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A STUDY TO ASSESS THE LOW-BIRTH-WEIGHT OF SCORECARD FOR EARLY PREVENTION AND EARLY DETECTION ON MATERNAL RISKS AMONG MOTHER IN SELECTED HEALTHCARE AT TUMKUR

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ABSTRACT

Introduction: The Low birth weight babies are common problem with have a maternal risk of complications and health problems irrespective of caste, custom, religion, culture, ect. One of the efforts to prevent LBW births is to detect risk factor in pregnancy women. This study aims to test the accuracy of an early LBW detection scorecard based on maternal risk factors. **Methods:** Design; The research design used was observational analytical study. **Sample:** the sample in this study was 177 mothers who were registered and delivered at selected hospitals and PHC at Tumkur. Sampling technique used Purposive sampling methods. Tools and research instruments are LBW score card, maternal medical records, baby's scale are used. A purposive sample design is adopted in the DHO with primary sampling units being census enumeration blocks (CEBs) in urban areas and villages in rural areas, face to face interviews was conducted to collect data. **Result:** The LBW scorecard which was based on maternal factors analysis can significantly predict LBW births.(p=0.000) **Conclusion:** The LBW early detection score card is able accurately to predict the incidence of LBW births. Through analysis and calculations of maternal risk factors, it can be seen whether the mother is at risk of giving birth to a LBW or normal weight baby. Early detection of LBW can improve for at-risk babies, resulting in a positive impact on their health outcomes.

Keywords: low birth weight baby, Scorecard, Maternal risk factor, NHFS-NATIONAL HEALTH AND FAMILY WELFARE, lower-middle-income countries (LMICs).

INTRODUCTION

The low birth weight is the first weight of the baby, taken after being born and before 37 weeks of gestation. World Health Organization defines low birth weight (LBW) as the birth weight less than 2,500 grams irrespective of gestational age. LBW is a valuable public health indicator of maternal health, nutrition, healthcare delivery, and poverty as LBW babies are at a higher risk of death and illness shortly after birth and non-communicable disease in the life course. LBW infants are 20 times more likely to develop complications and die in comparison to normal weight babies.

Moreover, LBW babies are in the potential risk of cognitive deficits, motor delays, cerebral palsy, and other behaviour and psychological problem. The household cost, as well as health system costs, could be saved by reducing the burden of LBW. The path physiology of low birth weight is unclear, whereas intrauterine growth retardation (IUGR) and preterm birth considered as the cause of LBW. IUGR is the outcome of insufficient uterine–placental perfusion and fetal nutrition affecting the overall anthropometric parameter of the fetus. IUGR newborn has typical features of malnutrition.

However, extra-uterine infection, trauma, illness, IUGR, fetal infection, and anomalies are the contributing factors for preterm birth, resulting in growth retardation which ultimately results in LBW. LBW is considered a significant public health problem as it is estimated that 15% to 20% of all birth worldwide are LBW. The prevalence of LBW varies across regions with the highest 28% in South Asia and the lowest 6% in East Asia and the Pacific region. The prevalence of LBW in Nepal ranges from 12% to 21.6%.

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OBJECTIVES:

1. The aim of the study is to develop an antenatal risk scoring scale for prediction of LBW.
2. To review of prevalence and risk factors of low birth weight

REVIEW OF LITERATURE

1.Children's growth and development can occur optimally if the mother has good physical and psychological conditions (Park *et al.,* 2018). A child's growth and development begin at the beginning of conception and pregnancy; therefore, the physical, psychological and nutritional conditions expended by the mother need to be maintained because they greatly influence the growth and development of the fetus (Suryati, 2014). More over mothers who experience malnutrition during pregnancy have a greater risk of giving birth to LBW babies and having health problems. Apart from that, the incidence of LBW also has an impact on several other health problems and increases the neonatal mortality rate (Tadese *et al.,* 2021).

However the World Health Organization (WHO) defines LBW as a newborn with a body weight below 2,500 g (WHO, 2014). LBW is a public health problem at a global level that has short-term and long-term consequences. It is estimated that between 15% and 20% of all births in the world are LBW births. The target set by WHO by 2025 is to achieve a 30% reduction in the number of babies born with a body weight of less than 2500 g (WHO, 2014).

Moreover one of the risk factors for LBW babies is the mother's history of high-risk pregnancies. The estimated number of pregnant women at high risk or complications in the city of Tumkur in 2016 was 9,496 people. Meanwhile, the coverage of high-risk pregnant women or complications treated at health facilities is 90.24% (City, 2016).

The Infant Mortality Rate (IMR), Under-five Mortality Rate, and Maternal Mortality Rate (MMR) are important indicators to determine the level of public health. India is expected to be able to reduce MMR and IMR as an effort to support the achievement of the Sustainable Development Goals (SDGs) (Tumkur, 2019).

Consequently, maintenance of digital records with Health Management Information Systems and linking them with the Mother and Child Tracking System should be considered. Second, it is imperative to strengthen the existing maternal and newborn health program components toward achieving improvement in the quality of ANC services for early detection of high-risk pregnancies and reduction of the burden of LBW. Substantial governmental efforts in strengthening nutritional supplementation services and food security initiatives require more focused implementation in antenatal women, especially those from lower socioeconomically disadvantaged backgrounds. Third, growth monitoring and dietary interventions to protect the health of newborns with LBW warrant high prioritization in LMIC settings.

METHODS

Design: This research used an observational analytical design to examine the accuracy of an early LBW Hence this study aims to identify the associated risk factors of LBW at the community level by including the participants health facilities Tumkur.

Data Collection Tool: LBW score card, maternal medical records, baby's scale. Face-to-face interviews. The instruments in this research were a demographic questionnaire and maternal medical records during pregnancy, infant weighing scale, and an early detection scorecard for LBW which had been developed in the previous study. Based on Table 1,:the scorecard consists of several indicators, including history of giving birth to LBW, maternal employment, parity status, gestational age

Sample: Purposive sampling technique, method based on inclusion and exclusion criteria. The inclusion criteria of this study

Table 1. Risk factor Scorecard of Low Birth Weight Baby

Risk Factor	Score
There is past history of giving birth to LBW	10
Mother works (makes a living)	2
Current maternal parity status: Primipara (one delivery) or grande multi-para (≥5 times)	2
Gestational age at delivery <37 weeks	2
Gemelli/double pregnancy	1
Mother's last education < high school / equivalent	1
In this pregnancy experiencing pre-eclampsia	1
In this pregnancy, maternal HB levels < 8 g/dl (TM 1 and 3) or < 10.5 g/ dl (TM 2)	1
Have a history of chronic hypertension	1
Have a history of pre-gestational diabetes mellitus	1
Total Score	**22**

Mothers who gave birth in a hospital or health center in the city of Tumkur, 2) willing to be respondents, and 3) cooperative. Meanwhile, exclusion criteria included 1) mothers whose babies died at birth, 2) mothers or babies experiencing serious complications and requiring intensive care. The scorecard consists of several indicators, including history of giving birth to LBW, maternal employment, parity status, gestational age Total number of research sample 177 mother who had registered and gave birth in hospital and health centres in the city of Tumkur.

Data Collection**:** The research began with the selection of research sample namely mothers who gave birth in hospital and health centres in the Tumkur city and were willing to be respondents. Mothers were assessed and scored on their maternal factors causing LBW based on several components on the score card. The scoring results were then adjusted to the cutoff point limit. If the risk factors scoring result was 3.5 then the baby was predicted to have a normal birth weight. If the scoring is more than 3.5 then baby was predicted to be experienced LBW. The prediction result was then matched with the baby birth weight of the babies in each group after that, the mother was followed until she gave birth and birth weight was measured using a scale. Mothers who had babies with a birth weight of less than 2.5kg were grouped in the low-birth-weight group while mother who had babies with a birth weight more than 2.5kg were grouped in the normal group.

Testing Scorecard Accuracy**:** At this stage, the researchers tested the accuracy of LBW scorecard in predicting LBW in 177 samples. The results of testing the accuracy of the scorecard are said to be effective if several calculation stages have been fulfilled: the results of the risk score comparison test between the LBW group and the non-LBW group were stated to be significantly different.

Ethical Clearance: Received approval for ethical eligibility from the Health Research Ethics Commission Dr. Veerabhadraiah at district Hospital on June 7th, 2023.

Discussions: The application of the LBW early detection scorecard has high accuracy in predicting the incidence of LBW. Through analysis and calculation of risk factor scores for mothers, it is possible to determine the possibility of a baby being born with LBW. The results of the analysis of the LBW early detection scorecard that was developed also showed significant differences between the group of mothers with LBW babies and the group of mothers with normal birth weight babies.

However, Several risk factors that are important to assess based on the score card developed include history of giving birth to LBW, mother's occupation, parity status, gestational age < 37 weeks, gemelli pregnancy, education history, experiencing pre-eclampsia or having chronic hypertension history, maternal HB levels < 10.5 g/dl , and having a history of pre gestational diabetes mellitus. Early detection of LBW can improve services for at-risk babies, thereby having a positive impact on their health outcomes. Early detection of LBW helps mothers to better understand whether their condition during pregnancy is included in the risk category.

Midwifery services are an integral part of health services which focus on maternal, newborn and child health services in realizing quality family health. The state of maternal and child health is a national problem that needs to be given top priority because it determines the quality of human resources for the next generation. The high MMR and IMR figures and the slow decline in these two figures indicate that maternal and child health services are urgently needed to be improved both in terms of reach and services provided by health workers, especially midwives (Neelam Kumari, 2015; Datta, 2015).

Obstetric services focus on prevention efforts, health promotion, assisting with normal childbirth, detecting complications in the mother and child, carrying out treatment according to authority or other assistance if needed, and carrying out emergency measures (Jurnal Keperawatan Padjadjaran) Through the development of an early LBW detection scorecard, health workers, especially midwives, have an important task in health counseling and education, not only for women but also for families and communities, especially in early detection of risk signs for LBW (PARK., 2017; Research gate *et al.,* 2023). Birth weight is an important indicator of a child's survival,

future growth and overall development and, since it is not possible to provide expensive scales to community members and families, it is important to find alternative methods for estimating birth weight (Anil *et al.,* 2020). Even though ultrasonic measurement techniques have been widely applied to measure fetal weight, only a small number of pregnant women are able to utilize maternity and child health program services due to limited economic resources and other social backgrounds (Rahfiludin and Dharmawan, 2018).

Babies with a birth weight of less than 2,500 g can cause various health problems in the future. The high risk of death and health complications shows the importance of early prevention of LBW births (Huque and Hussain, 1991). ANC is a mandatory program in India with a minimum of four visits (Adawiyah *et al.,* 2021). The aims include preventing adverse birth outcomes, low birth weight, and detecting pregnant women who are at risk of giving birth to LBW babies by scoring. Many references state that pregnant women with anemia tend to give birth to LBW babies, but so far there has been no tool or scoring used to determine that pregnant women with a certain score are more at risk of giving birth to LBW babies (Kumalasari, Tjekyan and Zulkarnain, 2018). Through the development of this LBW early detection card, LBW births can be predicted more optimally (Utami *et al.,* 2023).

The study accurately reports the statistical significance of the data in predicting LBW through identification of maternal factors. The limitation of this study is that the sample of respondents is not representative and several other respondents are still needed. We recommend to do additional research to determine the best time to use this instrument to maximize its effectiveness in predicting the incidence of LBW and promoting healthier pregnancies.

Results: The research results include demographic data and risk factors for mothers, scorecard accuracy test results, and model accuracy test results, which are explained as follows.

Table 2: Demographic Characteristics of Mother (n=177)

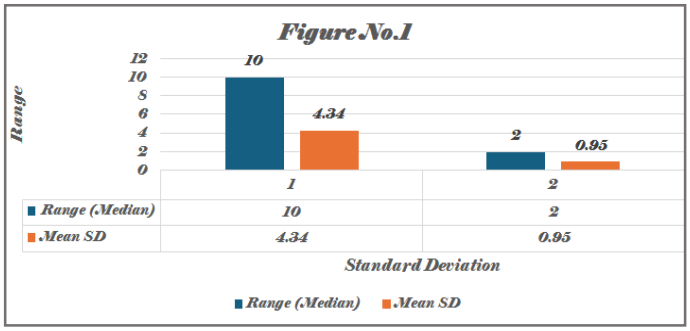
Indicators		LBW (n=59)		Not LBW (n=118)	
		n	%	n	%
Gestational Age					
<37 Week		32	54.2	0	0
>37 Week		27	45.8	118	100
Double Pregnancy					
Yes		3	5.1	0	0
No		56	94.9	118	100
History of LBW Birth					
Yes		**10**	**16.9**	**4**	**3.4**
No		**49**	**83.1**	**114**	**96.6**
History of Diabetes Mellitus					
Yes		**8**	**13.6**	**0**	**0**
No		**51**	**56.4**	**118**	**100**
History of chronic hypertension					
Yes		**6**	**10.2**	**0**	**0**
NO		**53**	**89.8**	**118**	**100**
History of Pre eclampsia					
Yes		**11**	**18.6**	**5**	**4.2**
No		**48**	**81.4**	**113**	**25.8**
Haemoglobin					
<11 / <10.5		**16**	**27.1**	**26**	**22.0**
>10.5 / >11		**43**	**72.9**	**92**	**78.0**
Education History					
Under Senior High School		**25**	**42.4**	**75**	**63.6**
Senior High School		**34**	**57.6**	**43**	**36.4**
Job status					
Working		**24**	**40.7**	**45**	**38.1**
Does not working		**35**	**59.3**	**73**	**61.9**
Parity					
Primy Gravida		**28**	**47.5**	**35**	**29.7**
Not Primy Gravida		**31**	**52.5**	**83**	**70.3**

Demographic Data and Maternal Risk Factors: Maternal demographic data. which include demographic characteristics and risk factor analysis based on components on the early detection scorecard, are displayed in Table 2.

Based on the results of the cross-tabulation analysis in Table 2, it is known that 59 mothers gave birth to babies with LBW, while 118 mothers gave birth to babies with normal weight. Indicators of haemoglobin values for mothers that were below normal (< 11 g/dl) were also found to be the majority in the group of mothers with LBW babies. Meanwhile, indicators in the form of educational history, mother's type of employment, and parity number obtained equal results in both groups. The risk score comparison test from the score card between LBW and non-LBW subjects used the Mann Whitney test because the risk score data for the non-LBW group was not normally distributed.

Table - 3

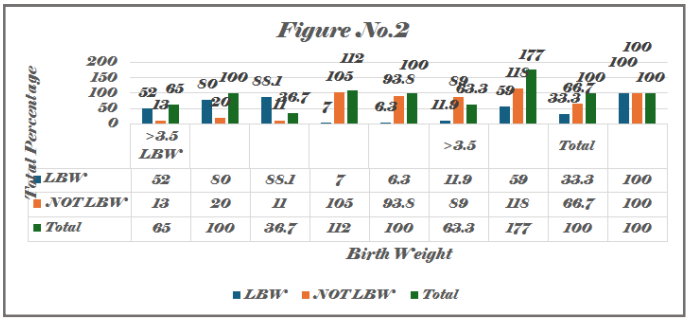
Risk score	LBW(n=59)	Not LBW(n=118)	p-value
Range (Median)	2-22(10.00)	1-4(2.00)	0.00
Mean ± SD	9.27±4.34	2.25±0.95	



Based on the results of the analysis in table3 & figure No.1, it is known that 105 mothers did not give birth to LBW as predicted(risk score ≤3.50) and 52 mothers gave birth to LBW according to prediction (risk score ≥ 3.50). However, seven pregnant women who had a risk score of < 3.50 actually gave birth to LBW, and 13 mothers who had a risk score of ≥ 3.50 actually gave birth to babies with normal weight.

Table - 4

Cut off point	Birth Weight		Total
	LBW	Not LBW	
	52	13	65.0
>3.5 (LBW)	80.0	20.0	100.0
	88.1	11.0	36.7
	7	105	112.0
<3.5 (Not LBW)	6.3	93.8	100.0
	11.9	89.0	63.3
	59	118	177.0
Total	33.3	66.7	100.0
	100	100	100.0



	>3.5 LBW					>3.5		Total	
LBW	52	80	88.1	7	6.3	11.9	59	33.3	100
NOT LBW	13	20	11	105	93.8	89	118	66.7	100
Total	65	100	36.7	112	100	63.3	177	100	100

Based on the results of the analysis in table 4 & figure No.2, it is known that 105 mothers did not give birth to LBW as predicted (risk score ≤3.50) and 52 mothers gave birth to LBW according to prediction (risk score ≥ 3.50). However, seven pregnant women who had a risk score of < 3.50 actually gave birth to LBW, and 13 mothers who had a risk score of ≥ 3.50 actually gave birth to babies with normal weight.

CONCLUSIONS

The LBW early detection scorecard can accurately predict the occurrence of LBW births. Through analysis and calculation of risk factor scores for pregnant women, it can be seen whether the mother is at risk of giving birth to a LBW or normal weight baby. Early detection of LBW can improve services for at-risk babies, thereby having a positive impact on their health outcomes.

Conflict of interest: There is no conflict of interest.

Recommendation :

Premature infants (gestation age<37 weeks) and Low-Birth-Weight infants (<2.5 kg) require complex care to ensure their survival, growth and neurological development. Increased risk for developmental disorders, infections, and challenges with nutrition and body temperature regulation require comprehensive measures in care. The aim of this guideline was to improve the care of premature and low-birth-weight infants through updated recommendations. The recommendations of the World Health Organization (WHO) have been implemented in this guideline in accordance with the WHO handbook for guideline development. This publication has been translated into staff members of Collaborating Centres at tumkur.

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