



Original Article

A Study to Evaluate the Relationship of Estimated Fetal Weight and Actual Fetal Birth Weight Using Ultrasound

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ABSTRACT

Estimated fetus weight is an essential measurement used to predict the fetal health during pregnancy as it has a close correlation with fetal mortality, Low fetal weight can lead to IUGR and high fetal weight can lead to fetal and maternal complications. **Objective:** To assess the changes among Estimated fetus weight and Actual fetus weight after birth. **Methods:** This cross-sectional study was conducted in the obstetric and gynecological sector of tertiary care setup in Gujrat, Pakistan. The data was collected for the duration of 4 months from December 2021 to March 2022. Data was collected using a convenient sampling technique. A sample size of 169 patients was calculated using the mean from previous related published studies. A Toshiba ultrasound machine was used with a 3.5 MHz convex probe was used. Data analysis was done by SPSS version 20. Consent was taken from all the participating pregnant females. **Results:** In this study result mean of estimated fetal weight (g) in the 3rd trimester was 2690.72 ± 463.97 g the average of actual weight (g) gained after delivery was 2701.04 ± 483.24 g. The paired t-test shows no significant change in estimated fetus weight on ultrasound and actual fetus weight after birth. **Conclusion:** This study determined that estimated fetal weight can be measured using an advanced ultrasound machine which can be cost-effective. This study also concluded that the difference among estimated fetus weight and actual fetus weight after birth is not statistically significant.

INTRODUCTION

In the obstetric department, ultrasonography is commonly used for estimating fetal weight and the characteristics used to predict birth weight [1]. Multiple part parameters are more effective than standard parameters in estimating fetal weight [2,3]. Biparietal diameters (BPD), abdominal circumference (AC), and femur length are important metrics for determining fetus weight, with abdominal circumference being the most sensitive [4,5]. The fetal weight can be predicted by clinical examination but through ultrasound, it seems to be more effective [6]. Fetal weight assessment is a vital and ubiquitous part of antenatal care, both in the labor and delivery as well as in the treatment of complicated pregnancies and

observation of prenatal care [7,8]. The single most significant factor of newborn survivability is the infant's birth weight [9]. Less and high fetal weight at birth are implicated in the pathogenesis of neonatal problems during labor and the postpartum period [7]. Due to preterm birth and intrauterine growth restriction, low birth weight is related to increase chances of death and disability [10]. Dystocia of shoulder, upper limb injury, Muscles and skeletal injuries, and intrapartum hypoxia are all possible risks of vaginal birth for extremely large fetuses, while vaginal and floor of pelvic injuries, a higher frequency of surgical vaginal besides cesarean births, and post-delivery hemorrhage are among the maternal complications [11,12].

As fetal size grows, cephalopelvic imbalance becomes more common, resulting in a higher surgical vaginal birth and cesarean delivery for macrosomic fetuses than normal-sized pregnancies [12]. The ideal birth weight range is amidst 3000 and 4000 grams [8,13]. Neonatal weighing more than 4000g are referred to as "macrosomic." [14]. The adequate birth weight range is amidst 3000 and 3999g, and the birth weight range is amidst 2500g and 2999g is known to be inadequate or insufficient [15]. The low neonate weight denotes a weight of < 2500g [16]. The very low neonatal weight and severe low neonate weight indicate < 1500g and <1000g respectively are the last classification of low birth weight strata which include two supplementary and distinct categories [8,16]. Aside from the neonate gestational age and gender of the neonate, birth weight has a strong link to infant death and its aspects [16,17]. Lower neonatal weight as well as lower gestational age leads to an increase in death chances in the first year of life [18]. A problem may present with the placenta or fetus as the result of the too-small fetus [19]. It's possible that the woman can present with gestational diabetes if the fetus is too large [20]. Many formulas for ultrasonography estimated fetal weight have been published over the past 30 years [21,22]. The Hadlock and colleagues' w7x formulas, which were adopted for this study, are the most common formulas in the United States [23]. In the United Kingdom, Campbell and Wilkin w2x and Shepard w17x formula are used, while Merz w11x formula is used in Germany. All of the above-mentioned formulas are used in most ultrasonography each with a unique sign [8,24]. The obstetricians need to know about fetal weight when it comes to gravidity and parturition. To estimate fetus weight on ultrasound is key information for competent birth attendants to make decisions about the optimum path for the fetus delivery. This study aimed to determine the estimated fetus weight in the 3rd trimester on ultrasound and actual fetus weight after birth. This study will give information about the weight changes in estimated fetus weight on ultrasound and immediate actual fetus weight to reliability of weight diagnosed by ultrasound.

METHODS

This cross-sectional study was conducted in obstetric and Gynecological departments in a private setup in Gujrat, Pakistan. The study has been done for the duration of 4 months from December 2021 to March 2022. The sample size of 169 patients is calculated via a convenient sampling approach from the previous three related studies [5,8,25]. All the healthy pregnant females included and the females with one more problem like hypertension, hypotension, and diabetes were excluded. Consent was taken from all

participants before collecting data. Toshiba ultrasound machine with 3.5 MHz convex probe used to examine patients with ultrasound gel. The participants were lying in a supine position on the plane medical couch. The Statistical Software Version 20 (SPSS 20) was used for the analysis of data.

RESULTS

The sample size was 169 pregnant females, all the females contributed to the study (100%). In table 1 the mean age of females was (28.9 ± 4.66) along with the median age (28.0). The mean weight in kg of the female was (71.92 ± 5.67) with a median weight in kg (72.0). The mean number of parity was (1.4 ± .97) and the median of accouchement (was 2.0). The maximum maternal age was 40 and the minimum age was 20 with the range of 20 years' age. The maximum maternal weight (kg) was 84 and the minimum weight (kg) was 62. The maximum parity of the females was 4 along with minimum parity of 0 and a range of 4. The mean of the estimated fetus weight (g) in the 3rd trimester was (2690.72 ± 463.97g) along the median (2671.0g). The mean of the actual fetus weight after immediate birth was (2701.04 ± 483.24g) along the median (2677.0g). The maximum estimated fetus weight (g) was (4313.00g) and the minimum (1257g). The maximum actual fetus weight (g) after birth was (4722.0g) along with a minimum weight (g) of (1267g). In table 3: To assess the impact of the estimated fetus weight during in 3rd trimester (weight calculated by ultrasound using Hadlock formula) and immediately after birth a paired sample t-test was performed. The result showed, that the difference amidst estimated fetus weight and actual fetus weight after birth statistically is not significant p = 0.000 (two-tailed). The mean increase in the test score was -10.32544 ranging from -22.05032 to 1.39943 along with a 95% confidence interval. Figure 1 shows the correlation between estimated fetal weight on ultrasound in the 3rd trimester of pregnancy and the actual fetal weight at immediate birth. Measuring fetal weight on ultrasound reveals a positive correlation (r = 0.975) with the actual fetus weight after immediate birth. So, it's statistically stated that a linear positive relationship is present amidst estimated fetal weight on ultrasound and actual weight after immediate birth of the fetus.

Population vital statistic				
		Maternal age (yrs)	Maternal weight (Kg)	Parity
N	Valid	169	169	169
	Missing	0	0	0
	Mean	28.9645	71.9231	1.443
	Median	28.0000	72.0000	82.0000
	SD	4.66738	5.67786	.97503
	Range	20.00	22.00	4.00
	Minimum	20.00	62.00	.00
	Maximum	40.00	84.00	4.00

Table 1: Population vital statistic

Population vital statistic		
	Estimated fetus weight(g) in 3rd trimester	Actual fetus weight(g) after birth
N	Valid	169
	Missing	0
	Mean	2690.7219
	Median	2671.0000
	SD	463.97212
	Range	3056.00
	Minimum	1257.00
	Maximum	4313.00

Table 2: Comparison of estimated fetus weight on ultrasound and actual weight of fetus after immediate birth

		Mean	SD	SE Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Estimated fetus weight(g) in 3rd trimester - Actual fetus weight(g) after birth	10.32544	77.20825	5.93910	22.05032	1.39943	1.739	168	.084

Table 3: The comparison among estimated fetus weight on ultrasound and actual fetus weight at immediate birth (paired t-test)

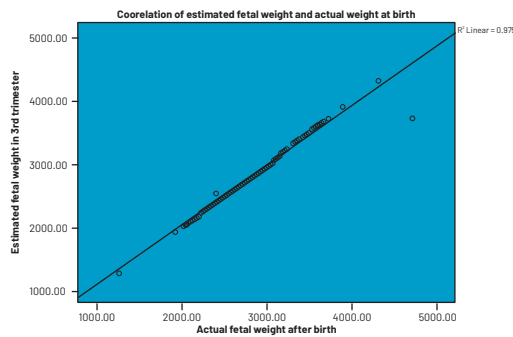


Figure 1: The correlation between estimated fetus weight on ultrasound and actual weight of fetus after immediate birth

DISCUSSION

Birth weight is an obligatory aspect of newborns for their good health, as it imitates the nutritive conditions of metabolism of the mother, and in the development of the fetus throughout pregnancy. According to the World Health Organization (WHO), birth weight is the initial estimation attained from the neonate after delivery which also concludes the arrangement of weight strata. The current study involves a total of 169 healthy pregnant females and was conducted for three months from January 2022 to March 2022; in a private gynecology and obstetrics setup in Gujrat, Pakistan using a Toshiba ultrasound machine along with a 3.5MHz probe. This study intends to evaluate estimated fetus weight in the 3rd trimester of pregnancy and actual fetus weight after immediate birth and to see changes in weight from the 3rd trimester to actual birth weight. Fetus weight cannot be estimated directly so it can be measured by the fetus and the maternal anatomical

attribute, the technique cast-off for this study to evaluate estimated fetus weight is ultrasound, the other method can use to estimate the fetal weight is clinical, Mohammad Wasim Awan (2015) also use this method in his study. Furthermost the average actual weight in this study was $2690.7219 \pm 463.97212g$ [25]; which was lesser than the $3,069.00 \pm 508.093g$ stated by Abdalla Mohamed Abdalla Albasha et al. (2020) which may be due to some socio or regional factors which may affect the fetus birth weight. The estimated fetus weight on ultrasound mean (2690.72 ± 463.97) and the actual birth weight (2701.04 ± 483.24) show no significant change in weight when both are compared [26]. A study was done by Ugwa et al. 2015 also confirmed this in his study and describe that ultrasonography is comparable with clinical weight for the prediction of fetal weight [27]. Fetal weight is important for the delivery mode because it can cause a problem if the fetus is too large (macrosomic fetus). Macrosomic fetus weight will be high and if vaginal delivery is done in this case it can cause complications in newborns like shoulder dystocia, brachial plexus injuries, bony injuries, and intrapartum asphyxia. These complications were also concluded by the study of Mohammad Wasim Awan (2015) [25]. The Hadlock formula which used in this study for the estimation of fetus weight using ultrasound was close to the actual fetus weight after birth which proved that Hadlock is accurate in the measurement of estimated fetal weight. A study was done by Ruby Yadav (2016) also stated this in her study. In the current study, the relationship coefficient for the method of ultrasound in comparison to the actual birth weight was (+0.975), which correlated positively with the actual neonate weight. In their evaluation of ultrasonic estimate, the relationship coefficient for ultrasonography estimation is equivalent to a minor difference (=0.64).

CONCLUSION

This study concluded that the findings of this study have significant insinuations for emerging countries, where is a scarcity of innovative ultrasound machines technology which are accomplished some unique functions but may be cost-effective. This study also concluded that no statistically significant difference among estimated fetus weight on ultrasound and actual weight of fetus after immediate birth. Therefore, it can be an unswerving way the prediction of baby's health and also confirmed the path of delivery in approximate cases.

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