Original Article

Influence of Maternal Demographic and Obstetric Characteristics on Neonatal Birth Weight

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ABSTRACT

Aims. The purpose of current study was to estimate the prevalence of low birth weight among Libyan newborns, as well to evaluate the impact of maternal personal and obstetric characteristics on birth weight. *Methods. A cross section study was conducted among 300 women with a singleton; intrauterine pregnancy delivered at Al-Jala Hospital Tripoli, Libya in period of Jun, 1st till December,31st 2022 Measure of Socio-demographic characteristic; birth outcome and obstetric risk information were obtained from patients' face to face interview before discharge from the postnatal word.* *Results. The birth mean weight of our sample was 3.117±0.65 Kg; about 16.2% had low birth weight (LBW). Prematurity has a significant influence on BW where mothers who had history of premature baby more liable to deliver baby with LBW (56%) compared with mothers who had no previous history of prematurity (12.5%). Mothers with positive history of LBW babies had higher risk to deliver LBW babies with a percentage of 46.2% vs. 11.7% respectively (p=0.0001). Mothers complicated with abruptioplacenta more likely to deliver LBW babies (25.9%) than mothers without (15.3%).* *Conclusions. The major determinants of low birth weight were prior history of low birth weight or history of prematurity, and pregnancy complicated with diabetes mellitus. Future research should focus on factors of potential data are either unavailable or inconclusive*

INTRODUCTION

In both developed and developing countries, birth weight is probably the single most important factor that affects neonatal mortality, in addition to being a significant determinant of post-neonatal infant mortality and of infant and childhood morbidity [1]. Thus, birth weight has long been a subject of clinical and epidemiological investigations and a target for public health intervention. In particular, considerable attention has been focused on the causal determinants of birth weight, and especially of low birth weight (LBW), in order to identify potentially modifiable factors.

Low birth weight is defined by WHO as a birth weight less than 2500 g (before 1976, the WHO definition was less than or equal to 2500 g), since below this value birth-weight-specific infant mortality begins to rise rapidly [2-5]. However, plots of the cumulative frequency distribution of birth weight show two different normal distributions and 2000 g have been suggested as a lower cut-off point [6].

In most developing countries the majority of infants are born at home, women are often unsure of the date of their last menstrual period, and investigators are generally content with accurate birth weight measurements on a defined population. However, analysis by Villar & Belizan of data from 11 different regions in developed countries and 25 areas

in developing countries indicates that in the former most LBW is due to IUGR, whereas in developed countries (especially those with the lowest LBW rates) most is due to prematurity [7]. Differences in the IUGR rates of developing and developed countries are far greater than those for prematurity, with relative risks of 6.6 and 2.0, respectively. This study aimed to estimate the prevalence of low birth weight among Libyan newborns. As well, evaluate the impact of maternal personal and obstetric characteristics on birth weight.

METHODS

Study design and setting
Across sectional study was conducted at post-natal word of Al-Jalla maternity hospital in Tripoli/Libya during June, 1th 2022 till December 31th 2022.

Data collection procedure
Three hundred cases were randomly selected for the study; mothers who were delivered in Al-Jala hospital during the study period (last six months of 2022) were included. The questionnaires were completed by the researches through a face-to-face interview with the mothers admitted to postnatal word before discharge. A verbal consent was taken from the mothers after the researcher explained the purpose of the study to them.

Study tool and statistical analysis
The questionnaire formed of three parts. Part I: included personal data of the mother; age, education level, occupation, monthly income, exposure to passive smoking, and medical history of chronic illnesses. Part II: included the past obstetric history as; parity, order of child in the study, inter-pregnancy interval, gestational age at booking visit, number of antenatal visits during current pregnancy, use of supplements, weight gain during pregnancy, and history of previous low birth weight. Part III: include neonatal data as; sex, birth weight, history of admission to nursery, and neonatal outcomes. Statistical analysis was computerized using the Statistical Program for Social Sciences (SPSS version 25) that used for data entry and analysis.

RESULTS

The birth weight of our sample ranged between 1kg and 4 Kg with mean weight = 3.117±0.65 Kg, about 78.4% were within normal range of BW, 5.4% were macrosomic and 16.2% had LBW (Figure 1).
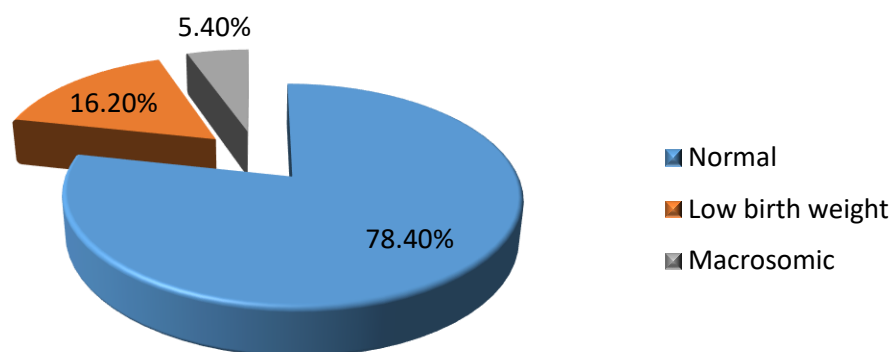

Figure 1. Distribution of LBW among mother under the study

Regarding the effect of sociodemographic characteristics of mothers on BW, we found that maternal age has no significant effect where 16.4% of the mothers aged 16-25 years has LBW babies and same percentage for mothers aged between 26-35 years and a slightly less percentage (15.7%) for older mothers (table 1). For the maternal educational level, the result reveals that 20% of illiterate mothers have LBW babies compared with 16.7% and 16.1% for mothers with low and high education, respectively (p=0.988). The difference in the distribution of BW among working and not working mothers was insignificant (p=0.375) where 18.5% of housewives have LBW against 12.5% for working mothers, the working state studied in more details and results showed that 12.4% of mothers working for 1-6 hours/day has LBW compared with 14.3% of mothers working 7-12 hours, shifting duties for mothers (day and night) have different effect on BW, where mothers who work mainly on day duties more liable to deliver LBW baby (25%) compared with shifting duties (17.7%).

For monthly income; mothers with low income (150-500 LD) have LBW babies compared with 11.5% for mothers with (1100-1500 LD) salary, concerning on passive smoking as it is a known cause of LBW, this study fails to detect any difference in BW between mothers exposed to passive smoking or not; where the percentage of LBW was almost same for both groups (Table 1).

Table 1. Distribution of birth weight according to maternal socio demographic Characteristics (Al-Jala Maternity Hospital postnatal word Tripoli / 2022)

Character	Birth weight			p value
	LBW (%)	Normal BW (%)	Macrosomia (%)	
Maternal age(years)				
16-25	10(16.4)	48(78.7)	3(4.9)	0.998
26-35	25(16.4)	119(78.3)	8(5.3)	
36-45	13(15.7)	65(76.3)	5(6)	
Educational level				
Illiterate	1(20)	4(80)	0	0.988
Low education	6(16.7)	28(77.8)	2(5.6)	
High education	41(16.1)	200(78.4)	14(5.5)	
Occupation				
Not working	34(18.5)	141(76.4)	9(4.9)	0.375
Working	14(12.5)	91(81.3)	7(6.3)	
Number of working hours				
None	30(20.8)	110(76.4)	4(2.8)	0.334
1-6 hrs	11(12.4)	72(80.9)	6(6.7)	
7-12 hrs	3(14.3)	17(81)	1(4.8)	
Shifting				
Day duty	2(25)	6(75)	0	0.722
Shifting	42(17.7)	193(78.5)	11(4.5)	
Monthly income				
150-500	14(28.6)	34(69.4)	1(2)	0.150
550-1000	20(32.7)	128(81.5)	9(5.7)	
1100-1500	6(11.5)	42(80.8)	4(7.7)	
>1500	8(21.1)	28(73.7)	2(5.3)	
Past smoking				
Yes	21(16.2)	102(78.5)	7(5.4)	1.000
No	27(16.3)	130(78.3)	9(5.4)	

According to past obstetric history: parity was found to have no influence on LBW where multipara (2-4 children) had 17.1% of LBW compared to primigravida (15.4%) and mothers who had > 4 children made a percentage of 14.6% of total number of LBW. Prematurity has a significant influence on BW where mothers who had history of premature baby more liable to deliver baby with LBW (56%) compared with mothers who had no previous history of prematurity (12.5%), history of abortion made insignificant difference in BW distribution where mothers with history of one abortion were riskier to have LBW baby (21.7%) than mothers with number of abortion 2-7 times (12.9%). Mothers with positive history of LBW babies had higher risk to deliver LBW babies with a percentage of 46.2% vs 11.7% respectively (p=0.0001), inter-pregnancy interval has insignificant role in LBW distribution as 13.3% of mothers with less than 2 years inter-pregnancy interval had LBW and 18.4% of mothers with 2-4 years interval between the last 2 babies. Mothers complicated with abruptio placenta more likely to deliver LBW babies (25.9%) than mothers without (15.3%), only one mother with placenta previa and she deliver LBW baby (5.6%).

This study proves that mothers with previous morbidity like hypertension and cardiomyopathy are more likely to deliver LBW babies where 37.5% of hypertensive mothers and 30% of mothers with cardiomyopathy had LBW babies. The current study shows a significant relation between diabetes and BW, where the percentage of LBW was 0% among diabetic mothers compared with 16.9% for non-diabetics. Mothers who had respiratory diseases had a rate of LBW 13% compared with 16.5% for mothers with no history of respiratory diseases (Table 2).

Table 2. Distribution of birth weight according to obstetric data (Al-Jala Maternity Hospital postnatal word Tripoli/2022)

Obstetric history	Birth weight			p value
	LBW (%)	Normal (%)	Macrosomia (%)	
Parity				
p1	14(15.4)	73(80.2)	4(4.4)	0.953
p2-4	28(17.1)	127(77.4)	9(5.5)	
p>4	6(14.6)	43(58.1)	7(9.5)	
Prematurity				
No	34(12.5)	223(82.3)	14(5.2)	0.001
Yes	14(56)	9(36)	2(8)	
H/O LBW				
No	30(11.7)	212(82.5)	15(5.8)	0.001
Yes	18(46.2)	20(51.3)	1(2.6)	
Inter-pregnancy interval				
1st child	9(12.7)	59(83.1)	3(4.2)	0.225
<2years	15(13.3)	93(82.3)	5(4.4)	
2-4 years	16(18.4)	64(73.6)	7(8)	
>4 years	8(32)	16(64)	1(4)	
Abruptio placenta				
No	41(15.3)	215(79.9)	13(4.9)	0.324
Yes	7(25.9)	17(63)	3(11.1)	
Placenta-previa				
No	47(16.9)	216(77.7)	15(5.4)	0.446
Yes	1(5.6)	16(88.9)	1(5.6)	
Hypertension				
No	45(15.6)	228(74.2)	15(5.2)	0.142
Yes	3(37.5)	4(50)	1(12.5)	
Cardiomyopathy				
No	45(15.7)	225(78.7)	15(5.6)	0.394
Yes	3(30)	7(70)	0	
Diabetes Mellitus				
No	48(16.9)	223(78.5)	13(4.6)	0.004
Yes	0	9(75)	3(25)	

H/O LBW= History of Low Birth Weight

DISCUSSION

Demographers have long been interested in studying adverse birth outcomes, in large part because of its strong influence on the risk of infant mortality and other severe medical problems during childhood period. Our study found that, 16,25% were low birth weight infants indeed, there are larger percentage of low birth weight within the life-birth if we were able to collect the data throughout the year as well if we could include the other two big hospitals in Tripoli, Libya. Pregnancy outcomes, including birth weight and gestational age, are generally less favorable among adolescents and women over 35 years of age; however, there is considerable controversy whether age itself is an independent determinant of either intrauterine growth or gestational age is closely associated with parity, which must therefore be controlled in attempts to isolate the independent impact of age.

Regarding the effect of monthly income eight studies enable fairly confident conclusions to be drawn about the effect of socioeconomic status (monthly allowances) on birth weight and IUGR. Previous studies found no increased risk of IUGR (or LBW) for women of lower socioeconomic status, while none of the six studies that had a bearing on mean birth weight reported a significant association between socioeconomic status and birth weight [8,9]. These results permit the inference that socioeconomic status has no independent effect on intrauterine growth. Although this study reported that mothers with low income 28.6% (150-500 LD) have LBW babies compared with 11.5% for mothers with (1100-1500 LD). Maternal cigarette smoking could affect intrauterine growth (and possibly gestational duration) through several mechanisms [10].

An earlier study reported no effect of birth spacing on intrauterine growth, which is consistent with results from this study [11]. Moreover, this study proves that mothers with previous morbidity like hypertension and cardiomyopathy are more likely to deliver LBW babies where 37.5% of hypertensive mothers and 30% of mothers with cardiomyopathy had LBW babies.

Since adequate uterine blood flow depends to some extent, on maternal hemodynamic, systolic and diastolic blood pressure or maternal plasma volume might be expected to have an association with birth weight. Demonstration of the

effect of these factors should be based, however, on measurements taken before pregnancy to avoid confusing a determinant of body weight or gestational age with an intermediate outcome of pregnancy.

CONCLUSION

This study found that the major determinants of low birth weight were prior history of low birth weight or history of prematurity, and pregnancy complicated with diabetes mellitus. An active public health approach is indicated for those important and modifiable determinants of intrauterine growth and gestational duration whose role is clearly established. For other factors, however, a more restrained approach is probably called for, with the highest research priority given to modifiable factors of potential quantitative importance but for which current data do not justify large-scale public health interventions. Establishment of a direct link between a suspected risk factor and the "true" outcomes of mortality, morbidity, and performance requires the use of far larger sample sizes, and often a longer follow-up period than demonstration of an effect on LBW. While the practical difficulties must be acknowledged, future research in this area should attempt to establish such direct links whenever possible.

Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

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تأثير الخصائص الديموغرافية والتوليدية للأمهات على الوزن عند الولادة عند الأطفال حديثي الولادة

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المستخلص

الأهداف. الغرض من الدراسة هو تقدير مدى انتشار انخفاض الوزن عند الولادة بين الأطفال حديثي الولادة الليبيين، وكذلك تقييم تأثير الخصائص الشخصية والتوليدية للأم على الوزن عند الولادة. **طرق الدراسة.** تم إجراء دراسة مقطعية بين 300 امرأة حامل بطفل واحد داخل الرحم تم ولادتهن في مستشفى الجلاء طرابلس، ليبيا في الفترة من 1 يونيو إلى 31 ديسمبر 2022. قياسات الخصائص الاجتماعية والديموغرافية؛ تم استخلاص معلومات نتائج الولادة ومخاطر الولادة من المقابلة وجهاً لوجه مع المرضى قبل الخروج المستشفى. وتم إجراء تحليل البيانات باستخدام برنامج SPSS. **النتائج.** متوسط الوزن عند الولادة 3.117 ± 0.65 كجم؛ وكان حوالي 16.2% منهم يعانون من انخفاض الوزن عند الولادة (LBW). وفيما يتعلق بتأثير الخصائص الاجتماعية والديموغرافية للأمهات، وجدت الدراسة أن عمر الأم ومستوى تعليم الأم ومهنتها ليس لها تأثير إحصائي (P=0.988). بينما لوحظ إن الدخل الشهري له تاثير, فالامهات ذوات الدخل المنخفض (150-500 دينار) لديهن أطفال ناقصي الوزن مقابل 11.5% للأمهات اللاتي لديهن راتب (1100-1500 دينار). و للخداج تأثير كبير على وزن الجسم، حيث تكون الأمهات اللاتي لديهن تاريخ سابق لولادة أطفال سابق لأوانه أكثر عرضة لولادة طفل مصاب بنقص الوزن عند الولادة (56%) مقارنة بالأمهات اللاتي ليس لديهن تاريخ سابق للخداج (12.5%). كذالك الأمهات اللاتي لديهن تاريخ إيجابي لإنجاب أطفال منخفضي الوزن عند الولادة أكثر عرضة لخطر ولادة أطفال منخفضي الوزن عند الولادة بنسبة 46.2% مقابل 11.7% على التوالي (قيمة الاحتمال = 0.0001). الأمهات المصابات بانفصال المشيمة المفاجئة أكثر عرضة لولادة أطفال منخفضي الوزن عند الولادة (25.9%) مقارنة بالأمهات اللاتي لا يعانين من حدوث الانفصال المفاجئ للمشيمة (15.3%). تثبت هذه الدراسة أن الأمهات اللاتي يعانين من أمراض سابقة مثل ارتفاع ضغط الدم وقصور عضلة القلب أكثر عرضة لولادة أطفال منخفضي الوزن عند الولادة، حيث أن 37.5% من الأمهات المصابات بارتفاع ضغط الدم و30% من الأمهات المصابات بقصور عضلة القلب أنجبن أطفالًا منخفضي الوزن عند الولادة. **الاستنتاجات.** وجدت هذه الدراسة أن المحددات الرئيسية لانخفاض الوزن عند الولادة هي التاريخ السابق لانخفاض الوزن عند الولادة أو تاريخ الخداج، والحمل المعقد مع مرض السكري. وتمت الإشارة إلى نهج نشط للصحة العامة لتلك المحددات المهمة والقابلة للتعديل للنمو داخل الرحم ومدة الحمل والتي تم تحديد دورها بوضوح.

الكلمات الدالة. الوزن عند الولادة، الخصائص الديموغرافية للأمهات، انخفاض الوزن عند الولادة، تقييد النمو داخل الرحم