

PREVALENCE OF LOW BIRTH WEIGHT AND ITS DETERMINANTS IN AN URBAN AREA OF KANCHEEPURAM DISTRICT, TAMIL NADU

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ABSTRACT

To estimate the prevalence of Low birth weight and its determinants among the children below one year of age in the study area. This study was carried out in an urban area of Kancheepuram district, to estimate the prevalence of Low Birth Weight among infants and its associated determinants such as socio – demographic factors, environmental factors, previous obstetric history, antenatal details and delivery details of the mothers which directly or indirectly contribute to Low birth weight were assessed.

Keywords

thyroid dysfunction, chronic hypertension, bronchial asthma and tuberculosis

Introduction

Birth weight is the first weight of the newborn measured within the first hour of life before significant postnatal weight loss occurs. Low birth weight (LBW) is defined by World Health Organisation (WHO) as birth weight less than 2.5 kg irrespective of the gestational age. Low birth weight continues to be a significant public health problem globally.(1) In developing countries like India, adoption of standard weight (< 2.5 kg) would lead to high incidence of LBW neonates and many of them does not require special care. Hence, Indian Association of Paediatrics used a definition of a weight below 2 kg to represent LBW. (2)

LBW is considered to be the important predictor of infant mortality, especially for the deaths that occur within first month of life.(6) Thus, it contributes to neonatal, infant and childhood mortality and morbidity.(7) Also using low birth weight as an indicator, the progress towards the internationally agreed goals can be monitored.(8) Across the world, neonatal mortality is 20 times more common in Low birth weight babies when compared to the normal birth weight babies i. e. >2.5 kg.(9)

Neonatal complications are markedly increased in ELBW and VLBW infants. The common complications are hypothermia, hypoglycaemia, perinatal asphyxia, respiratory distress syndrome, fluid and electrolyte imbalance, hyperbilirubinemia, anaemia, impaired nutrition and feeding difficulties, infection, neurological problems, hearing deficits and sudden infant death syndrome. (10) Similarly LBW is also associated with inhibited growth and cognitive development, and chronic diseases like type 2 diabetes, hypertension and coronary heart disease later in life. (1)

Low birth weight is the single most important factor determining the survival chances of the child. (5) It is more common in developing countries when compared to developed countries. (6-10) Overall, it is estimated that 15% of all births worldwide were low birth weight, according to UNICEF.(11) Interventions for preventing LBW must be cause specific. It can be achieved through providing good prenatal care and interventional programmes. The interventions can be direct or indirect. Direct intervention measures like increasing food intake, controlling infections, early detection and treatment of medical disorders, etc. Indirect interventions like avoidance of excessive smoking, family planning services, improved sanitation measures, etc.(12)

According to recent estimate of WHO shows that global IMR is 30.5 per 1000 live births in 2016 (13) and India has IMR of 34 per 1000 live births, Tamil Nadu has IMR of 17 per 1000 live births (Sample registration system 2016).(14) In 2012, World Health Assembly (WHA) resolution endorsed a Comprehensive implementation plan on maternal, infant and young child nutrition. The main goal of this low birth weight policy brief is to achieve a 30% reduction of the number of infants born with a weight lower than 2500 g by the year 2025. (11) Reproductive and Child Health Phase II (RCH II) is a programme developed to reduce maternal and child mortality and morbidity by providing proper obstetric care. This is implemented at the level of household, through ANMs at sub centre level and through medical officers and nurse at primary health care level.(5)

Integrated Management of Neonatal and Childhood Illness (IMNCI) strategy is one of the main interventions under RCH II. This strategy is developed by WHO and UNICEF for the management of childhood illness. Facility based IMNCI (F- IMNCI) is one of the most important facility which focus on providing appropriate management of major causes of neonatal and childhood mortality such as LBW, asphyxia, sepsis, pneumonia, etc. (5) Similarly, Maternal and Child Health (MCH) services deliver health care to special group in the population which is especially vulnerable to disease, disability or death. One of the main objectives of MCH is to reduce morbidity and mortality rates among mothers and children. These programmes aim at providing proper care for antenatal women, neonates, infants and children. Therefore, a high percentage of LBW therefore points to deficient health status of pregnant women, inadequate antenatal care and need for improved care of antenatal women. (5)

MATERIALS AND METHOD

Study design:

This study is a community based cross – sectional descriptive study conducted in a urban area of Kancheepuram district, Tamil Nadu.

Study area and study population:

Kancheepuram district is one among the 32 Districts of Tamil Nadu. According to the census of India 2011, Kancheepuram district covers an area of 4433Sq. km. The population of Kancheepuram District is 39.98 lakhs comprising of 20.12 lakh males and 19.8 lakh females. Anakaputhur is a Municipality city in the district of Kancheepuram, Tamil Nadu.

Inclusion criteria:

Children belonging to the age group below 12 months irrespective of their morbidity status residing permanently with their families in Anakaputhur area whose mother consented for the study were included.

Exclusion criteria:

- Infant's mothers who were not willing to participate in the study
- Infant's mothers who were not able to contact even after 2 visits
- The infant's mothers who were not having maternal and child health card (MCH card) or antenatal check up book and scan reports were excluded from the study.

Ethical approval:

The study was approved by Institutional Ethics Committee of SreeBalaji Medical College and Hospital, Ref. No. 002/SBMC/ IHEC/ 2016/195.

Data collection method:

The name and address of the infant along with the details of the mother were collected from the infant register available at the UHTC. The designated infants were chosen from the sampling frame by systematic sampling method and their houses were visited. The availability of the mother and child at their residence was confirmed by the field staff. Each participant along with their mother was interviewed for duration of 10 to 12 minutes. Details of the anthropometric measurements and haemoglobin of mothers during their pregnancy period were obtained from MCP/ Antenatal card. Relevant information was also collected from the medical records kept by the mothers.

Data Analysis:

Data was analyzed using the software Statistical Package for the Social Sciences (SPSS), version 17. Results were presented using descriptive and analytical statistics. The descriptive statistics were presented as frequency distribution and percentage. The analytical statistics used were Chi – square, Odds Ratio and Confidence Interval to determine the association of LBW with its risk factors. P value < 0.05 was considered as statistically significant value.

RESULTS

This study was conducted among 375 infants for identifying the prevalence of Low birth weight and association between LBW and its risk factors. Table 1: Socio demographic characteristics of the study participants

S. No	Socio demographic characteristics	Frequency n = 375	Percentage
1	Age of the mother (at delivery)		
	<19	15	4.0
	20- 24	195	52.0
	25- 29	129	34.4
	≥ 30	36	9.6
2	Education of the mother		
	Illiterate	10	2.7
	Primary school	12	3.2
	Middle school	75	20.0
	High school	175	46.7
3	Occupational status of the mother		
	Employed	48	12.8
	Unemployed	327	87.2
4	Socio economic status (BG Prasad)		
	Class I	99	26.4
	Class II	153	40.8
	Class III	78	20.8
	Class IV	29	7.7
	Class V	16	4.3
5	Religion		
	Hindu	310	82.7
	Muslim	39	10.4
	Christian	26	6.9

6	Type of family		
	Nuclear	252	67.2
	Joint	58	15.5
	Three generation	65	17.3

Mother's characteristics before conception:

Characteristics of infant's mother before conception are enumerated in Table 2. Among the mothers 26. 7% had consanguineous marriage, 6. 7% had history of infertility and 1.1% was tobacco users.

Table 2: Mother's characteristics before conception

S.No	Mother's characteristics	Frequency	Percentage
1	Consanguineous marriage		
	Yes	100	26.7
	No	275	73.3
2	History of infertility		
	Yes	25	6.7
	No	350	93.3
3	Tobacco use		
	Yes	371	98.9
	No	4	1.1

Chronic illness among infant's mothers

In Figure 1 chronic illness among the infant's mothers is represented, among which the most common illness was thyroid disorder (6 .10%), followed by bronchial asthma (2.10%), followed by diabetes and hypertension (1.10%), followed by Psychiatric illness (0 .50 %), followed by tuberculosis and heart disease (0.30%).

Figure 1 : Chronic illness among infant' s mothers (in percentage)

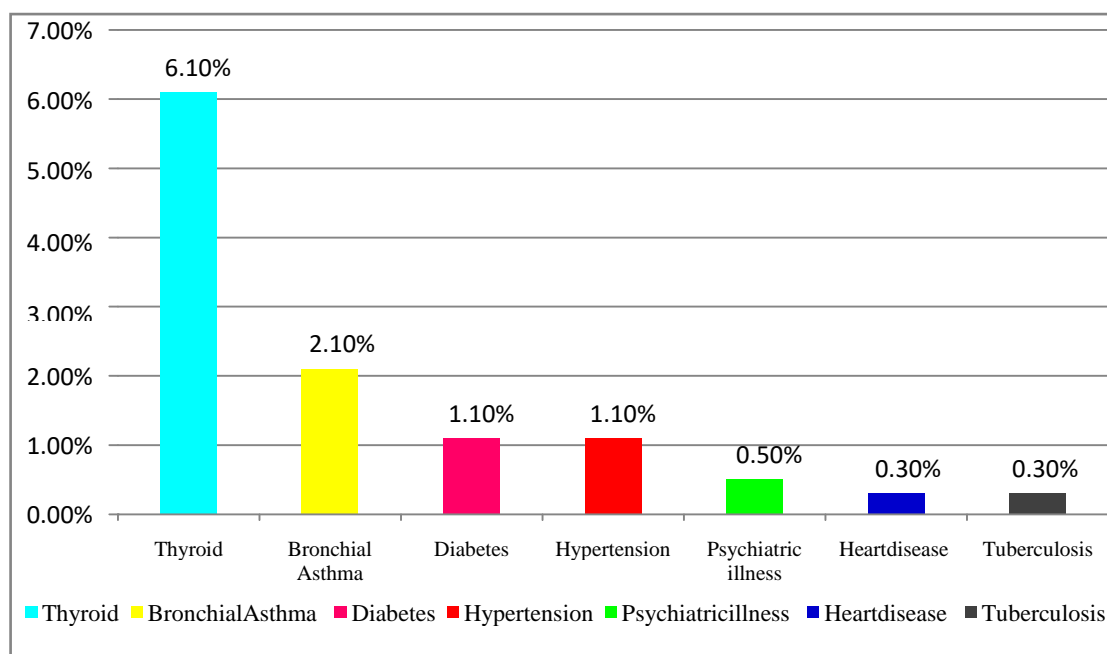
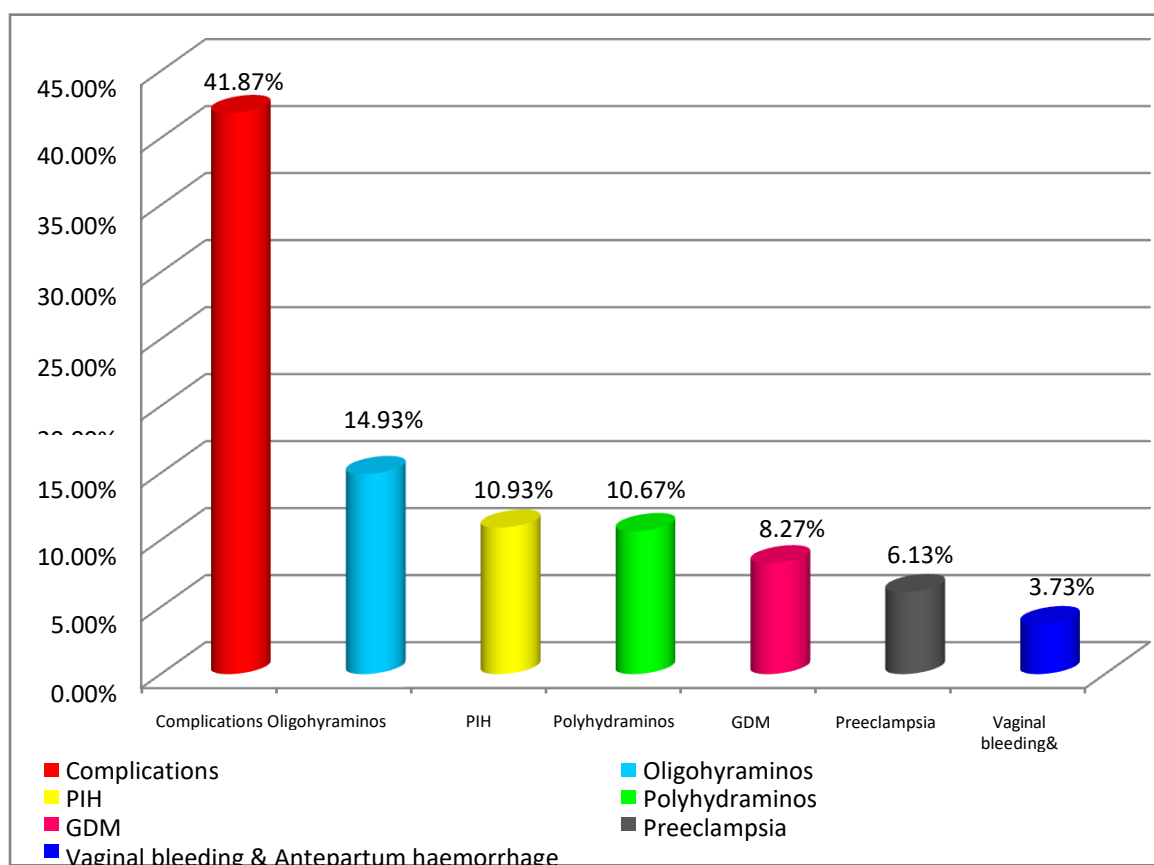


Figure 2 : Complications of pregnancy among mothers



Delivery particulars of the study participants

Delivery particulars of the study participants were enumerated in table 6. Majority of them had vaginal delivery (59.2 %), when compared with LSCS (40.8%). Among the study participants pre term births were 8.5%, multiple births were 0. 8%. Males and females were 48.8% and 51.2% respectively.

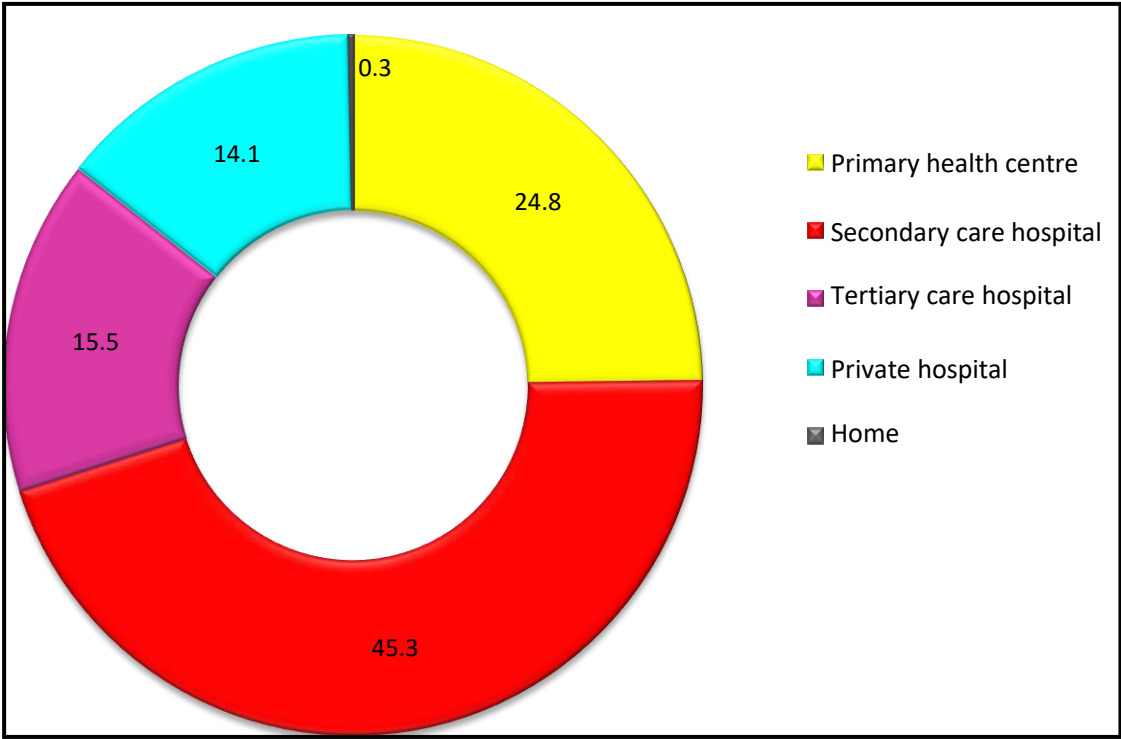
Table 4: Delivery particulars of the study participants

S.No	Delivery particulars	Frequency	Percentage
1	Mode of delivery		
	Vaginal delivery	222	59.2
	LSCS	153	40.8
2	Gestational age		
	Preterm	32	8.5
	Term	343	91.5
3	Outcome		
	Single	372	99.2
	Multiple	3	0.8
4	Gender of the baby		
	Male	183	48.8
	Female	192	51.2

Health facility preferred for delivery

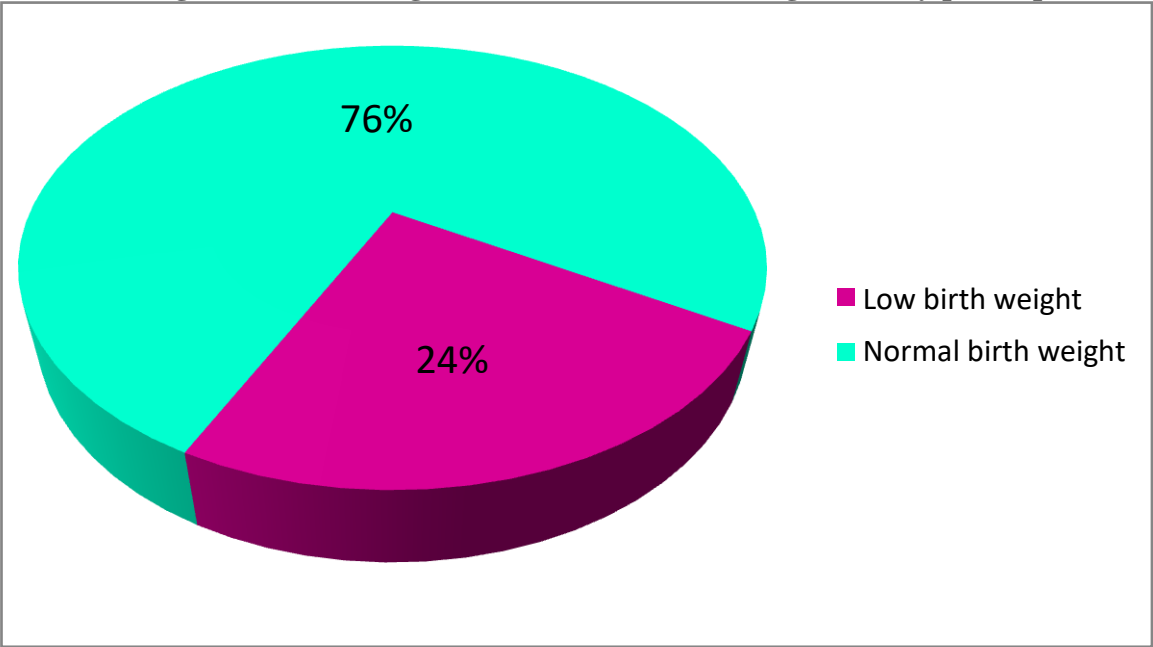
In figure 3, the pie chart represents the health facility preferred for delivery. Majority of them prefer secondary care hospital for delivery (45.3%), followed by primary health centre (24.8 %), tertiary care hospital (15.5%), private hospital (14.1%) and only 0.3 % of them had home delivery.

Figure 3: Health facility preferred for delivery



Percentage of LBW and NBW infants are represented in figure 4. In the study participants 76% of them were NBW infants and 24% of them were LBW infants.

Figure 4 : Percentage of LBW and NBW among the study participants



Anthropometric measurements

In table 7, anthropometric measurements of the mothers like height, pre pregnancy weight, BMI before conception, pregnancy weight gain and weight during delivery were enumerated. Among the mothers, 6.4 % of them had height below 145 cm, 46.4% of them had pre pregnancy weight above 51 kg, 61.1% had BMI within 18.5

– 24 .99, 44. 5% of them had weight gain during pregnancy within 9 to 11 kg and majority of the mother' s weight during delivery was ≥ 61 kg (50 .7 %).

Table 4 : Association between complications during pregnancy and Low birth weight

S. No	Complications	N=375	Low Birth Weight		Odds Ratio	95% CI	Chi square	P Value
			n= 90	%				
1	Complications							
	Present	166	72	43.4	8.13	4.58 – 14.41	61.29	0.000*
	Absent	209	18	8.6	Ref	-		
2	PIH							
	Present	41	17	41.5	2.53	1.29 – 4.97	7.70	0.006*
	Absent	334	73	21.9	Ref	-		
3	GDM							
	Present	31	2	6.5	0.2	0.05 – 0.86	5.71	0.017*
	Absent	344	88	25.6	Ref	-		
4	Vaginal bleeding and Antepartum haemorrhage							
	Present	14	11	78.6	13.23	3.6 – 48. 57	23.74	0.000*
	Absent	361	79	21.9	Ref	-		
5	Polyhydraminos							
	Present	40	15	37.5	2.07	1.04 – 4.13	4.43	0.035*
	Absent	335	75	22.5	Ref	-		
6	Oligohydraminos							
	Present	56	36	64.3	8.83	4.75 – 16.42	58.57	0.000*

	Absent	319	54	16.9	Ref	-		
7	Preeclampsia							
	Present	23	15	65.2	6.93	2.83 – 16.95	22.82	0.000*
	Absent	352	75	21.3	Ref	-		
* Statistically significant at 95% CI								

DISCUSSIONS

Association between delivery particular and LBW were enumerated in table 16. Mothers who delivered more than one baby were more to have LBW babies (100%), which was statistically significant ($P < 0.05$). Mothers who delivered preterm babies had majority of the LBW infants (84.4%), which was statistically significant ($P < 0.05$), with an odds ratio of 24 (95% CI 8.89 – 64.76). Gender of the infant and mode of delivery was not statistically significant ($P > 0.05$). In a study conducted in Bangladesh done by MR Haider et al prevalence of LBW was 17.6%, (15) while a study done in Iran, conducted by Momeni M et al showed a prevalence of 9.4%. (18) Similarly in a study carried out by OM Muchemi in Kenya showed a prevalence of 12.3%. (20) The prevalence range for LBW in other countries was comparatively low when compared to the prevalence of LBW in this study.

In this study high percentage of the LBW babies were born to the mothers belonging to < 19 years of age. It was found that there was a statistically significant association between LBW and maternal age group. These findings were similar to the study done by Joshi HS et al in Nepal and SR Shrivastava et al in Kancheepuram. (21,22) But in a study done by D Raghunath et al in Indore the mother's age was not statistically associated with LBW. (44) This variation may be due to categorization of age group which differs from the above mentioned studies. Regarding education status of mothers, illiterates had high percentage of LBW infants (60%) when compared with literates and also there was a statistically significant association between LBW and literacy level of mothers. A study done by SR Shrivastava et al reported that 41.5% of illiterates had LBW infants. Even though the percentage was low, there was a statistically significant association between LBW and maternal education similar to this study. (39) Lack of awareness is one of the major issues in order with low literacy level and illiterates which leads to improper utilization of antenatal care, improper sanitation and hygiene practices. Occupational status of the mothers did not show statistically significant association with LBW in this study. These results were similar to the study done by A Bener et al and C Tellapragada C et al. (16-19) But in studies done by T Khatun et al and Joshi HS et al there was statistically significant association for occupational status mother and LBW. (20)

In this study socio economic status of mothers showed statistically significant association with LBW. Mothers belonging to class V socio economic status had high percentage (68.8%) of LBW infants. Similarly a study done by Joshi HS et al reported that 67.86% of women belonging to the class V socio economic status had LBW babies with statistically significant association. (23) A study done in Karnataka conducted by Aivalli P et al observed similar

results when compared to this study, in which 58.3% of the class V women had LBW babies which was high when compared with other classes. There was statistically significant association between socioeconomic status and LBW.(24,25) Women belonging to low socioeconomic status does not have proper nutrition supply, poor hygiene, etc which may result in delivering LBW babies.

In this study there was statistically significant association was found between type of fuel used for cooking and passive smoking with LBW. Among which mothers using coal, kerosene or wood and mothers who were passive smokers delivered high percentage of LBW infants. In this study IFA tablets and Haemoglobin levels were statistically associated with LBW. In a study done by Agarwal K et al mothers who had Hb levels less than 10gm/dl delivered 60.5% which had statistically significant association with LBW. In our study, in which the mothers who had levels less than 11g/dl delivered 28.3 % of LBW infants, which was low when compared with the study done by Agarwal K et al. (26) A study done by Uche C et al observed that mothers who did not use iron and folic acid tablets delivered 33.2% of LBW babies, which had statistically significant association. In our study 54.5% of LBW babies are born to the mothers who had irregular intake of IFA tablets, which was high when considered with the study done by Uche C et al. (27) The statistical association between LBW and IFA tablets consumption. But in a study done by RH Dandekar et al, reported that there was no statistically significant association between LBW and IFA tablets intake.(28)

In this study BMI and pre pregnancy weight before conception was found to have statistically significant association with LBW. In a study done by Velankar DH et al 60.7% of the LBW infants were born to the mothers who had BMI below 18.6 which was statistically significant ($P < 0.02$). (29) But in our study only 34.6% of the LBW infants were born to the mothers who had BMI less than 18.49 before conception. Even though there is a change in percentage of LBW infants in both the studies, they had statistically significant association between BMI and LBW. In this study mothers who had pre pregnancy weight below 40 kg delivered 47.2 % of LBW infants. Deshpande JD et al reported that mothers who had pre pregnancy weight below 45kg delivered only 23.5% of LBW infants which was low when compared to this study. There was statistically significant association between pre pregnancy weight and LBW, which is similar to our study. (30-33) There was a difference in percentage of LBW, which may be due to difference in categorization of pre pregnancy weight in both the studies.

In this study weight gain during pregnancy and weight during delivery showed statistically significant association with LBW. In a study done by RH Dandekar et al and Rajashree K et al reported a statistically significant association with weight gain during pregnancy and LBW.(24) Agarwal K et al observed that mothers who had weight less than 50 kg delivered 76.1% of LBW babies, which was statistically significant. This result was similar to our study.(27)

CONCLUSION

The prevalence of LBW was observed to be 24% in the urban field practice area of our Medical College, in Kancheepuram district. The study also revealed that mothers of the infants who delivered low birth weight babies were exposed to various risk factors. The major risk factors like age at delivery, inadequate antenatal care, short birth interval, poor maternal nutrition, history of abortion, still birth and LBW babies in previous deliveries, were found to be associated with LBW in newborns, this was statistically significant.

Mothers who had chronic illness like thyroid dysfunction, chronic hypertension, bronchial asthma, tuberculosis, etc had significant association with LBW. Certain other environmental conditions like passive smoking, poor sanitation, and improper housing standards were also

associated with LBW. Complications of pregnancy like oligohydramnios, PIH, preeclampsia and bleeding were also important factors for LBW with significant association. Regarding the preference of health facility for delivery majority of them preferred secondary health care hospital. In order to achieve the WHA resolution (2012) to reduce Maternal and Infant mortality and morbidity, one of the main goals mentioned is to achieve a reduction of LBW babies by at least 30% from the present level. So enhanced health education, awareness creation and early intervention programmes need to be implemented to bring down the prevalence of LBW to a minimum level.

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Ethical approval: The study was approved by the Institutional Ethics Committee

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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