



A PROSPECTIVE COMPARATIVE STUDY OF THREE CLINICAL METHOD FOR ESTIMATION OF FETAL WEIGHT IN FULLTERM NULLIPARA AT TERTIARY CARE CENTRE IN SOUTH GUJARAT

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ABSTRACT

Background Foetal weight estimation, a critical factor in obstetric care, significantly impacts labor and delivery management. It plays a crucial role in preventing and treating complications like perinatal morbidity and mortality (both maternal and neonatal) associated with abnormal birth weights. This study aims to compare the accuracy of three clinical methods (Johnson's, Insler's, and Dawn's formulas) for estimating foetal weight against actual birth weight. The objective is to assess the accuracy of three different clinical methods for estimation of foetal weight in full term nullipara pregnancy delivering at our institute. **Methodology** As observed in this study, while comparing estimated foetal weight by different formulas with actual birth weight, for Johnson's formula p-value is 0.378, for Insler's formula p-value is 0.021, for Dawn's formula p-value is 0.199. **Results** As observed in this study, while comparing estimated foetal weight by different formulas with actual birth weight, for Johnson's formula p-value is 0.378, for Insler's formula p-value is 0.021, for Dawn's formula p-value is 0.199. **Conclusion** In this study, Johnson's formula was found to be the most accurate for estimating foetal weight with p value 0.378 showing no significant difference from actual birth weight. Insler's formula underestimated foetal weight, while Dawn's formula was slightly less accurate but still reliable. Overall, Johnson's method is recommended for clinical practice due to its accuracy.

KEYWORDS :

INTRODUCTION

Foetal weight estimation, a critical factor in obstetric care, significantly impacts labor and delivery management. It plays a crucial role in preventing and treating complications like perinatal morbidity and mortality (both maternal and neonatal) associated with abnormal birth weights.^{[1][2]}

Low birth weight infants are susceptible to conditions like hypoxia, hypothermia, and hypoglycaemia. Conversely, large for gestational age (LGA) babies are at increased risk for operative vaginal delivery, postpartum haemorrhage, and birth injuries.^{[3][4]}

Two primary methods for estimating foetal weight are clinical assessment and ultrasound imaging. While ultrasound requires specialized equipment and trained personnel, clinical methods are cost-effective and applicable in resource-limited settings. Therefore, clinical assessment serves as a valuable initial screening tool, potentially aiding in timely referrals for high-risk pregnancies.

This improved knowledge can positively impact both maternal and neonatal outcomes, potentially saving lives and improving prognosis. This will help us know the outcome of the mother and the baby and our intervention at the earliest might be able to save lives and give a better prognosis to both mother and baby.

The main objective is to assess the accuracy of three different clinical methods for estimation of foetal weight in full term nullipara pregnancy delivering at our institute.

METHODS

✓ **Study Design** : Prospective comparative study

Place and Duration of Study: Department of Obstetrics and Gynecology, Tertiary health care center of south Gujarat over one year of period.

Ethical Approval and Patient Consent: The study was

conducted in accordance with the Ethical standard of the Institutional Ethical Committee. Due consent was taken from the participants.

✓ **Inclusion Criteria:**

- Vertex presentation
- Singleton pregnancy
- Longitudinal lie

✓ **Exclusion Criteria:**

- Polyhydramnios
- Uterine Fibroid in pregnancy
- Oligohydramnios
- Obesity
- Non consenting
- preterm
- congenital anomaly
- IUFD

✓ **Sample Size**: 100 participants

✓ **Statistical Analysis and Software Used** : Data was entered in MS excel and analysed using IBM SPSS software version 23.

✓ **Methodology**

JOHNSON'S FORMULA - Foetal weight in grams = Fundal Height(cm)-(13,12or11) x 155^{[5][6]}

INSLER'S FORMULA - Foetal weight in gram = Abdominal girth (cm) x Fundal height in (cm)^[7]

DAWN'S FORMULA - Foetal Weight in grams = Fundal Height(cm) x (transverse diameter of uterus in cm)² x 1.44 divided by 2^[8]

New born weight is recorded from baby sheet attached to case record.

RESULTS

In this study 100 women with single lives fetus, in full term nullipara pregnancy with cephalic presentation admitted to labor room were selected as study group.

Table No.1 Comparison of Johnson's, Insler's, Dawn's estimated foetal weight and Actual birth Weight

(I) V4	(J) V4	Mean Difference (I-J)	Std. Error (SE)	Sig. P-value	95% CI (Lower Bound)	95% CI (Upper Bound)
1	2	154.6	53.548	0.004	49.23	259.77
	3	125.65	53.548	0.019	20.39	230.93
	4	46.85	53.548	0.382	-58.42	152.12
2	1	-154.5	53.548	0.004	-259.77	-49.23
	3	-28.8	53.548	0.59	-134.11	76.13
	4	-107.6	53.548	0.45	-212.92	-2.38
3	1	-125.6	53.548	0.019	-230.93	-20.93
	2	28.84	53.548	0.590	-76.43	134.11
	4	-78.81	53.548	0.142	-184.08	26.46
4	1	-46.85	53.548	0.382	-152.12	58.42
	2	107.65	53.548	0.045	2.38	212.92
	3	78.810	53.548	0.142	-26.46	184.08

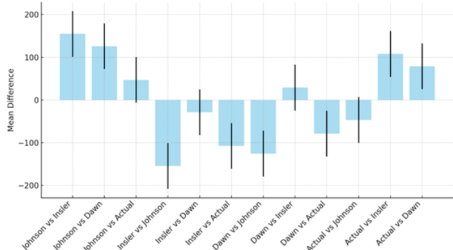


Chart 1

A significant difference ($p = 0.004$) is observed between Johnson's and Insler's methods, indicating that the two formulas estimate foetal weight differently, with a mean difference of 154.6 g (95% CI: 49.23 to 259.77).

Similarly, there is a significant difference between Johnson's and Dawn's formulas ($p = 0.019$), with a mean difference of 125.65 g (95% CI: 20.39 to 230.93).

However, the difference between Johnson's formula and actual weight is not statistically significant ($p = 0.382$), indicating that Johnson's method provides a reasonably accurate estimation of foetal weight when compared to actual birth weight.

Table No. 2: Comparison of Johnson's Method and Actual Weight for Foetal Weight Estimation

Group (V4)	N	Mean	Std. Deviation (SD)	Std. Error Mean
4	100	2647	384.67	38.467
1	100	2693	365.6	36.5
				Significance P value
				0.378

The mean foetal weight for Johnson's method is 2693 g, while the mean actual weight is 2647 g, resulting in a small mean difference of 46.85 g.

The standard deviations for Johnson's method and actual weight are 365.6 g and 384.67 g, respectively, reflecting a similar spread of data around the mean for both methods. The t-test statistic for this comparison is 0.88 with 198 degrees of freedom, and the corresponding p-value is 0.378, which indicates no statistically significant difference between Johnson's method and the actual birth weight.

The standard error of the mean difference is 53.07 g, and the 95% confidence interval ranges from 151 g to 57.8 g, further supporting the conclusion that Johnson's method provides a close approximation of the actual foetal weight. These results suggest that Johnson's method is a reliable tool for estimating foetal weight in clinical practice.

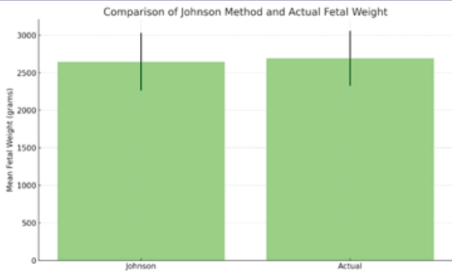


Chart 2

Table No 3: Comparison of Inslers Method and Actual Weight for Fetal Weight Estimation

Group (V4)	N	Mean	Std. Deviation	Std. Error Mean
4	100	2647	384.67	38.467
2	100	2519.35	255.34	25.535
				Significance P value
				0.021

This table provides a statistical comparison between Insler's method (Method 2) and the actual birth weight (Method 4). The mean estimated foetal weight using Insler's formula is 2519.35 g, compared to the actual mean of 2647 g, yielding a significant mean difference of 107.65 g.

The standard deviations are 255.34 g for Insler's method and 384.67 g for the actual weight, indicating a narrower distribution of estimates around the mean for Insler's method. The t-test statistic is 2.3 with 198 degrees of freedom, and the p-value is 0.021, showing a statistically significant underestimation of foetal weight by Insler's method.

The standard error of the mean difference is 46.17 g, and the 95% confidence interval ranges from 16.6 g to 198 g. These results suggest that although Insler's method is widely used, it tends to significantly underestimate foetal weight when compared to actual measurements, potentially impacting clinical decision-making.

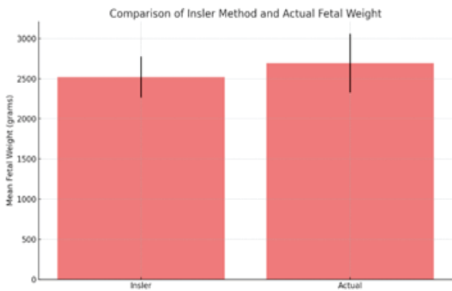


Chart 3

Table No. 4: Comparison of Dawn's Method and Actual Weight for Fetal Weight Estimation

Group (V4)	N	Mean	Std. Deviation	Std. Error Mean
4	100	2647	384.67	38.467
3	100	2568.19	476.006	47.601
				Significance P value
				0.199

This table shows the statistical comparison between Dawn's method (Method 3) and the actual birth weight (Method 4). The mean foetal weight estimated by Dawn's method is 2568.19 g, while the actual mean weight is 2647 g, resulting in a mean difference of 78.8 g.

The standard deviations for Dawn's method and actual weight

are 476.01 g and 384.67 g, respectively, indicating greater variability in estimates using Dawn's method. The t-test statistic is 1.28 with 198 degrees of freedom, and the p-value is 0.199, indicating that the difference between Dawn's method and the actual weight is not statistically significant.

The standard error of the mean difference is 61.2 g, and the 95% confidence interval ranges from -41 g to 99 g, suggesting that while Dawn's method underestimates foetal weight, the difference is not substantial enough to be considered significant. Overall, Dawn's method is relatively reliable but tends to slightly underestimate foetal weight compared to actual birth weights.

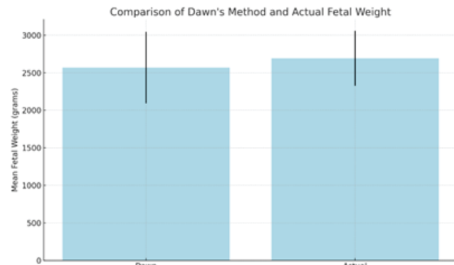


Chart 4

DISCUSSION

- ✓ Two most commonly used methods for predicting birth weight are the clinical and ultrasonographic methods. The clinical methods of estimating fetal weight are less costly, widely accessible, and simple compared to ultrasound. However, they have the disadvantages of being subjective and influenced by external factors.
- ✓ When comparing estimated foetal weight Johnson's formula with actual birth weight, p-value is 0.378, which indicates no statistically significant difference between Johnson's method and the actual birth weight. These results suggest that Johnson's method is a reliable tool for estimating foetal weight in clinical practice.
- ✓ When comparing estimated foetal weight Insler's formula with actual birth weight, p-value is 0.021, showing a statistically significant underestimation of foetal weight by Insler's method. These results suggest that Insler's formula is not a reliable tool for estimating foetal weight.
- ✓ When comparing estimated foetal weight Dawn's formula with actual birth weight, p-value is 0.199, which indicates no statistically significant difference between Dawn's method and the actual birth weight. This indicates Dawn's formula is a reliable tool for estimating foetal weight. Overall, Dawn's method is relatively reliable but tends to slightly underestimate foetal weight compared to actual birth weights.
- ✓ So in our study, it can be concluded that the Johnson method provides the most accurate estimate, with very close values compared to the actual weight.

Limitation Of The Study

This study was carried out on a small scale (N = 100)

However large scale studies are required to establish reliability as well as accuracy amongst these methods in different populations. Small scale studies may not account for extreme cases or outliers that could significantly influence the mean and standard deviation. Larger samples help to average out these extremes, providing a more accurate representation of the population.

CONCLUSION

- ✓ Accurate foetal weight estimation is a cornerstone in the management of labor and delivery. It informs clinical decisions, enhances safety for both mother and baby, and supports optimal outcomes.

- ✓ Based on the data in present study, on comparing three clinical methods for foetal weight estimation—Johnson's, Insler's, and Dawn's methods—against actual birth weight, it can be concluded that the Johnson method (Foetal weight in grams = Fundal Height(cm) - (13,12 or 11) x 155) provides the most accurate estimate, with very close values compared to the actual weight. Dawn's method, while slightly less accurate than Johnson's, also demonstrates reasonable reliability, although it tends to slightly underestimate foetal weight. The Insler's method, however, consistently underestimates foetal weight and shows significant deviation from actual birth weight, making it the least accurate of the three methods. Overall, the Johnson method is the most reliable for clinical use in estimating foetal weight in full-term nullipara, while Dawn's method could be a reasonable alternative if Johnson's method is unavailable.

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