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Afr. J. Biomed. Res. Vol.17 (September, 2014); 159- 163

Full Length Research Paper

Weight Gain and Pregnancy Outcome in Adolescent and Adult Mothers in Ilorin, Nigeria

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ABSTRACT

This study determined the relationship between maternal weight gain and pregnancy outcomes among adolescent and adult mothers in Ilorin, Nigeria. A retrospective review of 1,770 case-notes of adolescent and adult mothers who booked for antenatal care and delivered in the three selected maternity hospitals in Ilorin between January 2008 and December 2012 were used for this study. A record review was used to obtain information on the maternal sociodemographic characteristics, maternal variables such as weight gain at second and third trimester, packed cell volume (PCV) and infant birth weight. The data were analyzed using chi-square, student t-test and Spearman's correlation. All the adolescents were primipara while 66.9% of the adult mothers were multipara. The highest educational status attained by 89.2% of the adolescent mothers was secondary school education while 35.4% had tertiary education. The mean birth weight of infants of the adult mothers was higher than that of adolescent mothers ($p < 0.05$) and the mean maternal weight gain in adolescent mothers was significantly higher than in adult mothers ($p < 0.05$). Proportion of infants with LBW was significantly higher among the adolescent mothers ($p < 0.05$) than in adult mothers. Parity, maternal age, religion, occupation and PCV were observed to have significant positive and strong association with infant birth weight ($r = 0.457, 0.663, 0.727, 0.590, 0.468$ respectively; $p < 0.01$). A strong association was also observed between maternal weight gain and infant birth weight ($r = 0.816$; $p < 0.01$). Adolescent mothers are at higher risk of delivering infants with LBW compared to the adult mothers, inspite of the higher maternal weight gain. Therefore, adolescent pregnancy should be discouraged or adequate weight gain should be ensured because children born with low birth weight are prone to stunted growth, cognitive challenges and chronic diseases in later life.

Key words: Adolescent mothers, adult mothers, birth weight, pregnancy outcomes, Nigeria.

INTRODUCTION

Pregnancy during adolescence poses high risk of adverse birth outcomes, including preterm delivery, low birth weight, and increased perinatal mortality (Ventura et al, 2002). Every year, throughout the world nearly 15 million new-borns are delivered by adolescents between

15 and 19 years-old, which comprises about 10% of all deliveries worldwide (McIntyre, 2008). Young maternal age and other social and behavioural determinants such as low educational attainment, low social status, and a lack of access to or low use of health care facilities have been observed to contribute to adverse maternal and infant risks associated with pregnancy and childbirth.

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Date Received: February 2014

Date Accepted: June 2014

Abstracted by:

Bioline International, African Journals online (AJOL), Index Copernicus, African Index Medicus (WHO), Excerpta medica (EMBASE), CAB Abstracts, SCOPUS, Global Health Abstracts, Asian Science Index, Index Veterinarius

(McIntyre, 2008; WHO, 2008). In developing countries, other determinants such as an urban location of residence and early marriage have also been identified (McDevitt, 2009; Singh and Samara, 1996).

Adolescent girls face considerable health risk during pregnancy and childbirth accounting for 15% of the Global Burden of Disease for maternal conditions and 13% of all maternal deaths (WHO, 2001). Appropriate nutrient intake and weight-gain during pregnancy are considered two of the most important modifiable behaviours for improved maternal and infant outcomes (Institute of Medicine, 1990). However, inappropriate dietary intake has been observed as a common practice among the adolescent population (Moran, 2007), and this could interact with their growth status and have an impact on the pregnancy outcome (Nielsen *et al*, 2006).

The burden of low birth weight (LBW) has been reported to be higher in the developing countries, with 95.6% of all LBW births occurring in low and middle-income countries (Wardlaw, 2008). Maternal weight gain during pregnancy has been consistently associated with infant birth weight and pregnancy outcome (Caton and Hess, 2010) and low maternal weight gain is considered as a preventable risk factor for LBW (Abrams *et al*, 1995). Low birth weight and preterm deliveries in adolescent pregnancies are twice as common as in adult pregnancies and neonatal mortality in adolescent pregnancies are three times higher in frequency than for adult pregnancies (King, 2003). National data for these relationships in Nigeria does not exist, yet it is important to determine not only the LBW rates but its determinants for policy and practice purposes. Therefore, the objective of this study was to examine the relationship between maternal weight gain and pregnancy outcome in adolescent and adult mothers.

MATERIALS AND METHODS

Study design

This study was a descriptive cross sectional and retrospective in design.

Study location

The study was carried out in Ilorin, the capital of Kwara state. Ilorin is one of the largest cities in Nigeria with a population of 777, 667 as at the 2006 census, representing 32% of the total population of Kwara State (NPC, 2006). Three facilities including a tertiary hospital, one secondary hospital and a primary health care centre in Ilorin were purposely selected for the study. These locations were chosen because of available data due to good record keeping

Subject selection

All pregnant adolescents <20 years and adult mothers aged >20 years, who booked for antenatal care and delivered in the selected three health facilities in Ilorin between January 2008 and December 2012 were included in this study. Exclusion criteria were multiple pregnancies, deliveries that exceeded more than 40 weeks of gestation, those that occurred before 36 weeks of gestation and records which were incomplete.

Data collection

A record review was used in extracting maternal and infant variables from the antenatal and delivery case-notes. Case-notes for a total of 1,770 pregnant mothers were retrieved and data including age, educational status, occupation, weight gain and infant birth weight were extracted.

Statistical analysis

Data collected were analysed using descriptive statistics such as frequencies, percentages and means with their standard deviations. Chi square, student t-test and spearman correlation was used to test for association between variables. Statistical significance was taken as a $p < 0.05$.

RESULTS

The characteristics of both the adolescent and adult mothers are presented in Table 1. All the adolescents were primipara (i.e first delivery) while 25.4% of the adult mothers were primipara and 66.9% were multipara. Majority (86.9%) of the adult mothers were employed while 86.5% of the adolescent mothers were unemployed. The highest educational status attained by 89.2% of the adolescent mothers was secondary school education while 37.3% of the adult mothers had secondary education and 35.4% had tertiary education. Majority (73.0%) of the adolescent and 86.0% of the adult mothers had normal PCV (i.e $\geq 30\%$) while 27.0% of the adolescent mothers had low PCV (i.e $< 30\%$).

Table 2 shows the comparison between the infant birth weight and maternal weight gain of both the adolescent and adult mothers. The mean birth weight of infants of the adult mothers was significantly higher than those of the adolescent mothers ($p < 0.05$) while the mean maternal weight gain in adolescent mothers was significantly higher than in adult mothers ($p < 0.05$). The proportion of infants with LBW between the adolescent and adult mothers is presented in Table 3. More LBW was recorded among the adolescent mothers than in adult mothers.

Table 1:
Characteristics of the adolescent and adult mothers

Maternal characteristics	Adolescent mothers(n=37) n(%)	Adult mothers(n=1733) n(%)
Parity		
Primipara (1)	37 (100.0)	440(25.4)
Multipara (2- 4)	0	1260(72.7)
Grandmultipara (>5)	0	33(1.9)
Employment status		
Employed	5(13.5)	1506(86.9)
Unemployed	32(86.5)	227(13.1)
Maternal educational status		
No formal education	2(5.4)	226(13.0)
Primary school education	2(5.4)	248(14.3)
Secondary school education	33(89.2)	646(37.3)
Tertiary education	0	613(35.4)
Packed cell volume (PCV in %)		
<30 (Low)	10(27.0)	242(14.0)
≥30 (Normal)	27(73.0)	1491(86.0)

Table 2:
Weight gain and infant birth weight

	Adolescent mothers Mean(±SD)	Adult mothers Mean(±SD)	P-value
Mean infant birth weight (kg)	2.9(±0.3)	3.1(±0.4)	0.003
Mean maternal weight gain (kg)	6.8(±3.4)	6.4(±4.3)	0.002

The association between maternal characteristics and infant birth weight is shown in table 4. Parity,

Table 4:
Association between maternal characteristics and infant birth weight

	Parity	Birth weight	Age	Maternal educational status	Religion	Occupation	PCV	Weight gain
Parity	1	0.457**						
Birth weight	0.457**	1						
Age	0.585**	0.663**	1					
Maternal educational status	0.116**	0.188**	0.219**	1				
Religion	0.625**	0.727*	0.912**	0.230**	1			
Occupation	0.461**	0.590**	0.711**	0.225**	0.733**	1		
PCV	0.434**	0.468**	0.582**	-0.098**	0.640**	0.472**	1	
Weight gain	-0.421**	0.816**	-	-0.197**	-0.657**	-0.530**	-	1
			0.598**				0.444**	

** $p < 0.01$; PCV= Packed Cell Volume

maternal age, religion, occupation and PCV were observed to have significant positive and strong association with infant birth weight ($r= 0.457, 0.663, 0.727, 0.590, 0.468$ respectively). A significant positive and strong association was also observed between maternal weight gain and infant birth weight ($r= 0.816$).

Table 3:
Prevalence of Low Birth Weight

Birth weight (kg)	Adolescent mothers (%)	Adult mothers (%)	P-value
<2.5 kg	13.9	10.1	0.021
≥2.5 kg	86.1	89.9	0.002

DISCUSSION

Birth weight plays an important role in infant survival, child development, and onset of adult metabolic diseases (Scholl *et al*, 1997). Maternal weight gain is one of the most important independent predictors of infant birth weight and interacts with other maternal characteristics, including age (Gilbert *et al*, 2004). It is universally acknowledged that maternal age is an important factor influencing the incidence of LBW (Stevens-Simon *et al*., 1990; Samiran *et al*., 2006). As observed in this study, maternal age had a significant positive and strong association with birth weight which implies that rate of LBW decreases significantly with the increasing age of mother. This has been attributed to gynaecological immaturity and growth, and nutritional status of the mother (Scholl *et al*, 1990). Moreover, the results of this study add to the evidence base for adolescent mothers having an increased risk of delivering LBW infants compared to adult mothers.

In spite of the higher weight gain of the adolescent mothers as compared with adult mothers, the mean birth weight of infants delivered to adolescent mothers was significantly lower than those of adult mothers. Scholl *et al.* (1997) and Gilbert *et al.* (2004) had similar

The prevalence of LBW was found to be significantly higher among infants delivered to adolescent mothers than in adult mothers. Igwegbe and Udigwe (2001) and Jolly *et al.* (2001) stated that pregnancy during the adolescence might interact with the growth status of the adolescent which could also deprive the fetus of the normal growth thereby having an impact on the pregnancy outcome and hence, LBW. This report is consistent with the observations of other researchers in Nigeria who also reported high prevalence of LBW among infants delivered to adolescent mothers than in adult mothers (Biodun and Isaq, 2004; Fadupin and Pikuda, 2011).

Maternal characteristics have been shown to influence the progress and outcome of pregnancy, especially those related to birth weight and perinatal mortality. In this study, a significant positive and strong association was observed between parity and birth weight of infants however, a significant, negative and strong association exists between parity and maternal weight gain. Yilgwan *et al.* (2012) and Finlay *et al.* (2011) related the effect of parity on birth weight; it was indicated as an important factor influencing the birth weight of infants as the rate of LBW infant was observed to decrease significantly with increasing parity. Similar results have also been observed by Stevens-Simon *et al.* (1990) and Samiran *et al.* (2006). A possible explanation of lower birth weight among first-born infants could be a consequence of biological immaturity as compared to later-born infants (Samiran *et al.*, 2006).

Maternal educational status had a significant and positive association with infant birth weight in this study. Muula *et al.* (2011) stated that, the mechanisms associated with LBW among the less educated may include poor diet as a result of low income and poor dietary knowledge. Limited education may also result in limited access to prenatal care. Winkleby *et al.* (1992) stated that educated women are more likely to adhere to health instructions because of their social circumstances and the cognitive priming that education gives.

In conclusion, findings from this study revealed that, infants of adolescent mothers are at higher risk of being delivered LBW compared to the adult mothers, in spite of higher maternal weight gain. Therefore, adolescent pregnancy should be discouraged or strategies to ensure adequate weight gain are employed because children born with low birth weight experience stunted growth, cognitive problems, and chronic diseases in later life.

observations, they attributed this to the fact that adolescence is a period of growth spurt in which nutrient requirement greatly increased and there may be maternal-fetal competition for nutrients as a result of incomplete growth of the adolescents before pregnancy. Maternal characteristics such as age, parity, educational level and weight gain could be used as predictors of mothers at risk of delivering infant with LBW in order to take necessary preventive actions. Health promotion efforts should be made to reach the pregnant adolescents and their families so as to lower the risk of delivering low birth weight infants.

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