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Epidemiology of Low Birth Weight in the Town of Sidi Bel Abbes (West of Algeria): A Case-Control Study

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Abstract

Introduction: The Low birth weight is defined as a live birth weighting less than 2500 g and it is considered to be a major determinant of the child survival, his health and development.

Objective: This study examined the frequency and risk factors that influence birth weight <2.5 kg (LBW) in the region of Sidi bel Abbes (west of Algeria).

Materials and methods: A descriptive prospective case-control study was done during the period of June 2012 to January 2013. Total samples were 1828 pregnant women and their newborns in neonatology department of Hospital Obstetrics and Gynecology in Sidi bel Abbes west Algeria.

Results: At the end of this work, it appears a prevalence of 1828 new born, including maximum newborn babies 92.97% had birth weight 2.5 Kg or more and 128 newborns with low birth weight <2.5 Kg, or a rate of 7.02%. It was found that mean weight of newborn babies was 3386.95 ± 560.70 (g). This study confirms the close association between low birth weight newborn and prematurity, primiparity, short interpregnancy interval, multiple pregnancy, previous history of low birth weight, delayed of first antenatal visit, low pre-pregnancy BMI, gestational weight gain less than the recommendations, primary educated mothers, other complications and diseases which contributed to high prevalence of LBW included hypertension and gestational diabetes.

Conclusion: It is essential to do a searching for pregnancies with higher risk of LWB like those who are primiparous or have short birth intervals, and it is also important to have better and more attentive prenatal care in order to reduce the incidence of LBW.

Keywords: Low birth weight; Risk factors; Pregnancy; Algeria

Introduction

Low birth-weight is a weight at birth less than 2,500 grams irrespective of gestational age [1]. The raison why 2.500 g has been chosen as a cut-off is based on the observations and research which found that if an infant is born weighing less than 2.500 g, he is more likely to die than heavier babies [2].

Every year it is estimated that 18 million LBW babies are born globally making up nearly 16% of all live births [3]. More than 95% of the low birth weight babies are born in developing countries. The estimated level of LBW in developing countries 16.5% is two-fold higher than the level observed in developed countries 7% [4]. In Europe the prevalence of LBW is of one in every seventeen infants, however in some regions of Asia the prevalence is of one in every two infants [5].

Birth weight determines the future mental and physical development of the newborn [6] and it can be caused by one of two reasons either by intrauterine growth retardation (IUGR) or by preterm birth or even in some cases by both. There is a change of the cause of the LWB according to the countries of its occurrence. For example, in developing countries it is caused by IUGR, however in the United States it is more frequently caused by preterm birth [7]. Children who survive LBW have a higher incidence of diseases, retardation in cognitive development and undernourishment.

LBW is also associated with predisposition for some future health issues like for example cardiac diseases or diabetes [8,9]. However, VLBW is more associated with the death of the infants at a rate that is 40 more higher than those with NBW [10]. In fact, even LBW infants are 25 to 30 times more at risks of death than NBW [11].

A variety of factors influence fetal growth, but they can be grouped into several general categories. The causes of LBW can be found in some biological determinants of the fetus and also of the mother, the medical care during the prenatal period, or the social and economic environment of the parents [12-14].

In order to reduce the rate of infant death, it is important to have reliable information on LBW rates, especially in developing countries. Therefore, the main objectives of this study were to determine the prevalence of LBW and to explore the effects of various maternal risk factors associated with low birth weighting in Sidi Bel Abbes, Algeria.

Materials and Methods

This prospective case-control study was conducted in neonatology department of Hospital Obstetrics and Gynecology in Sidi bel Abbes city, west Algeria during the period of June 2012 to January 2013, and the neonates were successively enrolled in the study and divided into two groups according to the birth weights recorded in the health records.

All LBW neonates were classified as the case group while those whose birth weight exceeded 2,500 g served as the control group, the

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infants were weighed on an electronic metric scale in the delivery room immediately after birth. We interviewed the mother and used the information from the maternal health record. We were interested in the gestational and pre-gestational morbidities, the characteristics of the prenatal care, and the socioeconomic and demographic information about the mother. Due to the fact of incomplete files we were unable to process further because of data shortage, which made it our only exclusion criteria in processing this study.

Statistical analysis was performed by the software STAT-VIEW (1998), Logistic regression analyses were conducted to determine the effect of risk factors on the birth weight. Factors with a p-value < 0.05 were taken as statistically significant.

Results

A total of 1828 deliveries were reported during the study period. Maximum newborn babies 92.97% had birth weight 2.5 Kg or more and 128 newborns with low birth weight <2.5 Kg, rate of 7.02%. Mean birth weight of the infants was 3386.95 ± 560.70 (g), the LBW infants seen in the period were distributed as follows: ELBW (4.8%), VLBW (11.53%) and MLBW (83.65) in the LBW group (Figure 1).

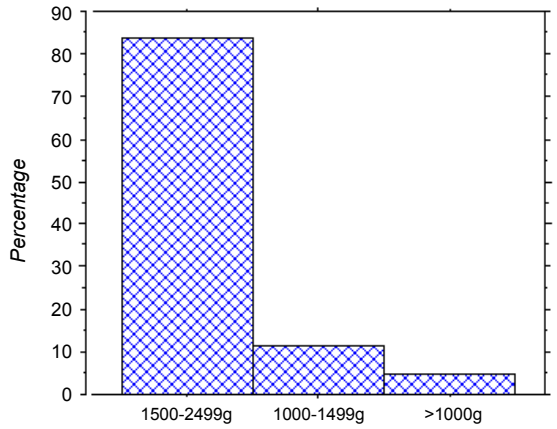

Fig 01 : Low birth weight

1500 - 2499 g: Low Birth Weight (LBW)
1000-1499 g: Very Low Birth Weight (VLBW)
>1000 g: Extremely Low Birth Weight (ELBW)

Figure 1: Frequency distribution for the low weight of the newborn.

Compared to babies with normal Apgar score>7, infants with low Apgar Scores <7 were found born with low birth weights (p<0,001). There is statistical significant (P=0.0012) between the biparietal diameter (BPD) and the weight of newborn in both groups (<2500 and ≥2500 g), our data showed that newborn's gender was significantly associated with LBW delivery (p=<0.0001), and that 72.22% of newborn loss were due to low birth weight < 2500 g (p<0.0001) (Table 1).

The premature babies represent 53.12% of LBW against 46.87% of BW superior or equal 37 weeks of amenorrhea, (p<0.001). 5.31% were singleton while 58.06% were multiple birth, this difference is statistically significant (p<0.0001), (Table 2). Most women whose infants were studied were in the age group 20-34 years (75.3%) and the mean age was (29.56 ± 6.01), no association was found between LBW and mother's age.

Mode of delivery was compared between the two groups. Delivery by way of caesarean section was seen in 18.53% and 81.46% be born through vaginal birth, no statistically significant difference was found.

Table 2 shows the results of testing the association of 13 maternal factors found to influence LBW in the present study. LBW has bivariate associations with mother's educational status (primary p=0.028) health problems during pregnancy (hypertension p=0.008) , month prenatal care began (delay in the first prenatal visit p=0.0333), gestational age (p<0.0001), a reduced childbirth interval (p=0.0375), parity (primiparous women p <0.0001), small fundal height (p<0.0001), gestational weight gain (less than IOM guidelines p=0.0003), history of previous LBW (p=0.0013), number of fetus (multiple p<0.001), socioeconomic status (Low p=0.012), pre-pregnancy BMI (p=0.0154) and weight gains < 10 kg (p<0.001).

Discussion

This study examined and analysed the prevalence and risk factors associated with LBW in a case- control study of birth cohort in Sidi Bel Abbes city. The incidence of LBW found in this study 7.02% which is closed to 7% published in 2004 by the World Health Organization (WHO) for Algeria [4]. It is quite similar to the rate found in Tunisia with 7% but lower than Egypt with 12% and Morocco with 11%. Making Algeria and Tunisia rate closer to those found in developed countries such as France and Spain with 6% [4]. In our study, the rate of female sex was predominant among LBW infants. Studies dealing with the etiology of LBW have shown us that; female sex is an important risk factor and this is attributed to the predisposition of the female sex to

Variable				P value	Significant p value
		Average %			(compared groups)
BPD (mm)	<2500	93.25 ± 7.67	6	0.0012	
	≥2500	93.25 ± 28.27	93.9		
Apgar Score (fifth minute)	0-3	2585.29 ± 1019.84	1.88	<0.0001 S	
	4-6	3118.42 ± 778.02	2.15	<0.0001	P: (0-3) and (4 - 6)
	7-10	3413.07 ± 524.96	95.96	0.001	
newborn's gender	Male	3439.63 ± 560.32	50.74	<0.0001	
	Female	3337.41 ± 549.06	49.25		
State of New born	Alive	3405.45 ± 529.89	98.02	<0.0001	
	Dead	2490.28 ± 1085.84	1.97		
Gender of twin	Male	2600.00 ± 693.93	41.17	0.762	
	Female	2530.00 ± 631.70	58.82		

Table 1: Distribution of birth weight according to Newborn characteristics.

Variable		Birth Weight		P value	Significant p value (comparison groups)
childBirth interval (years)	<2500	2.575 ± 2.375		0.0375	
	≥ 2500	3.144 ± 2.361			
Gestational Age(WA)	<2500	34.781 ± 4.660		<0.0001	
	≥ 2500	38.876 ± 2.610		<0.0001	
fundal height(cm)	<2500	29.616 ± 3.977		<0.0001	
	≥ 2500	31.903 ± 3.086			
Parity	Primiparous	3307.615 ± 551.887	44.26%	<0.0001 **S**	**P:** Primiparous and pauciparous
	pauciparous	3447.728 ± 553.629	54.25%	0.013	
	Multiparous	3577.778 ± 702.924	1.48%	0.2301	
Pathology	Anemia	3395.735 ± 576.220	54.24	0.074	
	AHT	3307.692 ± 608.864	36.76	0.1734 **NS**	**P:** AHT and Diabetes
	Diabetes	3688.571 ± 657.880	9	0.008 **S**	
Number of Fetus	Unique	3405.143 ± 543.654	98.29	<0.001	
	Multiple	2487.09 ± 620.614	1.7		
pre-pregnancy BMI	>16.5	3179.684 ± 467.668	1.18	0.3705	
	16.5-18.5	3297.368 ± 443.228	8.27	0.1113	
	18.5-25	3381.426 ± 546.659	62.5	0.0474	**P:** (>16.5) and (30- 35)
	25-30	3436.657 ± 631.906	22.45	0.0154 **S**	
	30-35	3521.605 ± 604.201	5.05	0.106	
	35-40	3200.000 ± 803.563	0.49		
Weight gains kg	<10 Kg	3357.59 ± 573.01	82.75	<0.001 **S**	**P:** (<10 Kg) and (10-14 Kg)
	10-14 Kg	3553.48 ± 517.61	13.48	0.0251	
	>14 Kg	3514.70 ± 507.63	4.26	0.6207	
Weight gain	Less than recommended	3351.522 ± 567.868	70.94	0.0011 **S**	
	Recommended	3472.330 ± 543.426	20.64	0.0051	**P:** Less than Recommended and Recommended
	More than recommended	3502.381 ± 648.131	8.41	0.6181	
LBW antecedent	Yes	3297.802 ± 542.623	18.99	0.0013	
	No	3509.794 ± 568.880	81.00		
month prenatal care	<2500	3.556 ± 1.509		0.0333	
	≥ 2500	2.389 ± .525			
mother's educational status	Illiterate	3475.556 ± 554.948	3.73	0.129	
	Primary	3296.583 ± 596.77	16.25	0.028 **S**	**P:** Primary and Middle
	Middle	3394.309 ± 564.811	43.24	0.216	
	Secondary	3428.215 ± 516.413	22.2	0.512	
	University	3391.566 ± 554.062	14.56		
socioeconomic status	Low	3295.031 ± 585.792	18.64	0.012 **S**	
	Average	3409.230 ± 553.792	70.72	0.7785	**P:** Low and Average
	High	3396.721 ± 564.022	10.62	0.0504 **NS**	

S: significant
NS: not significant
P-value < 0.05 was taken as statistically significant.

Table 2: Distribution of birth weight according to maternal characteristics, pregnancy and maternal history.

the other risk factors [15,16]. As expected, low birth weight deliveries were higher in babies whose gestation ages were below the norm of 37 full weeks. The preterm birth with low birth weight in our study is predominant 56.25% which is consistent with that of other studies [10,17-21]. In literature [22], two-thirds of infants born weighing less than 2500 g are preterm. Our study also showed a relationship between LBW and infant mortality where 72.22% of deceased new-borns had a weight less than 2500 g and the impact of LBW on neonatal mortality was found in many researches [23-25].

Neonatal and infant mortality can be reduced by the intervention of the obstetricians and it is important to note that the prognostic outcomes of preterm birth are in general way worse than the prognostic outcomes of infants born at term [26]. Some factors known as "risk

factors" that are associated with LBW, if they are present in an individual women can increase the risk of having a LBW infants.

As with regards to maternal factors, we found no significant relationship between maternal age and LBW (R=0.05). Proportion of primigravida was high among cases as compared to group control 52.34%. The difference revealed was statistically significant. This finding was similar to previous studies which revealed that primiparity is significantly associated with LBW [27,28]. It is considered that BMI is a good marker for the tissue nutrient reserves [29]. And we found that the mother with a low BMI had more risk of having a LBW [30].

During our study, we have discovered that a low pre-pregnancy BMI was significantly associated with LBW that was consistent with the results of other studies [31,32]. It is also believed that women with a reduced weight gain in their pregnancy have more risks of giving birth to LBW infants [33-35]. We found that an average weight gain of 10 kg during pregnancy period had some protective effects against the occurrence of this finding is in agreement with Bakewell et al. [36].

7.72% of mothers who gained weight lower than the weight recommended by (IOM, 1990) are significantly associated with LBW same results have been reported by [34-36] whereas a study found by [37] did not find any relation between the recommended weight gain and LBW.

In this study, Anemia was not a significant factor ($p>0.05$) but contribution of Anemia leading to LBW babies is controversial [38,39]. We established that the main pathology during pregnancy is practically associated with LBW. In our study, 11.88% of mothers suffering arterial hypertension had LBW newborn ($p=0.0008$), which was in agreement with findings from other studies [40-43].

Short birth intervals were found to increase LBW rate, similar studies done by [21,44]. This kind of results indicates that it is very important to have a little longer birth spacing in order to reduce LBW.

Multiple pregnancies have a significant association with birth weight similar studies done by Khatun et al. [45]. It is largely known that multiple birth infants have more risk of being LBW [46].

Birth weight is thought to be a reflection of socio-economic status and the quality of medical care received before birth. A lot of studies have shown the beneficial effects of prenatal cares [42]. In our study the incidence of LBW in mother who had done a first trimester visit is lower than those who didn't, this is similar to what was observed by Anand. Some risk factors were not associated with LBW in our study like the mode of delivery, the maternal age or the number of prenatal care. This kind of results can be caused by the nature of each mother included in our study.

A small number of women who never had prenatal care followed traditional way of care and advice from experienced fellows. Maternal age and prenatal care among the categories of the selected variables could not be compared because the full term neonates who had low birth weights were fewer (3.67%-3.84% respectively).

Various factors are clearly and consistently linked to low birth weight. And there are a lot of opportunities that exist even before pregnancy begins that can reduce the prevalence of LBW, but most of the times they are overlooked.

Conclusion

It is not easy to single out one particular factor that cause LBW, because there are many different factors interacting together affecting the weight of the infant and causing the happing of LWB. So, this is why it is very important to look for pregnancy that has more risk of giving birth to LBW infant, and this is the role of the physicians who should be more vigilant and attentive in checking those different factors, such as health problems during pregnancy, antenatal care , reduce gestational age, a reduced childbirth interval, primiparous women, small fundal height, gestational weight gain less than IOM guidelines, history of previous LBW, multiple pregnancy and low pre-pregnancy BMI.

We can also reduce LBW even before pregnancy occurs, for example by instructing the mother and giving her some health and nutrition education and nutrition also by increasing the use of health services before and during pregnancy. We highly recommend that mothers who are at risk be provided with adequate prenatal care and facilities.

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