Original Research

FACTORS ASSOCIATED WITH LOW BIRTH WEIGHT AMONG NEWBORNS IN ETHIOPIA

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ABSTRACT

Background: Worldwide more than 20 million low birth weights occur annually with the incidence of 15 to 20%, majority of this occur in low- and middle-income countries and 95.6% occur in developing nations. Its regional estimate was 28% in South Asia, 13% in sub-Saharan Africa and 13% in least developed country

Objective: To assess factors associated with low birth weight among newborns in Jugal Hospital, Harari Regional State, Ethiopia.

Methods: A cross-sectional study was conducted among newborns in Jugal hospital, Ethiopia from June 01 to July 10, 2019. Systematic random sampling technique was used to select the study subjects. Multivariate logistic regression analysis was used to identify factors associated with low birth weight among newborns

Results: The magnitude of low birth weight was 19.53%. Women who had previous history of low birth weight had 5.21 times higher odds ratio of delivered low birth weight baby than their counterparts [AOR = 5.21, 95% CI: (1.5-14.2)], and pregnant women who delivered before 37 weeks of gestational age had 4.8 times higher odds ratio of delivered low birth weight neonates than those delivered at term [AOR = 4.8, 95% CI: (1.3-10.4)]

Conclusion: The prevalence of low birth weight in Harar, Jugal Hospital was 19.53%. Low birth weight in the previous pregnancy and gestational age <37 weeks, and showed significant association with birth weight neonates. Governmental and non-governmental organizations working on maternal and child health should focus on identified factors in order to tackle the problem of birth weight.

Keywords: Ethiopia, low birth weight, newborn

BACKGROUND

Birth weight is the first weight of the new born obtained immediately after birth with in the first hour of life before significant weight loss occurred after birth (World Health Organization, 2004). World Health Organization classified birth weight as macrosomia, normal birth weight and low birth weight. Low birth weight is defined as having a birth weight of less than 2500 g regardless of gestational age (Katharyn & Laura, 1990).

Worldwide more than 20 million low birth weights occur annually with the incidence of 15 to 20%, majority of this occur in low- and middle-income countries and 95.6% occur in developing nations. Its regional estimate was 28% in South Asia, 13% in sub-Saharan Africa and 13% in least developed country (World Health Organization, 2014). Globally over the last twenty years the world made extensive progress in reducing mortality among less than 28 days aged children. Despite progress

over the past two decades, in 2017 alone, 2.5 millions of neonates died, due to low birth weight, prematurity and other preventable causes of neonatal death (Kumlachew, Tezera, & Endalamaw, 2018).

The prevalence of low birth weight in Senegal, Burkina Faso, Malawi, Ghana, and Uganda was, respectively, 15.7%, 13.4%, 12.1%, 10.2%, and 10% (He et al., 2018). Currently, thirteen percent of Ethiopian babies are low birth weight (Amsalu, Akalu, & Gelaye, 2019). Reasons of low birth weight are mainly linked with either infant/their mothers' side. In developed countries, predominant cause of LBW is preterm birth, whereas in developing countries, Intrauterine Growth Restriction (IUGR) is predominant cause of LBW (Siza, 2008). Mothers who had multiple gestations had a higher risk of delivering LBW babies (World Health Organization, 1999).The physical environment, specific and nonspecific infections, also plays an important role in determining the infant's birth weight and future health status (Nepal, 2011).

Child who have low birth weight children have immature immune function are also prone to have increased risk of disease, lower IQ and cognitive disabilities which could affect their performance in school, job opportunities as adults and may develop chronic illness like diabetes and coronary heart disease in adult hood (Gaiva, Fujimori, & Sato, 2016). Low Birth Weight of is also known to cause cerebral palsy more frequent hospitalization for all illness, more hearing and visual disability more behavioral disorders (Kliegman, Behrman, Jenson, & Stanton, 2007).

Therefore, this study aims to assess low birth weight and its associated factors that will help as a base for other researchers, health care providers, and policy makers for further designing of strategic plan and intervening accordingly.

METHODS

Study Design and Population
An institutional-based cross-sectional study was conducted among sampled mothers who delivered in Jugal Hospital during the study period and fulfill the inclusion criteria.

Setting
The study was conducted at Jugal hospital which is found 525 km to East of Addis Ababa. It has a total of 342 staffs among these 208 of them are health care professionals whereas the rest are non-health professionals, the hospital is found in Harar towns. It was established in 1902GC, it is the first governmental hospital in Ethiopia, named as Misrak Arbegnoch Hospital and the hospital changed its name to Jugal hospital. It provides promotive, preventive, curative, and rehabilitative services. Now the hospital has different wards, namely, medical, surgical, obstetrics & gynecology and pediatrics. The study was conducted from June 01 to July 10, 2019.

Sample Size
Sample size was calculated by using Single population proportion formula by taking 14.9% from similar research. By using the 95% CI and 5% marginal error (d) (n= $(Z\alpha/2)2p(1−p)/ d2$), which gave sample size of 195. By adding 10 % non-response rates the final sample size becomes 210.

Sampling Procedure
According to Jugal Hospital's delivery report, a total of 364 women delivered per month. Therefore, 210 study participants were selected by systematic random sampling technique. By taking the final sample size (n= 210), K=N/n=364/210 was one. Thus, the study participants were selected. But, when the selected study participant did not fulfill the inclusion criteria, the next individual was taken as participant.

Data Collection Tool
Well-structured interviewer administered questionnaire was prepared. The questionnaire was prepared in English language and translated to local language and back to English to check consistency. Pretesting was conducted in 5% of the sample size in Haramaya Hospital before the actual data collection. A total of two days intensive training was given for all supervisors and data collectors. Double entry was done to minimize error.

Data Processing and Analysis

Data checked for completeness and consistency; coded data was entered into computer programs after the required cleaning was done. Univariate, Bi-variate and then multivariate analysis was carried out. Odds ratio (OR) with confidence intervals and p-values were calculated the output of the analysis were given and odds ratio with their respective confidence intervals. P-value < 0.05 taken as level of significance.

Ethical Consideration

Ethical clearance was obtained from Harar health science college ethical committee. Consent was obtained from administrative body of the hospital and the participants. Confidentiality of the data has been kept throughout the study.

RESULTS

Socio Demographic Characteristics

Of the total 210 mothers, 210 of them were participated in the study with a response rate of 100 %. The majority of the respondents' age was between 28-37 years. More than three fourth 152 (72.38%) of the respondents can read and write and 35(16.67%) respondents were divorced (See **Table1**)

Table 1 Socio-demographic characteristics of mothers in Jugal Hospital, Harari regional state, Ethiopia, 2019

Variable		Frequency	Percent
Age	18-27	66	31.43
	28-37	92	43.81
	38-47	41	19.52
	≥48	11	5.24
Marital status	Single	16	7.62
	Married	147	70.00
	Divorced	35	16.67
	Widowed	12	5.71
Educational status	Can't read & write	58	27.62
	Grade 1-8	88	41.90
	Grade 9-10	31	14.76
	Preparatory	11	5.24
	Diploma & above	22	10.48
Occupation	Private	136	64.76
	Government	67	31.90
	NGO	7	3.33
Residence	Urban	99	47.14
	Rural	111	52.86

Magnitude of Low Birth Weight

In this study, the magnitude of low birth weight was 19.53%, female sex is more affected than male counterpart. Among low birth weight neonates, 32(15.24%) were between 1500 and 2499gr. Fifty-two (24.76 %) of the neonates were delivered before 37 weeks of gestation. Only 7(3.33%) of the neonates were delivered after 42 weeks of gestation (See **Table 2**).

Reproductive Characteristics

Among the respondents, 33 (15.71%) of them were reported previous abortion, 21(10%) of the clients had a low birth weight in the previous pregnancy, and 177 (84.29 %) of the client have Ante Natal Care follow up (See **Table 3**)

Table 2 Socio-demographic characteristics of neonates in Jugal Hospital, Harari regional state, Ethiopia, 2019

Variable		Frequency	Percent
Gestational age	<37 weeks	52	24.76
	37-42 weeks	151	71.90
	>42 weeks	7	3.33
Birth weight	1-1.5	9	4.29
	1.5-2.499	32	15.24
	≥2.5k g	169	80.48
Gender of the neonate	Male	78	37.14
	Female	132	62.86

Table 3 Reproductive characteristics of mothers in Jugal Hospital, Harari regional state, Ethiopia, 2019

Variable		Frequency	Percent
Ante Natal Care follow up	Yes	177	84.29
	No	33	15.71
Gravidity	One	89	42.38
	Two	59	28.10
	Three & above	62	29.52
History of abortion	Yes	33	15.71
	No	177	84.29
History of Low birth weight	Yes	21	10.00
	No	189	90.00

Factors Associated with Low Birth Weight

Variables considered for multivariate logistic regression analysis were those with a p-value<0.5 in bi-variate analysis and those significantly associated with bi-variable analysis were ANC follow-up, previous history of abortion, previous history of low birth weight, gestational age, and sex of new born. After controlling confounding variables using multiple logistic regressions, previous history of low birth weight and gestational age <37 weeks were significantly associated with low birth weight.

Women who had previous history of low birth weight had 5.21times higher odds ratio of delivered low birth weight baby than their counterparts [AOR = 5.21, 95% CI: (1.5-14.2)]. and pregnant women who delivered before 37 weeks of gestational age had 4.8times higher odds ratio of delivered LBW neonates than those delivered at term [AOR = 4.8, 95% CI: (1.3-10.4)] (See **Table 4**).

Table 4 Multivariate analysis result, factor affecting LBW among neonates delivered in Jugal hospital, Harari regional state, Ethiopia 2019

Variable	Category	COR (95%CI)	AOR (95%C.I.)	P- value
ANC follow	Yes	1		0.06
	No	3.7(1.2-4.5)	1(0.5-28.9)	
Previous history of abortion	Yes	2.8(2.4-6.3)	1(0.8-7.6)	0.0 9
	No	1		
Previous history of LBW	Yes	2.5(1.8-3.0)	5.21(1.5-14.2)	0.01∗
	No	1		
Gestational age	< 37 weeks	1.8(1.2-2.3)	4.8(1.3-10.4)	0.004∗
	>37 weeks	1		
Sex of neonate	Male	1		0.08
	Female	1.8(1.2-5.2)	3(0.2-4.7)	

DISCUSSION

The finding of this study indicated that 19.53%, of neonates were born with low birth weight. The finding of this study is higher than the studies done in Northern Ethiopia (10%) (Gebregzabiherher, Haftu, Weldemariam, & Gebrehiwet, 2017), Axum and Laelay Maichew district (9.9%) (Teklehaimanot, Hailu, & Assefa, 2014), Kenya (12.3%) (Muchemi, Echoka, & Makokha, 2015), Northeast Nigeria16.9%, (Takai, Bukar, & Audu, 2014), Jakarta Indonesia (4. 5%) (Yanita, 2010), Nepal11.7% (Singh, Shrestha, & Marahatta, 2010), Iran (6.8%) (Jafari, Eftekhar, Pourreza, & Mousavi, 2010) and Abha City Saudi Arabia18.8%, (Baijayanti, Faten, & HAM, 2012).Whereas it is lower than studies done in Kersa, West Ethiopia (28.3 %) (Assefa, Berhane, & Worku, 2012) and Gambia (22.5%) (Jammeh, Sundby, & Vangen, 2011). These differences might be explained due to variation in study setup, population difference, study time, and study design, due to difference in the skills of data collectors and due to urban rural difference.

This study did not find any significant association between low birth weight and socio-demographic factors including maternal age, residence, educational status and marital status. Several studies have shown that socio-demographic factors can influence low birth weight either directly or indirectly (Roudbari, Yaghmaei, & Soheili, 2007).

This study identified history of obstetric complications as a risk factor for low birth weight. Study subjects who did not experience any obstetric complications during their past pregnancies had decreased risk of low birth weight babies. Similar findings were reported by other descriptive studies in Ethiopia (Adane, Ayele, Ararsa, Bitew, & Zeleke, 2014; Alemu & Umeta, 2016; Demelash, Motbainor, Nigatu, Gashaw, & Melese, 2015).

In this study, previous history of low birth weight explained a significant association with low birth weight. Those women having previous history of LBW had higher odds to have delivery of LBW neonates than women who did not have previous history. This result is similar to the study

conducted in Japan (Viengsakhone, Yoshida, Harun-Or-Rashid, & Sakamoto, 2010). This may be an indication for the importance of early detection and treatment of complications during ANC visits. In addition, this study showed that LBW was significantly associated with gestational age. The odds of women who gave birth before37weeks of gestational age in their last pregnancy had get increased chance of LBW neonates compared to those mothers who delivered at term pregnancy. The finding is similar to studies conducted in Mekele (Bugssa, Dimtsu, & Alemayehu, 2014) and Jimma (Tema, 2006).

Strength and Limitations

Direct measurement of newborn's weight was done in contrast to history-based estimation as it eliminates recall bias was the strength and since this study is cross-sectional, it may not provide strong evidence on the direct cause and effect relationship between dependent and independent variables was the study Limitation.

CONCLUSIONS

The prevalence of low birth weight in Harar, Jugal Hospital was 19.53%. There are no documented cut-off values of public health significance for low birth weight internationally. However, 19.53% prevalence represents a substantial risk among newborns in this hospital. It is important therefore that the newborn unit is well equipped to provide essential services to newborns at risk, including low birth weight. In this study, low birth weight in the previous pregnancy and gestational age <37 weeks, and showed significant association with LBW neonates. Governmental and non-governmental organizations working on maternal and child health should focus on identified factors in order to tackle the problem of LBW. Community based studies are needed to ascertain the prevalence of low birth weight and associated risk factors.

Declaration of Conflicting Interest
The authors report no conflict of interest in this study.

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