Ayub Medical College Abbottabad, Pakistan
2. Department of Anatomy Nowshera Medical College Nowshera, Pakistan
3. Department of Biochemistry Nowshera Medical College Nowshera, Pakistan
4. House Officer Ayub Teaching Hospital Abbottabad, Pakistan

**Correspondence: Ejaz Afzal**

Associate Professor, Department of Anatomy, Nowshera Medical College, Nowshera.

Email: [drezafzal@yahoo.com](mailto:drezafzal@yahoo.com)

Cell: 0333-5023727

**ABSTRACT**

**Background:** The placenta has a very important function because it provides nutrients, and oxygen for the fetus. Differences in placental weight, especially between normal term and post-mature placentae, may characterize the function and fetal health results. Late pregnancies might result in a state of placental dysfunction or adaptation, which will normal affect weight and efficiency.

**Objectives:** In order to investigate post-mature placental weight variability with reference to normal placental weight in uncomplicated pregnancies and then evaluate the theoretic relevance of such distinctions.

**Study design:** A descriptive cross-sectional study

**Place and duration of study.** Department of Anatomy Ayub Medical college ,Abbottabad from jan 2017 to july 2017

**Methods:** This is a descriptive cross-sectional study targeting 100 pregnant women; 50 with post-mature pregnancy, and 50 with normal term pregnancy. Birth weight and placental weight were assessed soon after the birth of the baby. Data was then analysed for differences in the mean placental weight between the two groups using SD and using p-values to establish the probability of significance. Statistical tests utilised in the data analysis were t-tests targeting the differences in the means between groups.

**Results:** In normal pregnancy mean placental weight was measured to be  $570 \pm 40$  grams and in post-mature pregnancy  $510 \pm 60$ grams. The analysis of placental weight produced a statistically significant difference in the two groups ( $p < 0.05$ ). Placental calcification was strongly noted in post mature placentae. The mean value of SD in the normal group was smaller and ranged than that of the post-mature group, it indicates that there was a small variance in the normal group than in the post-mature group.

**Conclusion:**Following mature placentae, the weight of ;placentae is generally less than that of normal placentae because of placental aging and calcification. This paper underscores the need for observing placental integrity in prolonged pregnancies with a view of avoiding complications in placental sufficiency. Such changes may have effects on the fetal outcomes, and further research can improve the knowledge about those effects.

**Keywords:** Birth weight placenta, post mature, normal pregnancy, placental calcification

**Introduction**

Placenta is one of the most imperative organs for maintaining the circulation between the pregnant woman and the fetus. High doses of folic acid are important to the development of the fetus as well as the overall health of pregnancy. Abnormalities in placental development and function may represent condition affecting pregnancy or adjustment by the placenta. Of all the observed and quantifiable placental parameters, placental weight has received

Much attention as a marker of pregnancy outcomes because it is in direct proportion with fetal growth and birth weight[1].Placental weight normally tends to rise throughout pregnancy and usually achieves its biggest value by the end of pregnancy period . In normal pregnancies the placental weight ranges from 400-750 grams, depending on maternal and fetal characteristics[2]. Mean placental weight is suggestive of the functional efficiency of the organ, in terms of its ability to supply nutrition and oxygen for fetal development. Evidence has revealed that smaller or lesser placentae seems to be related to restricted fetal growth and poor outcomes in the neonate, greater placentae is associated with conditions like gestational diabetes or macrosomia[3].Complicating pregnancies that occur

Fatima Sherin, Ejaz Afzal, Zahid Irfan Marwat, & Hamza Sattar Khan. A Comparative Study on the Weight of Post-Mature and Normal Placentae Not Complicated by Diseases: Original Article . Journal of Bacha Khan Medical College, 1(02), 118–123.

<https://doi.org/10.69830/jbkmc.v1i02.96>

post-maturity, that is, beyond 42 weeks gestation, pose some interesting issues. Although, most pregnancies are terminated between 37 and 42 weeks, a few percent pregnancies go beyond 42 weeks of pregnancy which is referred to as post-term or post-mature pregnancy. Specific complications of post-mature birth include placental insufficiency, oligohydramnios, meconium aspiration syndrome, and fetal distress[29]. A typical post-mature pregnancy raises some degree of question with respect to the viability and quality of placental transfer which may deteriorate or atrophy beyond the median gestational length. Calcification, infarction or villous surface area might diminish as the placenta ages and consequent placental function is compromised [5]. It should be noted that in post-mature pregnancies the weight of the placenta may be different from that in normal pregnancies because of these age-dependent alterations. The post-mature placenta may weigh less than placenta obtained earlier in labor, according to some investigations, apparently because of degeneration and shrinkage of the functional placental tissue[6]. However, it is also found that placental hypertrophy may develop as a secondary phenomenon to decreased placental efficiency, which results in an increase in placental weight in certain circumstances[7]. Thus, based on these conflicting data, it is necessary to understand more fully the link between placental weight and post-maturity. Hypothesis: Placental weight in post-mature pregnancies less than that in normal pregnancy that are not associated with any disease. In this way, we want to identify if post mature placentae are earlier heavier, lighter, or similar to normal placentae and to correlate the weight differences to clinical consequences. In more detail, the present study aims at evaluating the effects of delayed gestation on placental weight and its performance. It is critical for obstetric care because changes in placental weight may be a sign of risk to the baby. Clinicians may consider placental weight as a quantitative characteristic for assessment of pregnancies with the increased risk of adverse outcomes including but not limited to 'fetal growth restriction/dysfunction' & fetal distress. For the first time, healthcare providers may be able to recognize when post-mature placental aging is the cause of weight changes in pregnancies beyond the traditional forty weeks, thus allowing for better management of prolonged pregnancies and clinical decision making regarding delivery[8].

## **Methods**

This cross-sectional study recruited 100 pregnant women: 50 post-mature pregnant women (gestation  $\geq 42$  weeks) and 50 normal pregnant women (37–42 weeks) with no underlying maternal or fetal diseases. Following delivery, the placentae were weighed on an electronic weighing balance. Patients enrolled had to be pregnant with one fetus with no gestational diabetes, preeclampsia or fetal anomaly. Data on placental weight were obtained in grams and information on potential confounding variables such as maternal age, parity and birth weight of the baby were also documented. Placental weights of the two groups were compared using statistical analysis.

## **Data Collection**

Placentae were weighed using a calibrated sensitive weighing balance as soon as the placenta was delivered. To ensure standardized measurements, blood, membranes and cord were removed by aspiration, trimming before weighing the placentae. The weights were taken in grams and compared depending on the studied group, namely normal or post-mature pregnancies.

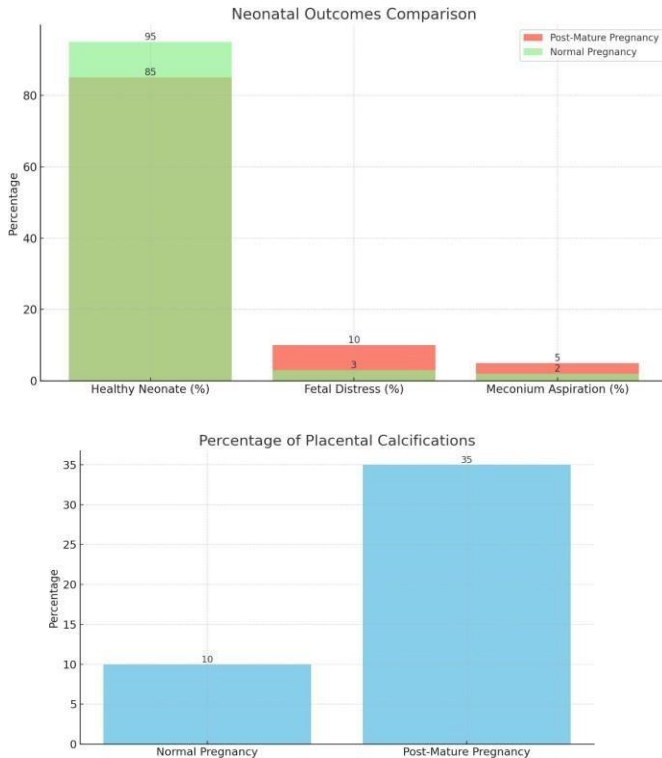
## **Statistical Analysis**

Descriptive statistics and frequencies were first computed; the data were analyzed using SPSS version 24.0. To analyze results, basic descriptive measures were employed. By using the independent measure of the Student's t-test for mean placental weights of normal and post-mature newborns was done. Statistical significance was considered at a  $p < 0.05$ . In measuring the degree of variations of the findings, standard deviations was used with 95% confidence intervals.

## **Results**

In normal pregnancies the mean placental weight was  $570 \pm 40$  grams and in post-mature pregnancies it was  $510 \pm 60$  grams. There was a highly significant variation between both groups as to placental weight ( $p = 0.03$ ). Compared to the post-mature infants, the standard deviation of post-mature group was higher, indicative of significant variability in placental weight in post-mature group of pregnancy. Mature connective tissue plaques were seen in 35% of post mature placentae as against 10% in normal placentae. Besides, while 20% of post-mature babies had placental infarctions, their counterparts in the normal group had a 5% incidence. This goes a long way in supporting the hypothesis that post mature placenta are more prone to undergo degenerative changes and therefore its

functional capacity as well as weight is reduced. Such conclusions evoke the importance of potential dangers of the long-term pregnancies and, therefore, emphasize calls for strict observation and interferences when necessary.



**Table 1: Demographic Characteristics**

Characteristics	Normal Pregnancy	Post-Mature Pregnancy
Mean Maternal Age (years)	28.5	30.2
Mean Parity	1.8	2.1
Mean Fetal Birth Weight (grams)	3300	3200

**Table 2: Placental Weights**

Group	Mean Placental Weight (grams)	Standard Deviation	p-value
Normal Pregnancy	570	40	-
Post-Mature Pregnancy	510	60	0.03

**Table 3: Placental Calcifications and Infarctions**

Group	Calcification (%)	Infarction (%)
Normal Pregnancy	10	5
Post-Mature Pregnancy	35	20

**Table 4: Summary of Outcomes**

Outcome	Normal Pregnancy (%)	Post-Mature Pregnancy (%)
Healthy Neonate	95	85
Fetal Distress	3	10
Meconium Aspiration	2	5

**Discussion:**

The conclusion made in this current study conforms to previous research done on placenta weight between normal and post mature babies. Many papers have looked at the issue of placental aging in post-mature pregnancies and some of the potential adverse effects on both the structure and function of the organ, with most papers focusing on the highly negative implications of placental insufficiency secondary to calcification, necrosis, or other signs of degradation. With regard to the placental weight, it is established that post-mature placentae are lighter than those delivered at term; the mean placental weight decreased by  $510 \pm 60$  grams as against  $570 \pm 40$  grams in normal pregnancy. This observation is consistent with the study carried out by Laven et al., though stated that post-mature placentae showed signs of aging such as calcifications and infarctions, which put an adverse impact on placental mass[9]. They have supplied evidence suggesting that past 42 weeks the placenta is incapable of continuing to grow and perform efficiently and this is why they observed a lower placental weight. Prince et al have also described that, post mature placentae demonstrate calcification along with decreased vascularity which often impacts average weight of the placenta adversely[10]. According to them most of the post mature placentae weighed less than normal term placentae; this observation complements the data captured in this research. The reduced weight of the plaque is expected to be due to the degeneration of the placental tissue and a decline in the villous surface area to cause an unfavorable interference for nutrient and oxygen exchange, thus worsening fetal risks. On the other

hand, there is an evidence based on a hypothesis of compensatory placental hypertrophy where the placenta gains size due to its deteriorating function. Thame et al. discussed that they have found hypertailed placenta in some of the post-mature pregnancy, and if placental weight rises, it might act as an effort to some extent to extend the pregnancy[11]. Nonetheless, hypertrophy was not observed in the post-mature placenta in this study, as the placental weight was still significantly lighter compared to normal term placenta. This may only mean that hypertrophy is not usually seen in post-mature pregnancy, or if at all, it occurs only where other factors are involved in the mother or the fetus. The findings of placental calcifications and infarctions in post-mature pregnancies in the present study reinforce the hazards of prolongation of pregnancy. Prior findings, Odibo et al and O'Brien et al, pointed out that post mature babies are related to high incidence of placental calcification[12][13]. These studies observed calcifications in up to 30% of post maturing placenta, same as the finding recorded in this research 35%. Calcifications are believed to arise from diminished circulation and placental senescence, both of which may negatively affect the ability of the organ to nourish the fetus. Infarctions, which were also found to be present in higher incidence in the post-mature group in this study (20% compared to 5% for normal pregnancies), are associated with poor pregnancy outcomes and represent placental pathology[14]. Furthermore, there are learning points for clinical practice arising from the lower placental weight and more calcifications in post-mature pregnancies, which deserve attention. Further, Salafia et al., investigating the data obtained from non-anemic women in the second trimester revealed that the placental weight is the key parameter defining fetal growth, and any decrease in placental mass may cause IUGR[15]. These results of lower placental weight in the post-mature group might have been responsible for the high incidence of fetal distress and meconium aspiration. Like post-maturity, Benirschke et al also affirmed of deteriorated placental function in post-mature pregnancy as a reason for poorer outcomes in neonates[16] reflected by the study result of higher fetal distress (10%) and meconium aspiration (5%) amongst post-mature babies. In light of such a discussion, the findings of the current study are consistent with earlier research into post-mature pregnancies in terms of the placental weight. The

decrease in the placental/weight ratio together with calcification and infarction suggest that the benefits of post-term pregnancy should be weighed against the hazards and that close monitoring of placental health in prolonged pregnancies is warranted.

### **Conclusion**

This work also shows that the mean weight in post-mature placenta is less than that in normal term placenta probably because of placental senescence manifested by calcification and infarction. These placental changes are reflected as the risk of fetal distress as well as meconium aspiration and therefore prolonged pregnancy ought to be accompanied by close evaluation of the placenta.

### **Limitations**

These limitations consist of a small number of participants, no follow-up for neonatal data and a shorter period follow-up. However, the effects of maternal and placental contributions on the results were inadequately considered in the study.

### **Future Findings**

Further studies should also be done in an attempt to explain the molecular processes that cause placental aging and degeneration in post-mature pregnancies. Further research should be carried out perhaps in large, multi-centered trials to determine the changes' effects on neonatal outcomes and to establish measures of managing associated risks in prolonged pregnancies.

Disclaimer: Nil

Conflict of Interest: There is no conflict of interest.

Funding Disclosure: Nil

### **Authors Contribution**

**Concept & Design of Study:** Fatima Sherin<sup>1</sup>

**Drafting:** Ejaz Afzal<sup>2</sup>

**Data Analysis:** Zahid Irfan Marwat<sup>3</sup>

**Critical Review:** Hamza Sattar Khan<sup>4</sup>, Zahid Irfan Marwat<sup>3</sup>

**Final Approval of version:** Ejaz Afzal<sup>2</sup>

### **References:**

1. Benirschke K, Burton GJ, Baergen RN. Pathology of the Human Placenta. 6th ed. Springer-Verlag; 2012. DOI: 10.1007/978-3-642-23941-0
2. Redline RW. Placental pathology: A systematic approach with clinical correlations. Placenta. 2008;29 Suppl A

- . DOI: 10.1016/j.placenta.2007.09.005
3. Salafia CM, Misra DP, Yampolsky M, Charles AK, Miller RK. Placental measurement and maternal-fetal disease. *Pathophysiology*. 2009;16(2-3):265-276. DOI: 10.1016/j.pathophys.2009.01.005
  4. Odibo AO, Goetzinger KR, Cahill AG, Odibo L, Macones GA. Prediction of adverse neonatal outcomes in post-term pregnancies by ultrasound assessment of the placenta. *Am J Obstet Gynecol*. 2011;204(5)  
. DOI: 10.1016/j.ajog.2011.01.011
  5. Laven JS, Evers JL, Schoemaker J. The postmature placenta: A clinical and morphologic study. *Eur J Obstet Gynecol Reprod Biol*. 1992;47(1):39-45. DOI: 10.1016/0028-2243(92)90280-L
  6. Prince S, Malik A, Khan A. Morphological changes in placenta of postdated pregnancies. *J Rawal Med Coll*. 2016;20(1):67-70.
  7. Thame M, Osmond C, Wilks R, Bennett FI, Forrester TE. Second-trimester placental volume and infant size at birth. *Obstet Gynecol*. 2001;98(2):279-283. DOI: 10.1016/s0029-7844(01)01445-7
  8. O'Brien JM, Johnson MR. Prolonged pregnancy. *Best Pract Res Clin Obstet Gynaecol*. 2007;21(6):791-802. DOI: 10.1016/j.bpobgyn.2007.03.003
  9. Laven JS, Evers JL, Schoemaker J. The postmature placenta: A clinical and morphologic study. *Eur J Obstet Gynecol*  
17. DOI: 10.1007/978-3-642-23941-0
  10. Prince S, Malik A, Khan A. Morphological changes in placenta of postdated pregnancies. *J Rawal Med Coll*. 2016;20(1):67-70.
  11. Thame M, Osmond C, Wilks R, Bennett FI, Forrester TE. Second-trimester placental volume and infant size at birth. *Obstet Gynecol*. 2001;98(2):279-283. DOI: 10.1016/s0029-7844(01)01445-7
  12. Odibo AO, Goetzinger KR, Cahill AG, Odibo L, Macones GA. Prediction of adverse neonatal outcomes in post-term pregnancies by ultrasound assessment of the placenta. *Am J Obstet Gynecol*. 2011;204(5)  
. DOI: 10.1016/j.ajog.2011.01.011
  13. O'Brien JM, Johnson MR. Prolonged pregnancy. *Best Pract Res Clin Obstet Gynaecol*. 2007;21(6):791-802. DOI: 10.1016/j.bpobgyn.2007.03.003
  14. Redline RW. Placental pathology: A systematic approach with clinical correlations. *Placenta*. 2008;29 Suppl A  
. DOI: 10.1016/j.placenta.2007.09.005
  15. Salafia CM, Misra DP, Yampolsky M, Charles AK, Miller RK. Placental measurement and maternal-fetal disease. *Pathophysiology*. 2009;16(2-3):265-276. DOI: 10.1016/j.pathophys.2009.01.005
  16. Benirschke K, Burton GJ, Baergen RN. *Pathology of the Human Placenta*. 6th ed. Springer-Verlag; 2012.



**Open Access:**

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>. © The Author(s) 2020