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Original Article

Effects of Different Nutritional Factors on Neonate's Birth Weight

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ABSTRACT

Under nutrition in mothers is a major factor which results in abnormal or reduced growth of fetus, low birth weight (LBW), neonatal illness and infant death **Objective:** To determine the association of dietary factors with birth weight of neonates **Methods:** This cross-sectional study was conducted on 100 mothers, divided into 2 groups, one having normal weight (NW) infants and other having LBW infants. Data regarding their dietary habits and anthropometric measurements were taken **Results:** The results showed that 29 mothers of NW babies were older child born with NW, 21 mothers of NW babies were not older child born with NW, whereas 29 mothers of LBW babies were older child born with NW, 21 mothers of LBW babies were not older child born with NW. There was an insignificant association (p=1.000) between education and neonate's birth weight as p-value is greater than 0.05. **Conclusions:** The rate of LBW were more affected by their food choices (lack of knowledge, improper antenatal care, less consumption of milk and protein and also fruits and vegetable) as compared to mothers with NW babies, other confounding determinants such as illiteracy rate, poor maternal nutrition and lifestyle factors, no knowledge regarding balanced diet and supplementation among pregnant females leads to prevalence of LBW infants.

INTRODUCTION

Good nutrition of mother is the main factor to contribute in growth of a fetus [1]. Nutritional status of a mother is assessed by measuring composition of body, biochemical measurements which include measurement of iron, folate and vitamin C, ways of food and energy intake and ingestion of essential nutrients [2]. Under nutrition in mothers is a major factor which results in abnormal or reduced growth of fetus, low birth weight (LBW), neonatal illness and infant death. Under nutrition may also result in chronic, incurable and injurious mental, motor and wellbeing damages [3]. Malnutrition in women may occur in any stage of their life including babyhood, adulthood and gestation period and it has a negative influence on infant's weight at the time of birth [4]. Women who are underweight prior to pregnancy have LBW infants [5]. Short height of mothers as a consequence of malnutrition also contributes to LBW. LBW may also result as an outcome of lack of certain nutrients which include folate, zinc, iron, vitamin A, vitamin, D and vitamin C [6]. About 12kg of weight is gained by mothers during their gestation period which averages 7.7 kg and includes enhancement in breast and uterine tissues, fat and extra cellular fluid [7]. Women residing in under-privileged areas are usually under nourished before conception; they may have multiple problems like anemia which occur as a result of insufficient intake of food and infections and low body weight or short stature [8]. 20% of maternal mortality occurs due to poor nutrition of women which is also a dominant cause of premature births; infant mortality, LBW and small for gestational age (SGA), still 10-20% women in many nations are malnourished. Short height of a mother may increase the chance of obstetric fistula, congested labor and mother death along with infant

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mortality and is usually the consequence of girls being short since babyhood [9,10]. Worldwide Pakistan ranks second in LBWs. In Pakistan, the incidence of LBW is around 32% among total child births. LBW occurs more frequently in developing countries among people where there is often a disproportionately high incidence of poverty, hunger, lack of awareness and knowledge. In later ages, if prevention could not be adopted in the pregnancy infants with LBW are more prone to become a victim of chronic diseases such as impaired development, malnutrition and stunted growth [11]. A population based prospective study was conducted by Denis HM et al., in 2011. Total of 3405 mothers were engaged in this study. Maternal milk intake 3 glasses per day was linked with greater fetal weight gain in the 3rd trimester of pregnancy, which led to an 88 g increase birth weight than that with the milk intake of 0-1 glass per day. Maternal milk intake is correlated with increased fetal weight gain. The correlation seems to be due to milk protein, or milk components nearly linked with proteins[12].

METHODS

A cross-sectional study was conducted at Pediatric and Gynae departments of Sir Ganga Ram hospital and the University of Lahore Teaching Hospital, Lahore. Study duration was 4 months and sample size were 100 females and divided into two groups, Group I having 50 females giving birth to normal weight babies Group II with 50 females giving birth to LBW babies. Data were collected after the ethical approval from The University of Lahore by using the non-probability sampling technique. Data collection was carried out by using pre-tested questionnaire/Performa. Data were analyzed with the help of SPSS version 21.0. Frequencies and percentages were calculated to determine dietary practices.

RESULTS

The results showed that 29 mothers of NW babies were older child, 21 mothers of NW babies were not older child born, whereas 29 mothers of LBW babies were older child born with NW, 21 mothers of LBW babies were not older child born with NW. There was an insignificant association (p=1.000) between education and neonate's birth weight as p-value is greater than 0.05 as shown in Table 1.

No	Groups	Older child born with normal weight		Total	P-value
		No	Yes		
1	Group I	21	29	50	1.0000
2	Group II	21	29	50	

Table 1: Association between older child born with normal weight and neonate's birth weight

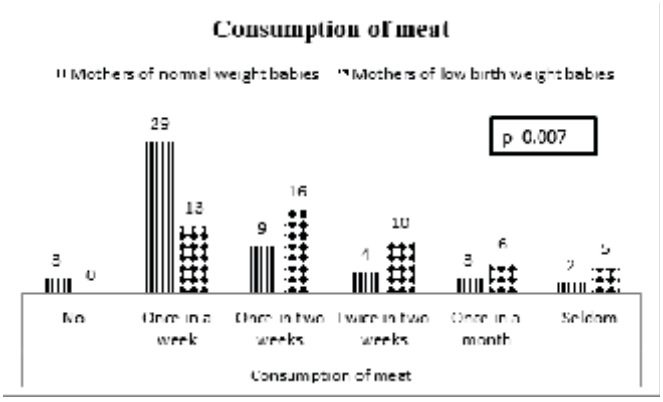

Figure 1: Association between consumption of meat and neonate's birth weight

The results showed that 3 mothers of normal weight babies were not consuming meat, 29 mothers were consuming of meat once in a week, 9 mothers were consuming meat once in two weeks, 4 mothers were consuming meat twice in two weeks, 3 mothers were consuming meat once in a month, 2 mothers were seldom consuming meat, whereas no mothers of LBW babies were consuming meat, 13 mothers were consuming meat once in a week, 16 mothers were consuming meat once in two weeks, 10 mothers were consuming meat twice in two weeks, 6 mothers were consuming meat once in a month, 5 mothers were seldom consuming meat. There was a significant association (p=0.007) between consumption of meat and neonate's birth weight as p-value is greater than 0.05 as shown in Figure 1.

Association between consumption of fruits and neonate's birth weight

The results showed that 5 mothers of NW babies were not consuming fruits, 13 mothers were daily consuming fruits, 16 mothers were consuming fruits 2-3 days in a week, 6 mothers were consuming fruits 4-5 days in a week, 8 mothers were monthly consuming fruits, 2 mothers were seldom consuming fruits, whereas no mother of LBW babies were consuming fruits, 10 mothers were daily consuming fruits, 10 mothers were consuming fruits 2-3 days in a week, 8 mothers were consuming fruits 4-5 days in a week, 18 mothers were monthly consuming fruits, 4 mothers were seldom consuming fruits. There was an insignificant association (p=0.041) between consumption of fruits and neonate's birth weight as p-value is greater than 0.05 as shown in Figure 2.

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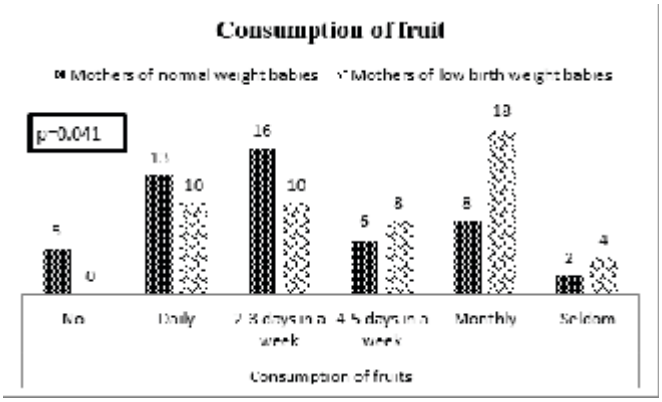

Figure 2: Association between consumption of fruits and neonate's birth weight

Association between consumption of any type of drug and neonate's birth weight

The results showed that 44 mothers of NW babies were not consuming any types of drugs, 2 mothers were consuming drugs for hypertension, 1 mother was consuming drug for diabetes, and 3 mothers were consuming drugs for others diseases, whereas 41 mothers of LBW babies were not consuming any types of drugs, 4 mothers were consuming drugs for hypertension, 2 mothers were consuming drug for diabetes, and 3 mothers were consuming drugs for others diseases. There was an insignificant association (p=0.776) between consumption of any types of drug and neonate's birth weight as p-value is greater than 0.05 as shown in Figure 3.

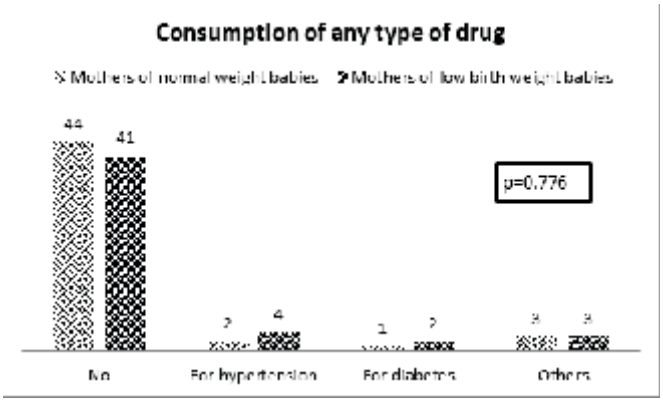

Figure 3: Association between consumption of any type of drug and neonate's birth weight

Association between intake of supplements during pregnancy and neonate's birth weight

The results showed that 11 mothers of NW babies were not taking supplements during pregnancy, 15 mothers were taking supplements during pregnancy, 1 mother was taking supplements during pregnancy and 23 mothers were taking supplements during pregnancy, whereas 8 mothers of LBW babies were not taking supplements during pregnancy, 18 mothers were taking supplements during pregnancy, 2 mothers were taking supplements during pregnancy and 22 mothers were taking supplements during pregnancy. There was an insignificant association (p=0.776) between intake of supplements during pregnancy and neonate's birth weight as p-value is greater than 0.05 as shown in Figure 4.

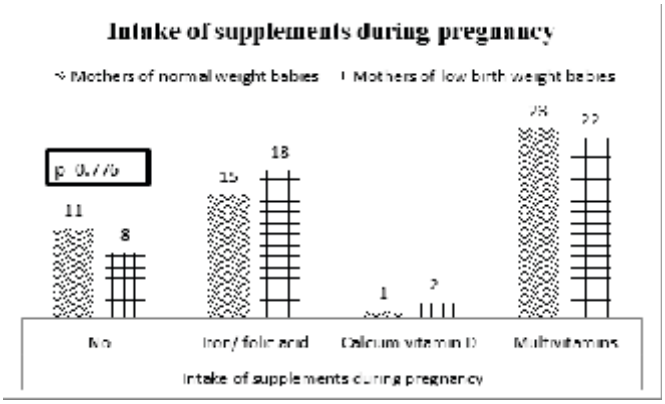

Figure 4: Association between intake of supplements during pregnancy and neonate's birth weight

Association between intake of anti-depressants and neonate's birth weight

The results showed that 46 mothers of NW babies were not taking anti-depressants, 4 mothers of NW babies were taking anti-depressants, whereas 43 mothers of LBW babies were not taking anti-depressants, 7 mothers of LBW babies were taking anti-depressants. There was an insignificant association (p=0.338) between intake of anti-depressants and neonate's birth weight as p-value is greater than 0.05 as shown in Figure 5.

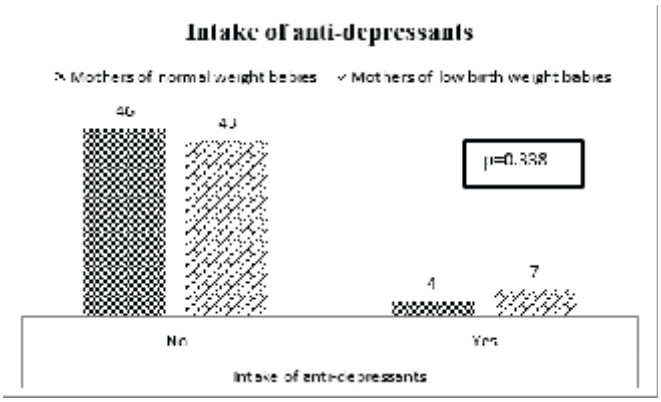

Figure 5: Association between intake of anti-depressants and neonate's birth weight

RESULTS

The results of current study showed that the illiteracy rate and socioeconomic status of mothers with LBW babies were very low as compared to mothers with NW babies. LBW is mostly associated with socio-demographic, economic, maternal and organizational factors. Another research conducted by Heppe DH et al., in 2011 from the

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Netherlands, total 3380 mothers were entitled. They evaluated the associations of first trimester maternal total fish, lean fish, fatty fish and shell fish intake with fetal growth aspects in the 2nd and 3rd trimester, growth aspects at birth and the risk of the neonatal difficulties, together with preterm birth, LBW and SGA. Maternal older age, higher education level, folic acid supplements use, alcohol consumption and not smoking were connected with higher fish intake. Likewise, total fish intake or specific intake of any type of fish was not constantly linked with the risk of neonatal difficulties [14]. Observational study was designed by Ludvigsson JF et al., in 2004 in Southeast Sweden to inspect the risk of LBW (greater than 2500g, LBW), intrauterine growth retardation (IUGR) and preterm birth (gestational age less than 37 weeks) in association with milk consumption. Low milk consumption during pregnancy was linked with high risk of IUGR. LBW and preterm birth were not linked with milk consumption during pregnancy. Study indicated that low milk consumption during pregnancy may be related to high risk of IUGR in the infant. The decrease in birth weight and increased risk of IUGR elevate health concerns, since even small changes in birth weight may increase the risk of future disease [13]. A research was made by Hrolfsdottir L et al., in 2013. Total 809 Danish pregnant women were entitled, with offspring follow up at 20 years of age. Maternal milk absorption of greater than 150mL per day vs. less than 150 mL per day was linked with 0.32 higher z-scores for birth weight 0.34 higher z scores for birth length. At, follow up 20 years later, those offspring's whose mother had taken greater than 150ml milk per day were prone to have 0.19 higher z scores for height, 8% higher insulin amount in comparison with offspring whose mothers absorbed less than 150ml milk /day [15]. Another study was designed by Fei Xue et al., in 2008. Total 34 063 women in the Nurses' Mothers Cohort were inspected about paternal aspects during the pregnancy with the birth weight of their nurse daughter. In the adjusted evaluation, daily absorption of each additional glass of milk was correlated to an increase of 6 g in birth weight and daily absorption of each additional cup of coffee was linked with a reduction of 10 g in birth weight. Consumption of 1-2, 3-4 and 51 cups of coffee daily was associated with a 28% and 63% increase, respectively, in the odds of intrauterine growth restriction as compared to non-drinkers [16]. Premature rupture membrane deliveries, preterm birth and miscarriages were high in those mothers with LBW babies as compared to mothers with NW babies. Similar study done by Siza JE et al., also revealed that LBW prevalence was high in women in premature rupture of membrane (38%) placenta previa (17%) and abruption of placenta (15.5%) [17]. In current study, LBW were more prevalent amongst all the pregnant females with inadequate dietary practices, inappropriate food choices, myths or restricted diet during pregnancy due to peer pressure leading to LBW babies. Many other studies have also published their results [18-20] in accordance with our study, stating that there is association of maternal nutritional factors with LBW babies.

CONCLUSIONS

The rate of LBW were more affected by their food choices (lack of knowledge, improper antenatal care, less consumption of milk and protein and also fruits and vegetable) as compared to mothers with NW babies, other confounding determinants such as illiteracy rate, poor maternal nutrition and lifestyle factors, no knowledge regarding balanced diet and supplementation among pregnant females leads to prevalence of LBW infants.

REFERENCES

[1] Poon AK, Yeung E, Boghossian N, Albert PS, Zhang C. Maternal dietary patterns during third trimester in association with birthweight characteristics and early infant growth. Scientifica. 2013. 2013:786409. doi: 10.1155/2013/786409.

[2] Rao S, Yajnik CS, Kanade A, Fall CH, Margetts BM, Jackson AA, Shier R, Joshi S, Rege S, Lubree H, Desai B. Intake of micronutrient-rich foods in rural Indian mothers is associated with the size of their babies at birth: Pune Maternal Nutrition Study. The Journal of nutrition. 2001 Apr 1;131(4):1217-24. doi: 10.1093/jn/131.4.1217.

[3] Potdar RD, Sahariah SA, Gandhi M, Kehoe SH, Brown N, Sane H, Dayama M, Jha S, Lawande A, Coakley PJ, Marley-Zagar E. Improving women's diet quality preconceptionally and during gestation: effects on birth weight and prevalence of low birth weight—a randomized controlled efficacy trial in India (Mumbai Maternal Nutrition Project). The American journal of clinical nutrition. 2014 Sep 17;100(5):1257-68. doi: 10.3945/ajcn.114.084921.

[4] Imdad A, Bhutta ZA. Maternal nutrition and birth outcomes: Effect of balanced protein-energy supplementation. Paediatric and Perinatal Epidemiology. 2012 Jul;26:178-90. doi: 10.1111/j.1365-3016.2012.01308.x.

[5] Tu N, King JC, Dirren H, Thu NH, Ngoc QP, Diep AN. Effect of animal-source food ssupplement prior to and during pregnancy on birthweight and prematurity in rural Vietnam: a brief study description. Food and nutrition bulletin. 2014 Dec;35(4_suppl3):S205-8. doi: 10.1177/15648265140354S307.

[6] Mitchell EA, Robinson E, Clark PM, Becroft DM,

DOI: https://doi.org/10.54393/pbmj.v5i1.269

Glavish N, Pattison NS, Pryor JE, Thompson JM, Wild CJ. Maternal nutritional risk factors for small for gestational age babies in a developed country: a case-control study. Archives of Disease in Childhood-Fetal and Neonatal Edition. 2004 Sep 1;89(5):F431-5. doi: 10.1136/adc.2003.036970.

[7] Barker DJ. The malnourished baby and infant: Relationship with Type 2 diabetes. British medical bulletin. 2001 Nov 1;60(1):69-88. doi: 10.1093/bmb/60.1.69

[8] Ramakrishnan U, Grant F, Goldenberg T, Zongrone A, Martorell R. Effect of women's nutrition before and during early pregnancy on maternal and infant outcomes: a systematic review. Paediatric and perinatal epidemiology. 2012 Jul 1;26:285-301. doi: 10.1111/j.1365-3016.2012.01281

[9] Dean SV, Lassi ZS, Imam AM, Bhutta ZA. Preconception care: nutritional risks and interventions. Reproductive health. 2014 Dec;11(3):S3. doi: 10.1186/1742-4755-11-S3-S3.

[10] Muchemi OM, Echoka E, Makokha A. Factors associated with low birth weight among neonates born at Olkalou District Hospital, Central Region, Kenya. Pan African Medical Journal. 2015;20(1). doi: 10.11604/pamj.2015.20.108.4831.

[11] Dewey KG, Cohen RJ. Does birth spacing affect maternal or child nutritional status? A systematic literature review. Maternal & child nutrition. 2007 Jul 1;3(3):151-73. doi: 10.1111/j.1740-8709.2007.00092.x.

[12] Heppe DH, van Dam RM, Willemsen SP, den Breeijen H, Raat H, Hofman A, Steegers EA, Jaddoe VW. Maternal milk consumption, fetal growth, and the risks of neonatal complications: the Generation R Study. The American journal of clinical nutrition. 2011 Jun 22;94(2):501-9. doi.org/10.3945/ajcn.111.013854

[13] Ludvigsson JF, Ludvigsson J. Milk consumption during pregnancy and infant birthweight. Acta paediatrica. 2004 Nov;93(11):1474-8. doi: 10.1080/08035250410018319.

[14] Heppe DH, Steegers EA, Timmermans S, den Breeijen H, Tiemeier H, Hofman A, Jaddoe VW. Maternal fish consumption, fetal growth and the risks of neonatal complications: the Generation R Study. British journal of nutrition. 2011 Mar;105(6):938-49. doi:10.1017/S0007114510004460

[15] Hrolfsdottir L, Rytter D, Bech BH, Henriksen TB, Danielsen I, Steingrimsdottir L, Olsen SF, Halldorsson TI. Maternal milk consumption, birth size and adult height of offspring: a prospective cohort study with 20 years of follow-up. European journal of clinical nutrition. 2013 Oct;67(10):1036. doi: 10.1038/ejcn.2013.151.

[16] Xue F, Willett WC, Rosner BA, Forman MR, Michels KB. Parental characteristics as predictors of birthweight. Human reproduction. 2007 Oct 12;23(1):168-77. doi.org/10.1093/humrep/dem316

[17] Siza JE. Risk factors associated with low birth weight of neonates among pregnant women attending a referral hospital in northern Tanzania. Tanzania journal of health research. 2008;10(1):1-8. doi: 10.4314/thrb.v10i1.14334.

[18] Christian P, Mullany LC, Hurley KM, Katz J, Black RE. Nutrition and maternal, neonatal, and child health. Semin Perinatol. 2015 Aug;39(5):361-72. doi: 10.1053/j.semperi.2015.06.009.

[19] Zhao R, Xu L, Wu ML, Huang SH, Cao XJ. Maternal pre-pregnancy body mass index, gestational weight gain influence birth weight. Women Birth. 2018 Feb;31(1):e20-e25. doi: 10.1016/j.wombi.2017.06.003.

[20] Kramer MS. Determinants of low birth weight: methodological assessment and meta-analysis. Bull World Health Organ. 1987;65(5):663-737