The Incidence of Low Birth Weight (LBW) and Small- for-Gestational Age (SGA) and its Related Factors in Neonates, Sabzevar, Iran

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Abstract

Introduction

Low birth weight (LBW) is a high risk for children's health and a problem of public health in under developing countries. SGA increases neonatal and infant death, and neonatal and adult morbidity. So the present study aimed to assess the incidence of LBW, SGA and their related factors in Sabzevar, Iran.

Materials and Methods

This prospective descriptive-analytic study was conducted on 481 low birth weight neonates born in Mobini Academic Hospital of Sabzevar, Iran, in 2011 to 2012. Neonates who their BW was <2500g entered the study. Study tool was a researcher-made checklist. It was confirmed by content validity and internal consistency (Cronbach's alpha (α=0.81)) reliability. Data were analyzed by descriptive-analytic statistics and using SPSS 11.5.

Results

480 (6.33%) of participating newborns were LBW (out of 7599). Mean weight of LBW neonates was (2039.1±9.6) g. Among LBW neonates, 62 (12.7%) and 24 (5%) of neonates were Very low birth weight (VLBW) and Extremely low birth weight (ELBW), respectively. 162 (34.1%) of neonates were SGA (out of LBW neonates). SGA rate was 2.2% (out of total newborns). Family income (p =0.026) and mother's education (p =0.004) were significantly lower in SGA neonates rather than LBW neonates. The incidence of mothers' urinary infection in VLBW neonates was significantly higher than non-VLBW neonates (p <0.001).

Conclusion

Findings showed that LBW and SGA incidence were similar to these statistics in developed countries and also other cities of Iran. But most types of growth retardation were asymmetric, in reverse to the reference books.

Keywords: Low Birth Weight (LBW), Small for Gestational Age (SGA), Related Factors.

Introduction

Low birth weight (LBW) is a high risk for children's health and also an indicator of a public-health problem in under developing countries. LBW is defined as a birth weight of a live born infant less than 2,500 g, regardless of gestational age. LBW is either caused by preterm birth (which is defined as younger than 37 weeks of gestational age) or the infant being small for gestational age, or a combination of both. Subcategories of preterm birth include early preterm (24 0/7–33 6/7 weeks of gestation) and late preterm (34 0/7–36 6/7 weeks of gestation) (1-5). SGA is defined as growth at the 10th or less percentile for weight of all fetuses at that gestational age (6). Prematurity and SGA are associated with neonatal and infant mortality and morbidity, and some disorders such as dysfunction of immune system in adulthood (6, 7). LBW reflects not only situation of health and nutrition, but also indicates survival rate, psychosocial and health growth and development. Intrauterine malnutrition sometimes sustains in all life time by causing hypotonicity. It also increases higher incidence of diabetes and heart disease, cognitive disorders and Intelligence quotient (IQ) (7) in adulthood. LBW incidence ranges from 8.1%lower in developed countries and 30-60% in under developing countries. The incidence of SGA neonates is one third of LBW neonates (6). Subcategories of LBW include Very low birth weight (VLBW) which is less than 1500 g, and Extremely low birth weight (ELBW) which is less than 1000 g. VLBW is a precise index for predicting neonatal death. It includes more than 50% of neonatal death rate and 50% of morbidities and neurological disabilities (8).

Previous studies have been assessed different factors like smoking, socio-economic situation, and consuming chlorinated water in induction of LBW and SGA neonates (9, 10). Since we have not found any study about the incidence rate of LBW, SGA and VLBW and their relationship with family's socio-economical situation in Sabzevar, the present study aimed to assess the incidence of LBW and SGA and their related factors in Sabzevar, Iran, in 2011 to 2012.

Materials and Methods

This prospective descriptive-analytic study was conducted on low birth weight neonates born in Mobini Academic Hospital in Sabzevar, Iran, 2011 to 2012. Participants were 481 LBW neonates by consensus sampling. The research was confirmed by Ethics Research Committee of Sabzevar University of Medical Sciences. Informed consents were obtained from parents of admitted neonates. Then data were gathered by 2 expert nurses who occupied in Neonatal intensive-care unit (NICU) by using a researcher-made checklist. The checklist was confirmed by content validity and internal consistency (Cronbach's alpha (α=0.81)) reliability. The checklist includes some neonatal characteristics such as: weight, gender, Apgar score, birth priority, anomaly in neonate, multiple pregnancy, delivery type, gestational age, etc.; and maternal information like perinatal problems (diabetes, preeclampsia, heart disease, renal disease, etc.), drug history, addiction, smoking, prenatal nutrition, and socioeconomic status.

Weight (W), height (H) and head circumference of neonates were measured initially at birth. Neonates' weight was measured by a Seca scale with an accuracy of 5 g. Anthropometric indices (weight, height, head and abdomen circumference) were charted on standard curves of neonatal growth according to gestational age. Neonatal percentiles <10% were classified as SGA (small for gestational age) and percentiles 10-90% were classified as appropriate for gestational age (AGA). Gestational age was calculated first according to Last menstrual period (LMP) if it was valid and then sonography, especially if it was done before 20 w of GA. Ponderal index (PI)[1] was calculated for each neonate

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[1] PI = [weight (in g) x 100] ÷ [length (in cm)]

and its percentile was determined according to standard curves mentioned in text books. The checklists were completed by one of nurses before discharge of the neonates.

Data were coded and analyzed by descriptive and analytic (one-way analysis of variance (ANOVA), t-test) statistics and confidence interval 95% by SPSS-11.5. $P < 0.05$ was considered significant.

Results

480 (6.33%) newborns were LBW (out of 7599 births). 275 neonates (57.4%) were female (Table.1).

Table 1: Frequency of maternal demographic and socio-economical situation

	Variable	N (percent)
Neonates		
gender	male female ambiguous genitalia	203(42.3%) 275(57.4%) 1(0.2%)
Birth priority	The first Second third 4≤	201(41.9%) 134(27.9%) 82(17.1%) 63(13.1%)
Delivery type	C.S N.D	238(49.8%) 240(50.2%)
Multi-pregnancy	Yes No	112(23.5%) 365(76.5%)
Cord diameter	Thin Not thin	22(4.6%) 454(95.4%)
Mothers		
Mother's education	Illiterate Primary Junior high school High school Academic	42(8.9%) 138(29.2%) 86(18.2%) 149(31.5%) 58(12.3%)
Place of residence	City Village	282(59.7%) 190(40.3%)
Prenatal care	Yes No	450(95.1%) 23(4.9%)
Pregnancy nutrition	Suitable Unsuitable	423(88.9%) 53(11.1%)
Preconception nutrition	Suitable Unsuitable	459(95.6%) 11(2.3%)
Heavy work	Yes No	44(9.3%) 428(90.7%)
Mother's addiction	Opium addiction Smoke, hookah Opium addiction, Smoke, hookah	22(4.6%) 3(0.6%) 1(0.2%)

Mean weight of LBW neonates was 2039.1±9.6 g (Table. 2). The lowest weight of neonates was 440 g and the most weight was 2490 g. The least and the most gestational age was 23 w vs. 40 w.

Table 2: Mean of Demographic Variables in mothers and neonates

Variables	Mean ± SD
Neonates	
Weight (g)	2039.1±9.6
Height (cm)	45±0.16
Head circumstance (cm)	31.5±0.10
Abdominal circumstance (cm)	25.4±0.11
Gestational age (w)	35.5±0.16
Mothers	
Age (y)	28.1±0.3
Preconception weight (kg)	59.6±0.6
Weight of mother near delivery (kg)	70.6±0.6

12.7% (62 neonates) were VLBW and 5% (24 neonates) were ELBW (Out of 480 LBW neonates). 280 neonates (58.3%) were preterm and 200 neonates were 37-40 w (out of LBW neonates). Preterm rate was 3.8% in 2011 (out of total newborns).

162 (34.1%) of LBW neonates were SGA. SGA rate was 2.2% in 2011 (out of total newborns). 306 (64.4%) and 7 (1.5%) of LBW neonates were AGA and Large for gestation age (LGA), respectively (Table. 3) (Figure.1). 18% of SGA neonates were symmetric SGA (head circumference (HC) and BW lower than 0th percentile). Mean of PI was 2.21±0.023 in SGA group vs. 2.21±0.013 (Figur.1).

Table 3: Frequency of LBW and SGA, AGA and LGA in each group of gestational age

Variable	N (percent)			
	SGA	AGA	LGA	LBW
Early preterm	9 (1.9%)	108 (22.7%)	7 (1.5%)	124 (26.1%)
Late preterm	14 (2.9%)	137 (28.8%)	0 (0.0%)	151 (31.7%)
term	139 (29.2%)	61 (12.9%)	0	200 (42.1%)
Total	162 (34.1%)	306 (64.4%)	7 (1.5%)	475 (100%)

Mean weight of neonates was respectively (1174.4±36.8) and (2182.2±12.9) in <1500 g (VLBW) and >1500 g groups. There was not a significant difference between mother's age and weight in these two groups (Table. 4).

Table 4: Mean of some variables in two groups of neonatal weight

| Variables	Mean ± SD		P-value
	<1500 g	>1500 g	
Weight (g)	1174.4±36.8	2182.2±12.9	<0.001
Height (cm)	38.7±.4	46.1±.1	<0.001
Head circumstance (cm)	27.7±.3	32.2±.1	<0.001
Abdominal circumstance (cm)	21.3±.4	25.8±.1	<0.001
Gestational age (w)	30.1±.4	36.3±.1	<0.001
Mother age (y)	27.9±.9	28 ±.3	0.825
Preconception weight of mother (kg)	60.9±2.4	59.3±.6	0.811
Weight of mother near delivery (kg)	69.1±2.5	71.2±.7	0.123

Mothers' urinary infection incidence was 18.3% in VLBW neonates vs. 4.4% in non-

Family income (p=0.026) and mother's education (p=0.004) were significantly lower in SGA neonates in comparison with the other LBW neonates. The incidence of mothers' urinary infection in VLBW neonates was significantly higher than non-VLBW neonates (p<0.001). Inadequate nutrition and low BMI of mothers were more in SGA neonates, but there was no significant relationship (p>0.05).

There was not a significant relationship between neonatal gender and birth priority with VLBW and ELBW; but there was a significant relationship between gender (p =0.024) with weight percentile. Female neonates had lower percentiles.

There was not a significant relationship between VLBW with deformity of organs, cord diameter, multi-pregnancy, mother's addiction, mother's education, place of residence, prenatal care, and heavy work during pregnancy; but there was a siginificant relationship between VLBW with prenatal difficulties (p<0.001), maternal problrms (p <0.001) and neontal apgar (p<0.001). Among mentioned variables, there was just a significant relationship between ELBW with cord diameter (p <0.001), prenatal difficulties (p-value=0.002), maternal problems (p<0.001) and neonatal apgar (p<0.001).

There was a significant relationship between GA with neonatal apgar (p<0.001).
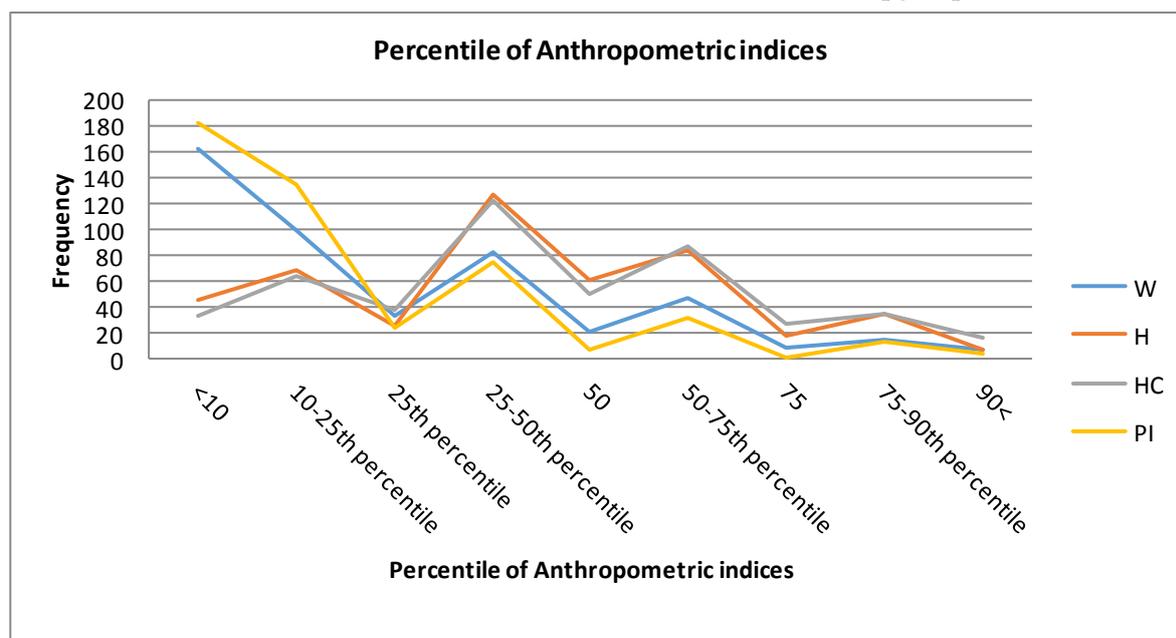
VLBW neonates.

Chart 1: Percentiles of participants' anthropometric indices

Discussion

The incidence of LBW is a good criterion in order to assess condition of mother's nutrition and health (7). LBW incidence was 6.3% in the present study. It is lower than Asian (19.7%), but it was similar to European (6.5%), North American (6.8%) and some other studies in different cities of Iran.

Preterm is one of important reasons for LBW (6, 8, 11). Preterm rate was 58.3% among LBW neonates, which was 3.8% out of total newborns in one year. The incidence of SGA was 34% in the present study which is similar to developed countries (6). SGA was 2.2% out of total newborns in one year. Mosayebi et al. showed that more than half of LBW neonates were preterm and the rest were IUGR (12). SGA incidence was 8.6% among preterm neonates in the present study. This result was in accordance with some statistics from NICHD Neonatal Research Network (NRN) in which SGA incidence was 9% in a 20'000 VLBW population of 25-30 w neonates; vs. 22% in a 4438 VLBW population of neonates (13).

In the present study, female gender was associated with LBW; so that 57.4% of LBW and 62.3% of SGA neonates were female. This finding is in consistent with some studies in Japan and Canada in which female gender was associated with a higher risk of LBW (14, 15).

20.4% of LBW neonates were due to multi-pregnancy in the present study. Zahed Pasha et al. concluded that preterm labor and multi-pregnancy increased LBW significantly (16).

In the present study, there was a significant relationship between VLBW and ELBW with prenatal difficulties, maternal problems and neonatal Apgar. But in contrast to Valero et al. who showed several factors like tobacco products consumption, alcohol and socio-economic level as effective factors in inducing pregnancy complications such as LBW, Intrauterine growth restriction (IUGR) and preterm labor (5), we did not find any significant relationship between LBW and these factors. However, in our study, mother's education and family income in SGA neonates was significantly lower than non-SGA neonates which is on accordance with mentioned study.

Conclusion

Findings showed that LBW and SGA incidence were similar to these statistics in developed countries and also other cities of Iran. But most types of growth retardation were asymmetric, in reverse to the reference books. So, we recommend educating caregivers for precise prenatal care and encouraging mothers for regular referral in order to have decrease LBW and SGA neonates.

Conflict of Interest: None.

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