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A study of determinants of low birth weight in Abha, Saudi Arabia

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Summary

This study examined the role of women's work as a possible determinant (among others) of low birth weight in the population of women followed in a Primary Health Care (PHC) center in Abha, Southern Saudi Arabia. All antenatal care files for all deliveries in the preceding 5 years were studied and the relevant data from 7067 files were collected and analyzed. Low birth weight was significantly higher in working mothers (odds ratio=1.31), adolescent mothers (odds ratio=2.56), and low parity mothers (OR= 1.28). Anemia of the mother contributed an odds ratio of 1.23 for low birth weight baby and inadequate antenatal care (less than 3 visits during pregnancy) had an odds ratio of 1.9. Female babies were significantly more prone to low birth weight (odds ratio 1.34). It is suggested that further evaluation of women's work conditions to detect and remedy stressful conditions especially during pregnancies, health education and better antenatal care may prevent a good proportion of low birth weight deliveries.

Keywords: *Low birth weight, Saudi Arabia, women's work, primary health care*

Résumé

Cette étude a été faite pour évaluer le rôle des travaux de la femme comme facteurs déterminant de la baisse de poids à la naissance aux bébés dans le centre de soins de santé primaire d'Abha, Saudi arabie. Tous les carnets de registre des visites prénatales dans les cinq dernière années étaient étudiés. Sept mille soixante sept carnets étaient collectés et analysés. Le faible poids à la naissance était significativement plus élevé chez les femmes travailleuses (OR :1.31), meres adolescent (OR :2.56) et meres de faible parités(OR :1.28). L'anémie de la mere contribuait a une différence de 1.23 pour le poids du bebe a la naissance et des soins prenatales inadéquate(moins de 3 visites durant la grossesse) avait une différence de proportion de 1.9. Les bebes de sexe féminin étaient significativement plus expose au poids faible a la naissance (OR :1.34). Il a été suggéré que d'autres évaluations soient faite sur leur conditions pendant les grossesses, leur education des soins de santé et les soins pré-natales meilleurs pourraient améliorer et prevenir une grande proportion des accouchements des bebes au poids normale.

Introduction

Low birth weight (LBW) is a major public health problem in many countries of the world.[1] Thus, despite some

reports on a global trend of lower infant mortality there is a considerable concern about low birth weight as a continuous problem.[2] On the other hand, low birth weight is a problem in many Asian, African and Latin American countries.[3] In Saudi Arabia, several studies showed that the incidence of low birth weight is high due to several factors related to the mother, psychosocial factors and the quality of antenatal care.[4,5,6] The risk factors related to low birth weight in full term babies are many and complex including some environmental factors such as poverty and antenatal care. social factors such as stress, behavioral factors such as smoking and nutrition and biological factors such as nulliparity and adolescent pregnancy.[7,8,9] About 75% of all newborn deaths and illnesses are associated with low birth weight. Moreover, some serious childhood problems like learning difficulties, visual problems, respiratory illnesses and cerebral palsy are sequelae of low birth weight.[10]

The work of women as a contributing factor to low birth weight has scarcely been studied in Saudi Arabia. This might be due to the relatively of small number of working women as well as their recent contribution to the work market. Work is associated with stress, time pressure and conflicts in work. Besides, it is reported that women's work outside their homes sometimes has an effect, especially in developing countries, on the stability and integrity of the family and consequently imposes psychological pressure and stress on the woman .[11] Pregnancies in these circumstances might not be welcome and a LBW baby can result from this.[12]

The aim of the present study is to identify the determinants of low birth weight in full term babies delivered during a 5-year period in a population of pregnant women recorded in a Primary Health Care (PHC) centre in urban Abha city, Saudi Arabia.

Methodology

Background information

The Mid-Abha Primary Health Care Center serves a population of 14000 inhabitant including 2730 families. This study dealt with 7812 maternal health cards covering a five- year period (1998-2002). For every pregnant woman visiting the center, an antenatal card is issued where prenatal, natal and postnatal information and services are recorded and compiled. Follow up visits are considered acceptable if they reach 5 visits on average with a minimum of 3 visits distributed evenly among the three trimesters.[13] On each visit any complaint, investigation results, treatment given or referral are recorded in the card. The weight, the blood pressure (BP) are measured, urine analysis for

Table 1: Differences between low birth weight and normal birth weight babies concerning mothers and babies attributes (n=7067)

	Normal birth weight babies (n=5886, 83.3%)	Low birth weight babies (n = 1181, 16.7%)	Significance
Mother's characteristics:			
Age of mother years (X±SD)	27.19 ± 6.05	25.11 ± 6.28	<i>P</i> < 0.001
Weight of the mother kg (X±SD)	74.8 ± 9.2	72.9 ± 5.2	<i>P</i> < 0.001
Work of the mother			
Yes: n=696	561(80.6%)	135 (19.4%)	$\chi^2 = 16.95$
No: n=6371	5501(86.3%)	870 (13.7%)	<i>P</i> < 0.001
Parity (X±SD)	4.86 ± 3.25	4.09 ± 3.32	<i>P</i> < 0.001
Systolic BP (mmHg) (X±SD)	123.72 ± 13.56	122.45 ± 13.66	<i>P</i> < 0.002
Diastolic BP (mmHg) (X±SD)	80.9 ± 8.9	80.5 ± 9.02	<i>P</i> < 0.878
Hemoglobin level (mg/dl) (X±SD)	12.53 ± 1.58	12.38 ± 1.78	<i>P</i> < 0.003
Babies' characteristics:			
Weight: (gm) (X±SD)	3100.3 ± 349.1	2102.1 ± 405.4	<i>P</i> < 0.001
Sex (n,%)			
Male	2422 (82.5%)	514 (17.5%)	$\chi^2 = 22.6$
Female	2288 (77.5%)	662 (22.5%)	<i>P</i> < 0.001

proteins, sugar, ketones and hemoglobin (Hb) level are performed. Clinical examination includes: full obstetrical examination and detection of edema. All findings are logged in the card for future reference. The summary of labor and postpartum complications as well as the baby's condition are recorded. It was observed however that all the antenatal cards were lacking information about mothers' work load and duration as well as smoking history. However, It was expected that there will be minimal differences of workloads among working women as 96.2% i.e. 670 women were teachers in girls schools, one of the few occupations women are allowed to practice in this country.

Inclusion criteria

All the cases delivered in the last five year-period were included in the study provided they fulfilled the following inclusion criteria. These are: full term singleton pregnancy, the baby's weight and sex as well as the mother's age, parity and occupation are recorded; the systolic and diastolic BP and the haemoglobin level should appear at least once in the card. The pre-pregnant weight of the mother should be recorded and each delivery during the 5 years period was considered as a case whether it was from same woman or not. All cases having present or past history of diabetes, chronic disease or are under regular drug intake were excluded from the study. Thus, a total of 7067 cases were eligible for this study.

Data analysis

The data were statistically analyzed using the SPSS ver-

sion 10 program starting by bivariate analyses and significant factors were introduced into a multiple logistic regression model after dichotomization. The dependent factor was the birth weight, where low birth weight was defined as birth weight below 2500 gm. [13] The independent variables were dichotomized as follows: whether the mother is working or not. Mothers were considered adolescent if less than 18 years of age and grand multipara if they had 5 or more previous pregnancies [14]. Anaemia was diagnosed if Hb level was less than 11 gm/dl. [15] Antenatal care was considered adequate if the patient made at least 50% of the booked visits and inadequate if less than 3 visits were made during the pregnancy. The systolic blood pressure was considered high if more than 140mmHg while the diastolic was considered if 90 or more mmHg. [13] Previous history of abortion, eclampsia, and antepartum hemorrhage. The only significant factor which was not introduced in the logistic regression model was the weight of the mother as it showed strong correlation with the age. The chosen level of significance was $p < 0.05$.

Results

Table 1 describes the differences between the low birth weight and normal birth weight babies related to the mothers and babies attributes. It is seen that working mothers had significantly higher proportion of low birth weight babies (19.4% compared to 13.7%). The low birth weight babies have significantly younger mothers (mean age 25.11 years ± 6.28 and 27.19 years ± 6.05) than the mothers of normal birth weight babies. Moreover, their mean mothers'

parity was significantly less than mothers of normal weight babies (4.09 ± 3.32 times versus 4.84 ± 3.25). Moreover, their mean mothers' hemoglobin level is significantly lower (12.38 ± 1.27 gm/dl compared with 12.83 ± 1.58 gm/dl). On the other hand, the mother of normal birth weight babies had a significantly higher mean systolic BP (123.72 ± 13.56 mmHg versus 122.45 ± 13.66 mmHg). While low birth weight male babies represented 17.5% of all male babies the female low birth weight babies amounted to 22.5% of all female babies; this is a statistically significant difference at $p < 0.001$.

Table 2: Adjusted odds ratios for significant factors (independent variables) contributing to low birth weight (dependent variable) in the logistic regression model ($n=7067$ babies).

	Adjusted odds	95% CI	P Value
Age of the mother (below 18 yrs)	2.56	2.12-3.00	0.001
Wrk of the mother	1.31	1.08-1.50	0.008
Parity (less than 5)	1.28	1.13-1.46	0.001
Mother's hemoglobin (less than 11 gm/dl)	1.23	1.06-1.42	0.006
Inadequate ANC visits (less than 3 visits)	1.09	1.01-1.92	0.021
Sex of the baby (female)	1.34	1.19-1.51	0.001

Overall predicted 8.42%

*ANC = Antenatal Care

Table 2 shows the adjusted odds ratios and their corresponding 95% confidence intervals for the significant factors related to the low birth weight in the logistic regression model. It is seen that the most significant risk factor for low birth weight with the highest risk estimate is an adolescent mother (less than 18 years of age) OR=2.56, followed by the female sex of the baby (OR=1.34). Work of the mother was related with an odds ratio of 1.31. Low parity showed an odds ratio of 1.28 while the low hemoglobin level of the mother had an odds ratio of 1.23. If the number of ANC visits are less than 3 throughout the pregnancy the odds ratio for low birth weight is 1.09. It is to be noted that the mother's systolic BP was not significant in that model. The overall predictive value of the model is 89.42%.

Discussion

Low birth weight is a multifactorial problem. At birth, the fetal weight is viewed as a crucial parameter that is directly and mostly related to the mother's health and nutrition. [16] The 5 years incidence of low birth weight in this study (16.7%) was higher than the range reported previously in Saudi Arabia (4% to 14%) with the highest figure recorded in Taif area. [17] The reason for this discrepancy might be due to the high altitude effect as Abha city is situated at

about 2100 meter above the sea level, about 700 meter higher than Taif. It has been shown in some studies that high altitude is associated with higher incidence of LBW. The claimed mechanism is related to the low oxygen tension as well as the effect of carboxyhemoglobin emanating from different sources of pollution. This latter pollutant is known to cause a more profound effect on tissue oxygenation at high altitude than at sea level. [18,19,20]

The results of this study showed that LBW is related to multiple risk factors as age at pregnancy, parity, work of the mother, the low hemoglobin level in pregnancy, the adequacy of ANC and the female sex of the baby. Adolescent marriage and pregnancy has relevance to some customs and tradition in that region and it was reported in the literature [21,22] that teenage pregnancy in this country resulted in 21.5% of low birth weight babies.

While studying the maternal influence on birth weight, Al Sekeit 1989 [23] found that beside the older age of the mother, her multiparity was also associated with an increase of the baby's weight. This agreed with the findings of the present study.

Work was revealed as a significant risk factor in this study. It is known that work is associated with variable levels of stresses. [24] The suggested mechanism is that stress leads to catecholamines release, decreased placental perfusion and uterine irritability. Altogether, lead to either intrauterine growth retardation or preterm labor and produces a LBW newborn. [25] However some researchers [26] revealed such an association among black Americans only.

As the process of pregnancy represents an extra physiological load on the mother, any nutritional defects particularly iron and vitamins (folates) deficiencies will have an impact on the developing fetus. Thus, anemia was pointed as a significant factor [27] and it was similarly revealed in this study. In this respect, the role of good quality ANC in diagnosing and treating nutritional deficiencies and other ailments has a positive effect on any pregnancy.

Several studies showed that the genetic and anthropometric factors played a role in LBW. [28] This might be the explanation of the higher proportion of LBW among female babies as females are in general of lower built than their male counterpart.

Conclusion and recommendations

The results of this study pointed to several risk factors for the LBW problem. Adolescent pregnancy, work of the mother, anemia of pregnancy and inadequate ANC are those amenable to prevention. Thus, health education, premarital counseling, adequate and efficient ANC are recommended as preventive measures to lower the incidence of LBW. The work conditions of women, especially during pregnancies should be studied thoroughly and ameliorated to remove the sources of stress and anxiety if any.

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