International Journal of Scientific Reports
Salman SK et al. Int J Sci Rep. 2026 Jul;12(7):263-268
https://www.sci-rep.com
pISSN 2454-2156 | eISSN 2454-2164
DOI: https://dx.doi.org/10.18203/issn.2454-2156.IntJSciRep20261981

Original Research Article

The relationship between newborn weight and the weight of its placenta at term in Masyaf, Syria

Safa K. Salman[1,2]*, Piran R. Hseen[1]

[1]Department of Obstetrics and Gynecology, Al-Andalus University for Medical Sceinces, Al-Kadmus, Tartus, Syrian Arab Republic
[2]Department of Obstetrics and Gynecology, Latakia (Tishreen) University, Latakia, Syrian Arab Republic

Received: 28 April 2026
Accepted: 02 June 2026

***Correspondence:**
Dr. Safa K. Salman,
E-mail: ss8@au.edu.sy

ABSTRACT

Background: The placenta is an organ that regulates fetal growth and affects the wellbeing of the fetus and the newborn. The aim of this study is to determine the average weight of placentas and neonates, and to evaluate the relationship between neonatal weight, placental weight and the effect of placental morphological deformations on these elements in Syria, as studies in Syria remain limited.
Methods: A prospective cross-sectional study was conducted at Masyaf General Hospital, Syria, from July 1st to August 31st, 2024. Data was collected by using a structured questionnaire and by directly measuring the weights of the placenta and newborn of 186 participants at full-term, healthy, pregnancies (37+0 - 41+0 weeks). Statistical analysis was performed using statistical package for the social sciences (SPSS) version 25.
Results: The mean of neonatal weight was 3017.47±374.78 g, the mean of placental weight was 535.08±117.76 g and the mean of neonatal weight-to-placental weight ratio was 5.826±1.04. A significant positive correlation was observed between placental weight and neonatal weight (Pearson's r=0.603; p=0.01) and no statistically significant correlation was found between neonatal weight, maternal body mass index, age, smoking status and wrapping of the umbilical cord around neonate's neck. Neonates born at 40 weeks had significantly higher birth weight, while placental weight was higher both at 37 and 40 weeks of gestation.
Conclusion: Placental weight was significantly correlated with neonatal birth weight. The higher birth weight is at 40 weeks of gestation. This study provides reference data for the Syrian population and highlights the need for larger studies to establish national reference standards.

Keywords: Neonatal birth weight, Placental morphology, Placental weight, Newborn\placenta correlation, Placental calcifications, Syria

INTRODUCTION

Live birth and the establishment of communication between the fetus and the mother introduced the placenta as a major anatomical organ.[1] The placenta regulates fetal growth by ensuring adequate respiration, nutrition, endocrine activity and immune support.[2] Dysfunctional placental development underpins many pregnancy complications, including fetal growth restriction.[3] The untroubled placental growth and the placental parameters are an integral part of fetal growth.[4,5] Placental weight represents a good marker of fetal growth and significantly correlates with early childhood growth in full-term infants.[6] Placental weight does not indicate the efficiency of the placental function.[7] Many studies found a positive correlation between placental weight and neonatal birth weight, and fetuses with lower placental weight are at high risk of developing fetal growth restriction.[7-9] The ratio of the placental and neonatal birth weights at term decreases with advancing gestational age.[8] The ratio of placental weight to neonatal birth weight is generally estimated at 1:6.[7,8] According to standard references, which are

endorsed by the College of American Pathologists; neonatal birth weight to placental weight ratio fully indicates fetal nutrition, while the placental weight to birth weight ratio is a replacement index for placental efficiency.[7] The placenta remains a human organ under research and placental measurements are powerful independent predictors of birth weight.[10] Examination of the placenta in utero as well as post-delivery gives valuable information about the state of the fetal well-being.[11] The placenta is impressive because it's an available and a valid measure for correlating certain important parts of health and disease.[12] Thus, the aim of this study is to determine the average weight of placentas and neonates, and to assess the relationship between neonatal weight and placental weight and placental morphological deformation among healthy pregnancies in Masyaf - Syria, because there is a lack of studies about this subject in the country.

METHODS

This study aims to determine whether there is a correlation between the weight of the placenta and the weight of the neonate at term in a mountainous region in Syria. Such studies are still so limited in the country. The research was carried out in cooperation between Masyaf Public Hospital and Al-Andalus University for Medical Sciences. Data was collected after having the ethical approval from the university and Masyaf Hospital. All participants provided verbal consent of participating in this study.

This prospective cross-sectional study lasted from 01 July to 31 August 2024. All women in labor who delivered at Masyaf Hospital and fulfill the research criteria were included.

A structured questionnaire, in Arabic, prepared by the researchers was used. The data included socio-demographic characteristics (mother's name (initials), age, educational level, occupation, socioeconomic status, place of residence, and maternal habits), medical history, gynecological and obstetrical history (parity, miscarriages, abortions, complications during previous pregnancies), in addition to the maternal body mass index. Face-to-face interviews were conducted, each lasting 10-15 minutes. Inclusion criteria were healthy pregnant women without complications during this pregnancy, delivering at term between 37+0-41+0 weeks of gestation, mode of delivery (vaginally or abdominally) and healthy newborn with Apgar-score of 8 and more at the fifth minute after delivery.

Pregnant women with a complicated pregnancy (stillbirth, intrauterine growth restriction, placenta previa, placental abruption, anomalies of placental implantation, premature rupture of membranes, preterm or post-term labor, multiple pregnancies), or with any medical problems during the current pregnancy, were excluded. Gestational age was determined based on the exact known date of the last menstrual period.

All placentas were weighed immediately after delivery, cutting the umbilical cord at its insertion on the placental disc, cutting the membranes and removing the clots. Umbilical cord insertion and its deformities were registered. Also, the percentage of the placental calcifications and infarcts were identified by using a transparent paper with 2 cm side length squares placed above the placenta. By this, placentas were divided into small squares, each with a side length of 2 cm and the number of calcified squares was counted to determine the total percentage of calcification and infarction.

Neonatal weight was determined immediately after delivery, following the cutting of the umbilical cord and while the baby was naked. The weight of the newborn was rounded to the nearest 100 g.

Statistical analysis

Data was collected using Microsoft Excel and the collected data was analyzed by using the statistical package for the social sciences (SPSS) version 25. Statistical methods include the Pearson's correlation coefficient, independent samples t-test, one-way ANOVA and descriptive statistics (frequency and percentage).

RESULTS

During the study period, a total of 237 deliveries were recorded. Among these, 186 (78.48%) mothers and newborns met the inclusion criteria. 20 cases were used as a pilot sample to assess the accuracy of the questionnaire. 31 cases were excluded due to the following: diabetes mellitus (n=3), hypertension (n=3), still birth (n=1) and incomplete data (n=24).

The mean of the maternal age was 27.17±5.24 years (range 16-44 years). The maternal body mass index ranged from 20-39.4 kg/m^2 with the mean of 27.26±3.81 kg/m^2. 172 (92.5%) of the participants were housewives and 14 (7.5%) were employed. In terms of educational status of the patients; 26 (14%) completed university study, 17 (9.1%) held vocational school certificate and 56 (30.1%), 41 (22%), 46 (27.7%), completed their high, middle and elementary school education respectively.

However, there were no illiterate participants. 176 (94.6%) of the participants resided in rural areas while only 10 (5.4%) were in urban areas. In terms of family income, 142 (76.3%) patients reported insufficient income while 44 (23%) described it as sufficient.

Considering the smoking status of the pregnant participants, 102 (54.8%) of them were nonsmokers, 37 (19.9%) were smokers and 47 (25.3%) were passive smokers. 88 (47%) of the mothers had planned their pregnancy whereas 98 (52.7%) had the pregnancy unplanned. Regarding the maternal blood group: 70 (37.6%), 7 (3.8%), 19 (10.2%), 2 (1.1%), 65 (34.9%), 10

(5.4%), 12 (6.5%), 1 (0.5%) were A+, A-, B+, B-, O+, O, AB+ and AB- respectively (Table 1).

Table 1: Sociodemographic characteristics of study sample.

Variables		N	Percentage
Maternal age (years)	16–19	7	3.76
	20–35	161	86.55
	36–44	18	9.67
Body mass index (kg/m²)	18>	0	0
	18–26	82	44.1
	26<	104	55.9
Occupation	Housewives	172	92.5
	Employed	14	7.5
Educational status	University	26	14
	Vocational school	17	9.1
	High school	56	30.1
	Middle school	41	22
	Elementary school	46	24.7
Residence	Rural	176	94.6
	Urban	10	5.4
Income	Insufficient	142	76.3
	Sufficient	44	23.7
Smoking	Nonsmoker	102	54.8
	Smoker	37	19.9
	Passive smoker	47	25.3
Planed pregnancy	Yes	88	47.3
	No	98	52.7
Blood group of the mother	A+	70	37.6
	A-	7	3.8
	B+	19	10.2
	B-	2	1.1
	O+	65	34.9
	O-	10	5.4
	AB+	12	6.5
	AB-	1	0.5

As for the neonates' gender; 105 (56.5%) were females with a mean of neonatal weight of 2973.33 g, and 81 (43.5%) were males with the mean of neonatal weight of 3074.69 g. Only 20 (10.8%) of the newborns were delivered vaginally and 166 (89.2%) were delivered abdominally.

Regarding gestational age, 71 (38.2%), 76 (40.9%), 24 (12.9%), 12 (6.5%) and 3 (1.6%) of the babies were born at 37, 38, 39, 40 and 41 weeks of gestation respectively. As for the examination of the placenta; 83 (44.6%), 74 (39.8%) and 29 (15.6%), showed calcifications or infarcts of 10-30%, 31-60% and 61-90% respectively.

The umbilical cord was in 47 (25.26%) of cases centrally, in 110 (59.13%) laterally and in 29 (15.59%) marginally inserted. No velamentous insertion of the umbilical cord was found. It was not wrapped around neonates' neck in 144 (77.4%) of cases, wrapped once in 3 (17.7%) and twice in 9 (4.8%) of cases (Table 2). The neonatal mean weight was 2942.96±388.15 g for babies who were born at 37 weeks of gestation, 2998.03±322.53 g, 3089.58±418.84 g, 3420.83 ±296.53 g and 3083.33±246.64 g for the babies born at 38,39,40 and 41 weeks of gestation respectively. The placental mean weight was 544.71±122.68 g, 525.00±111.50 g, 535.42± 146.50 g, 543,75±74.71 g and 525,00±66.14 g for the babies who were born at 37, 38, 39, 40, and 41 weeks of gestation respectively.

Table 2: Characteristic of pregnancies, cord and placentas.

Variable		N	Percentage
Newborn gender	Female	105	56.5
	Male	81	43.5
Gestational weeks	37	71	38.2
	38	76	40.9
	39	24	12.9
	40	12	6.5
	41	3	1.6
Mode of birth	Vaginally	20	10.8
	Caesarian section	166	89.2
Infarcts or placental calcifications (%)	10-30	83	44.6
	31-60	74	39.8
	61-90	29	15.6
Umbilical cord insertion and wrapping	Central	47	25.26
	Lateral	110	59.13
	Marginal	29	15.59
	Velamentous	0	0
	Knot	0	0
	No	144	77.4
	Once	33	17.7
	Twice	9	4.8

The mean of the neonatal weight was 3017.47±374.78g (range 2100- 4000 g), and the mean of the placental weight was 535.08 ±117.76 g (range of 300-950 g). The ratio of neonatal weight-to-placental weight was 5.826±1.04% (Table 3).

A statistically significant positive correlation was observed between neonatal weight and placental weight (Pearson's r=0.603; p=0.01). Statistically, no significant correlation was found between newborn weight and maternal body mass index, maternal age and umbilical cord wrapping around neonates' neck (Table 4). Similarly, no significant correlation was observed between neonatal weight and neonatal gender, nor with family income status or planning of pregnancy (Table 5).

Statistically, a significant difference in birth weight was noted between neonates born at different gestational weeks. Specifically, neonates born at 40 weeks had significantly higher birth weight compared with those born at other gestational weeks. The mean of difference in birth

weight was 477.88 g (p<0.001) for those born at 37 weeks, 422.81 g (p<0.001) for those born at 38 weeks and 331.25 g (p=0.010) for neonates delivered at 39 weeks.

While statistically no significant difference was found between neonates born at 41 weeks and those born at other gestational weeks (all p>0.05). This finding suggests that delivery at 40 weeks of gestation is associated with the highest neonatal birth weight (Table 6). There was no significant correlation between neonatal weight and maternal smoking status, umbilical cord insertion, placental calcification or maternal blood group (all p>0.05) (Table 6). Many of the studied factors didn't have a substantial impact on birth weight or placental weight. There was no significant correlation found between neonatal weight and umbilical cord wrapping around neonates' neck, maternal income status, pregnancy planning, maternal smoking status or maternal blood group. These findings suggest that these factors may not have significant impact on neonatal weight. Notably, cesarean section deliveries accounted for the majority of cases in this study (89.2%), reflecting a global trend toward increasing rates of surgical deliveries. The direct impact of the mode of delivery on birth weight was not assessed in the present study. The strength of this study lies in its prospective design and its focus on Syrian population that suffers from a clear lack of research on placental-neonatal weight. However, there are some limitations, including the small sample size and the sample being drawn from a single hospital, which may limit the generalizability of the results.

Table 3: Newborn's weight, placental weight and placental weight/birth weight ratio depending on gestational weeks at birth.

Weeks of gestation	N (%)	Birth weight mean±SD (g)	Placental weight mean±SD (g)	Placental weight/baby weight ratio
37	71 (38.2)	2942.96±388.15	544.72±122.68	5.59±1.0 8
38	76 (40.9)	2998.03±322.53	525.00±111.50	5.89±1.01
39	24 (12.9)	3089.58±418.84	535.42±146.50	6.00±1.08
40	12 (6.55)	3420.83±296.53	543.75±74.71	6.35±0.63
41	3 (1.6)	3083.33±246.64	525.0±66.14	5.97±1.14
Total	186 (100)	3017.47±374.78 (2100-4000)	535.08±117.76 (300-950)	5.82±1.04

Table 4: Independent Pearson's correlation coefficient between newborn weight and placental weight, mothers Body Mass Index, and umbilical cord wrapping around neonates' neck.

Correl.\sig.	Newborn weight and placental weight	Newborn weight and mothers body mass index	Newborn weight and the umbilical cord wrapping around neonates' neck
Pearson's correlation coefficient	0.603	0.004	-0.055
Statistical significance	0.01	0.129	0.453

Table 5: Independent samples t-test for differentiating between the mean weight of newborn depending on neonatal gender, Mother's financial income and pregnancy planning.

Variable		Mean of new born weight/mean (SD) g	t	Sig.(2-tailed), P value
Newborn gender	Female	2973.33±377.43	1.841	0.067
	Male	3074.69±365.72		
Family financial incoming	Insufficient	3005.63±374.83	0.773	0.440
	Sufficient	3055.68±376.36		
Mother's pregnancy planning	Planned pregnancy	2971.43±376.43	1.778	0.077
	Unplanned pregnancy	3068.75±368.30		

Table 6: Independent one-way ANOVA between neonatal weight and maternal smoking status, umbilical cord insertion, placental calcification, maternal blood group and gestational weeks.

Variable		Birth weight mean±SD (g)	f	P value
Neonatal weight by maternal smoking status	Nonsmoker	3048.53±404.27	0.774	0.463
	Smoker	2978.38±281.00		
	Passive smoker	2980.85±373.51		
	Central	3056.38±346.19	0.674	0.511

Continued.

Variable			Birth weight mean±SD (g)	f	P value	
Neonatal weight by umbilical cord insertion	Peripheral		3017.73±382.50			
	Marginal		2953.45±393.45			
Neonatal weight by placental calcification (%)	10-30		2964.46±362.87	1.879	0.156	
	31-60		3040.54±369.25			
	61-90		3110.34±410.22			
Neonatal weight by maternal blood group	A+		2970.00±400.85	1.146	0.337	
	A-		2900.00±317.54			
	B+		3171.05±400.45			
	B-		2850.00±212.13			
	O+		3019.23±360.41			
	O-		3180.00±336.81			
	AB+		2979.17±287.19			
	AB-		3300.00±00.00			
Neonatal weight by gestational weeks	37	38	2942.96±388.15	4.845	0.355	0.001
		39			0.000	
		40			0.509	
	38	37	2998.03±322.53		0.355	
		39			0.279	
		40			0.000	
		41			0.688	
	39	37	3089.58±418.84		0.086	
		38			0.279	
		40			0.010	
		41			0.977	
	40	37	3420.83±296.53		0.000	
		38			0.000	
		39			0.010	
		41			0.148	
	41	37	3038.33±246.64		0.509	
		38			0.688	
		39			0.977	
		40			0.148	

DISCUSSION

This study aims to explore the relationship between placental weight and neonatal birth weight at term, and to analyze maternal, fetal and placental factors in a sample of Syrian women in a rural mountainous region. This study reveals a statistically significant positive correlation between neonatal birth weight and placental weight (pearson`s r=0.603, p=0.01), which is consistent with several previous studies.[2,10,11] This relationship highlights the critical role of the placenta in fetal growth, as its weight is considered as an indirect index for placental efficiency and nutrient transfer.[3,9] Low placental weight was associated with low birth weight.[4] The mean placental weight in this study was 535.08±117.76 g, which is higher than the 449.24±82.07 g reported in Nepal, and lower than the 590±82 g reported in Nigeria.[8,12] Variations in the mean placental weight across studies may be referred to differences in methods of placenta handling and weighing protocols, including the time of umbilical cord clamping.[12] Additional factors, including ethnicity and unidentified variables, may also influence placental weight.[8] The mean birth weight in the present study was 3017.47±374.7 g, which is higher than the 2872.84±478.88 g reported in Nepal, but lower than the 3275±469 g reported in Nigeria, variation in birth weight may be related to environmental factors such as altitude of the area and maternal nutritional status.[8,12] The neonatal weight to placental weight ratio was 5.826±1.04 is approximate to the commonly accepted reference ratio of 6:1.[7,8,11] Evidence of placental efficiency in this study sample show a statistically significant positive correlation between birth weight and gestational age, which is similar to the results obtained by Panti et al in Nigeria.[8] The current study shows that the highest mean birth weight is at 40 weeks of gestation. But statistically, no significant correlation between neonatal weight, neonatal gender and body mass index of the mother was found. Soliman et al found that, at birth, placental weight was correlated significantly with maternal weight, and in Sri Lanka (2023), it has been found that placental weight was positively correlated with birthweight and maternal body mass index (which does not align with the results of this study), but not with newborn gender.[6,7] Placental calcifications and infarcts have not affected the newborn weight, as the present study found, but a systemic review and meta-analysis by Siargkas et al found that premature

placental calcifications is associated with several adverse perinatal outcomes.[13] In this study no correlation was found between the umbilical cord insertion and the placental weight. However, a study in India found that the length of the umbilical cord was related to the placental weight, which was not measured in this study.[2]

Mainly, the strengths of this study include that it is a prospective designed study. It enabled real-time data collection. Newborn weight and placental weight were measured immediately after delivery using a standard method. This kind of study is limited in Syria; therefore, the current research provides valuable region-specific data. Additionally, many maternal, fetal, and placental variables have been taken into consideration.

Limitations

Nevertheless, several limitations should be acknowledged. The design of the study limits the ability to establish causal relationship between placental weight and neonatal weight. The relatively small sample was drawn from a single center over a short period. Addressing these limitations in future studies is essential to enhance the validity of the findings. However, further research across multiple centers with a larger sample size is needed to establish national reference values and to explore factors contributing to placental function as well as fetal and pregnancy outcomes.

CONCLUSION

In conclusion, this study confirms a significant positive correlation between placental weight and neonatal birth weight at term. The current study shows that the highest mean birth weight is at 40 weeks of gestation, but statistically, no significant correlation between neonatal weight and neonatal gender, body mass index of the mother, smoking, residency, income, umbilical cord insertion, umbilical cord wrapping around the neck of the fetus, or calcifications and infarcts of the placenta. Placental weight may serve as a useful important indirect indicator of fetal well-being and growth efficiency.

ACKNOWLEDGEMENTS

The authors would like to thank the staff and the patients of the Department of Obstetrics and Gynecology in Masyaf General Hospital for their valuable support and Miss Khalisa N. Mahmoud for her dedicated assistance.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Khorami-Sarvestani S, Vanaki N, Shojaeian S, Zarnani K, Stensballe A, Jeddi-Tehrani M, et al. Placenta: an old organ with new functions. Front Immunol. 2024;15:1385762.
2. Tankala M, Rao MK, Senapati S, Behera SS. Morphometric Evaluation of Human Placental and Umbilical Cord for Neonatal Indices: A Cross-Sectional Study. Cureus. 2023;17;15(11):e48959.
3. Sun C, Groom KM, Oyston C, Chamley LW, Clark AR, James JL. The placenta in fetal growth restriction: What is going wrong? Placenta. 2020;96:10-8.
4. Leyto SM, Mare KU. Association of Placental Parameters with Low Birth Weight Among Neonates Born in the Public Hospitals of Hadiya Zone, Southern Ethiopia: An Institution-Based Cross-Sectional Study. Int J Gen Med. 2022;15:5005-14.
5. Scheel J, Hoch M, Wolfien M, Gupta S. NaviCenta: The disease map for placental research. Placenta. 2023,143:12-5.
6. Soliman AT, Eldabbagh M, Saleem W, Zahredin K, Shatla E, Adel A. Placental weight: Relation to maternal weight and growth parameters of full-term babies at birth and during childhood. J Trop Pediatr. 2013;59(5):358-64.
7. Sathasivam R, Selliah P, Sivalingarajah R, Mayorathan U, Munasinghe BM. Placental weight and its relationship with the birth weight of term infants and body mass index of the mothers. J Int Med Res. 2023;51(5):10.
8. Panti AA, Ekele BA, Nwobodo EI, Yakubu A. The relationship between the weight of the placenta and birth weight of the neonate in a Nigerian hospital. Niger Med J. 2012;53(2):80-4.
9. Liu HJ, Liu PC, Hua J, Zhao Y, Cao J. Placental weight and size in relation to fetal growth restriction: a casecontrol study. J Matern Fetal Neonatal Med. 2021;34(9):1356-60.
10. Nascente LM, Grandi C, Aragon DC, Cardoso VC. Placental measurements and their association with birth weight in a Brazilian cohort. Rev Bras Epidemiol. 2020;21:23:e200004.
11. Raghunath G, Vijayalakshmi, Shenoy V. A study on the Morphology and the Morphometry of the Human Placenta and its Clinical Relevance in a population in Tamilnadu. J Clin Diagn Res. 2011;5(2):282-6.
12. Kafle R, Nibedita K, Gupta BK. Mean birth weight and mean placental weight among deliveries in a tertiary care hospital. J Nepal Med Assoc. 2019;57(219):364-6.
13. Siargkas A, Pachi C, Nigdelis MP, Stavros S, Domali E, Mamopoulos A, et al. The Association of Placental Grading with Perinatal Outcomes: A Systematic Review and Meta-Analysis. Diagnostics (Basel). 2025;15(10):1264.

Cite this article as: Salman SK, Hseen PR. The relationship between newborn weight and the weight of its placenta at term in Masyaf, Syria. Int J Sci Rep 2026;12(7):263-8.