



**ORIGINAL RESEARCH PAPER**

**Obstetrics & Gynaecology**

**FETAL WEIGHT ESTIMATION BY JOHNSON'S FORMULAE, ANTENATAL USG AND ACTUAL BIRTH WEIGHT -A COMPARATIVE STUDY**

**KEY WORDS:**

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**INTRODUCTION**

- Estimating weight of the fetus is important for the obstetrician to assess the growth and optimise fetal outcome .(1)
- Contrary to the widely held belief, several studies have shown that USG estimated fetal weight are almost similar to clinical palpation in predicting fetal weight .(1)
- **The goal of study is to :**
  1. Evaluate the various methods of estimating fetal weight in term pregnancy
  2. To determine the relative accuracy in predicting the same in different weight categories

Extremes of birth weight are associated with increased risk of newborn complications during labour and puerperium.

Estimation of fetal weight would help in the successful management of labour, care of New born in the neonatal period.

Macrosomic babies have complications like shoulder dystocia ,brachial plexus injury, facial palsies,birth canal injuries,post partum hemorrhage, Difficult labour.

EFW also helps in diagnosing FGR,there by reducing perinatal morbidity and mortality

**Objectives**

To assess estimated fetal weight using clinical methods like Johnson's formula

To assess estimated fetal weight using antenatal USG scan

To compare accuracy of estimated fetal weight by USG , Johnson's formula with actual birth weight

**MATERIAL AND METHODS**

**Study Design** - Prospective observational study.

**Study Area.** - Department of obstetrics and gynecology GGH, Kurnool

**Study Period** - April2024 - September 2024

**Study Population** - Pregnant women attending OBG department ,GGH kurnool

**Sample Size.** - 500 cases

**Inclusion Criteria**

- Patients in whom delivery is anticipated within 1week of fetal weight estimation are included
- Singleton pregnancy
- Live fetus
- Cephalic presentation
- Known last menstrual period or ultrasound scan with confirmed expected date of delivery
- Gestational age between 37 weeks to 42 weeks
- Normal BMI( 18kg/m2-24.5kg/m2)

**Exclusion Criteria**

- Patients who didn't deliver within 1week of fetal weight

estimation.

- Multiple pregnancy
- Mal presentation
- Anomalous fetus
- Intrauterine death
- Medical disorders
- Pre existing conditions like fibroids, ovarian cysts
- Oligohydramnios, polyhydramnios
- Known cases of FGR
- Extremes of age <18yrs and >30 yrs of age

**1. Johnson's formula :**

- Fetal weight: ( Symphysiofundal height -12) x155 when the presenting part is not engaged
- Fetal weight:(Symphysiofundal height -11)x155 when the presenting part is engaged (6,7)

**2. USG - Hadlocks formula :**

- $1.4787 + 0.0018372(BPD) + 0.0458(AC)0.158(FL) - 0.03343(AC*FL)$
- BPD,FL,AC are measured using Ultrasound and using the above formula estimated fetal weight is calculated.(2)

**RESULT**

A total of 500 antenatal women in term gestation are subjected for estimation of fetal weight using Johnson's formula and USG these are compared with actual birth weight

**In our study:**

	Johnson's	USG	Actual
Minimum weight (in gms)	2790g	2000g	1800g
Maximum weight (in gms)	3954g	3900g	4000g

**USG**

WEIGHTS (gms)	UNDER ESTIMATED	OVER ESTIMATED
</= 100gms	12%(n=62)	23%(n=113)
101-500gms	21%(n=108)	26%(n=131)
501 - 1000gms	4%(n=17)	11%(n=54)
> 1000gms		

Equal -3%(n=15)

**Johnson's Formulae**

WEIGHTS	UNDER ESTIMATED	OVER ESTIMATED
</= 100gms	6%(n=30)	9%(n=46)
101-500gms	5%(n=24)	51%(n=255)
501-1000gms		26%(n=130)
>1000gms		2%(n=10)

Equal-1%(n=5)

- Mean actual birth weight:2836.500gms
- Mean USG birth weight:2922.334gms
- Mean Johnson's birth weight:3236.082gms
- Mean difference between Johnson's formula weight and: 400.02gms Actual birth weight
- Mean difference between USG birth weight and :85.83gms Actual birth weight

**Assessment of co-relation between Actual birth weight , USG estimated fetal weight and Johnson's formula .**

CLASS	ACTUAL	ANTENATAL USG	Johnson's formula
1(1500g-2500g)	140	99	34
2(2501g-3500g)	345	332	338
3(>_3500g)	15	96	128
Total	500	500	500

The above study given a P value of 0.02, which shows USG estimated fetal weight has good correlation with actual birth weight.

The above study given a P value of 0.04 which shows estimated fetal weight by Johnson's formula has good correlation with actual birth weight.

**DISCUSSION**

- In our study total 500 antenatal mothers are subjected to fetal weight measurement using Ultrasound scan-hadlocks formula, clinical-Johnson's formula
- Soon after birth the weight of the baby is measured and is compared with USG estimated fetal birth weight and estimated weight by Johnson's formula.
- In our study it was found that in USG estimated fetal weight : 35% are within range of +\_100gms of actual birth weight. 85% are within the range of +\_500gms of actual birth weight Out of which 49% were over estimated, 33% were under estimated, 3% were equal to the actual birth weight
- Mean difference between USG estimated fetal weight and actual birth weight is 85.83gms
- Similar results are shown by a study done by Fathima S, Dr A Lakshmi aparna et al publication in 2022.
- It was found that estimated fetal weight by Johnson's formula: 88% overestimated the actual birth weight. out of which 9% are within 100gms, 60% are within 500gms. A total of 86% overestimated are within 1000gms.
- Johnson's formula under estimates the actual birth weight by 11% are with in 500gms..
- In our study both methods over estimates the fetal weight when fetal weight is less than 2100gms and underestimates the fetal weight when it is more than 3.7kgs
- Amongst the two methods, USG is found to be more accurate in estimating fetal weight ,were 85% are with in the range of +\_500gms .
- Johnson's formula can also be used as a tool for assessing fetal weight in low set up areas were 71% are with in range of +\_500gms helps in assessing fetal outcome.
- Accuracy is compared with actual birth using P value , correlation of estimated fetal weight by Johnson's formula with actual birth weight had p value 0.04 which is statistically significant.
- Co relation of estimated fetal weight by USG with actual birth weight resulted a p value 0.02 which indicates it is more statistically accurate than Johnson's formula estimated fetal similar results are given by Chisolum Ogechukwu Okafor et al in South East Nigeria(5)Radikha M (2)
- However there is less significant difference between both the methods in estimating fetal weight.
- Similar study conducted by Radhika M ,Int J Reprod contracept obstet Gynecol comparative study of clinical assessment of fetal weight using Johnson's formula and USG with actual birth weight at nera term.shows similar results.2

**CONCLUSION**

- Our findings imply that clinical assessment of fetal weight using Johnson's formula can be used as diagnostic tool for the estimation of fetal weight in a term pregnancy and fetal outcome in low resource set areas.
- Except in low birth weight newborns ,clinical assessment is as accurate as USG.
- As a result a clinical assessment indicating weight less than 2.5kg ,an USG is recommended for more accurate

prediction and to assess fetal well being.

- This study found clinical assessment helps in managing labour and delivery in a term pregnancy, in developing countries like India.
- Recommendations, that all health care workers are taught how to estimate fetal weight as a normal screening protocol for all pregnant women at term.

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