The Results of the Fetal Weight Estimation of the Infants Delivered in the Delivery Room At Dan Khunthot Hospital by Johnson's Method

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Abstract—The objective of this study was to determine the accuracy to estimation fetal weight by Johnson's method and compares it with actual birth weight. The sample group was 126 infants delivered in Dan KhunThot hospital from January March 2012. Fetal weight was estimated by measuring fundal height according to Johnson's method. The information was collected by studying historical delivery records and then analyzed by using the statistics of frequency, percentage, mean, and standard deviation. Finally, the difference was analyzed by a paired t-test.The results showed had an average birth weight was 3093.57 ± 391.03 g (mean ± SD) and 3,455 ± 454.55 g average estimated fetal weight by Johnson's method higher than average actual birth weight was 384.09 grams. When classifying the infants according to birth weight found that low birth weight (<2500 g) and the appropriate birth weight (2500-3999g) actual birth weight less than estimate fetal weight . But the high birth weight (> 4000 g) actual birth weight was more than estimated fetal weight. The difference was found between actual birth weight and estimation fetal weight of the minimum weight in high birth weight (> 4000 g) , the appropriate birth weight (2500-3999g) and low birth weight (<2500 g) respectively. The rate of estimates fetal weight within 10% of actual birth weight was 35.7%. Actual birth weight were compared with the found that the difference is statistically significant (p <.000). Employing Johnson's method to estimate fetal weight can estimate initial fetal weight before passing to special examinations, which may require excessive high cost. A variety of methods should be employed to estimate fetal weight more precisely, which will help plan care for mother's and infant's safety.

Keywords—Johnson's method, Fetal weight estimate, Delivery Room, Student nurse.

I. INTRODUCTION

THE estimation of fetal weight is important and has advantages to both mother and infant. It helps plan proper care for their safety. There are many methods to estimate fetal weight; palpation method, fundal height measurement, and radio frequency volume reduction, which has been considered the most precise method [1]. However, radiofrequency volume

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reduction must be conducted only by doctor and advanced instrument is also required. As a result, this method is not available to every pregnant woman and health center. Johnson's method requires no expense and is easier to estimate precise birth weight and fetal weight. Johnson's method was predict fetal weight >60% [2]. Fundal height measurement is another easy method to calculate and estimate fetal weight and can also be conducted on every patient by student nurse.

II. OBJECTIVES

The study to determine the accuracy to estimation fetal weight by Johnson's method and compares it with actual.

III. STUDY DESIGN

A. Population

The study population consisted of 126 pregnant women admitted for delivery between Januarys to March 2012. in Dan KhunThot hospital. Inclusion criteria were: 1) live singleton pregnancy in cephalic presentation, 2) admission for planned delivery 3) gestational age beyond 28 weeks. Exclusion criteria were: 1) multifetal pregnancy, 2) dead fetus in utero. The fundal height was measured from the midpoint of the upper border of the pubic symphysis to the highest point of the uterine fundus.

The student nurse then performed a pelvic examination to evaluate cervical dilation and the degree of descent of the fetal head into the pelvis. The fetus was considered to be at zero station (engaged) when the vertex was at the level of the spines and at a plus station when it was below this level. Calculate the fetal weight according to the formulas proposed by Johnson's method

Johnson's method:

Fetal Weight in grams* = 155 x (Fundal height in cm – K)

K = 11 (fetal head at plus stations)

K = 12 (fetal head at zero station)

The infants were weighed using a digital balance, immediately after birth. The infants' actual birth weight and relevant maternal data were retrieved by the authors from the patients' charts, after discharge.

The accuracy of birth weight estimation was determined by calculation of the percentage error ([estimated birth weight- actual birth weight] x100/actual birth weight), and the ratio

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(by percentage) of estimates within 10 percent of the actual birth weight.

B. Study Instrument

The delivery records of Dan KhunThot hospital and birth registration book were used to collect data.

C. Data Analysis

1. Frequency and percentage from basic information were classified
2. The data of the estimated fetal weight and birth weight were analyzed by finding percentage, range, mean, standard deviation
3. Percentage difference by using the following formula: X/Y x 100

X= different weight (gram)
Y= actual birth weight (gram)

IV. RESULTS

A. The Information of Birth Weight

The sample group was 126 infants with actual birth weights between 2,150 – 4,230 grams, giving a mean of 3,093.57 grams and standard deviation of 391.03 grams. While the estimated weights ranged from 2,325 – 4,495 grams, with a mean of 3,477.66 grams and standard deviation of 454.55 grams. When comparing the mean (weight) of the sample group, it was found that there was a statistically significant difference at 0.000. (Table I) Of 126 infants, 117 were born with weights between 2,500 – 3999 grams (92.86%); 6 were born with low birth weight (<2,500 grams) (4.76%); and 3 weighed more than 4,000 grams (2.38%).

TABLE I
RANG, MEAN AND STANDARD DEVIATION OF ACTUAL BIRTH WEIGHT AND ESTIMATE FETAL WEIGHT

Birth weight	Range (grams)	Mean	SD	t	p-value
actual birth weight	2150 - 4230	3093.57	391.03	10.522	0.000
estimate fetal weight	2325 - 4495	3477.66	454.55		

B. The Weight difference between the Estimated Weight and Actual Weight

From 126 infants, the difference between actual birth weight and estimated weight was between (-745) – 1,325 grams, with a mean of 384.09 grams and standard deviation of 409.74 grams.

When classifying the infants according to birth weight, it was found that the group weighing less than 2,500 grams had birth weight less than the estimated weight 603.30 grams (mean) and that the group weighing between 2,500 – 3,999 grams had birth weight less than the estimated weight 386.33 grams (mean). However, the group weighing more than 4,000 grams had birth weight more than the estimated weight 141.67 grams (mean).

TABLE II
RANG, MEAN AND STANDARD DEVIATION OF WEIGHT DIFFERENCE BETWEEN THE ESTIMATED FETAL WEIGHT AND ACTUAL BIRTH WEIGHT BY ACTUAL WEIGHT

group of infant classify by birth weight	N	weight difference (grams)		
		Range	mean	SD
<2500	6	(-1250) – (-145)	- 603.3	390.96
2500-4000	117	(-1325) – 745	-386.33	401.52
>4000	3	(-250) – 630	141.67	447.89
Total	126	(-1325) – 745	384.09	409.74

C. The Rates of Estimates within 10% of Actual Birth Weight

The rates of estimates within 10% of actual birth weight were 35.71% and 10% of actual birth weight by baby weight category of high birth weight were 66.67 % appropriate weight were 35.90% and low birth weight were only 16.67% respectively

TABLE III
FREQUENCY AND PERCENTAGE OF WEIGHT DIFFERENCE BETWEEN THE ESTIMATED FETAL WEIGHTED AND ACTUAL BIRTH WEIGHT BY ACTUAL BIRTH WEIGHT

group of infant classify by birth weight	N	<10% of weight difference	
		n	Percent
<2500	6	1	16.67
2500-4000	117	42	35.90
>4000	3	2	66.67
Total	126	45	35.71

V. DISCUSSION AND RECOMMENDATION

The study of the estimation fetal weight of the infants delivered in the delivery room at Dan KhunThot hospital by using Johnson's method found that there was a statistically significant difference between the birth weight and estimated weight. The finding was different from the study of Altenfelder[3] which found that the weights estimated from the four methods (radiofrequency volume reduction, clinical examination by using Johnson's and Dare's formulas and mother's estimation) were all accurate and that the estimated weights from every method had no statistically significant difference. This may be because of shape difference between foreigner and Thai. Moreover, the study found that 60.32% of all the infants had birth weight different from the estimated weight more than 10%. The study of Belete&Gaym [4] indicated that the estimated weight from palpation method was more accurate than the estimated weight from formula, with statistical significance. However, Johnson's method was more accurate in estimating high birth weight infants. This study showed that there was a smaller difference in estimating high birth weight infants. Likewise, the study of Khani et al [5] found that the estimated weight from radiofrequency volume reduction, palpation method, and Johnson's method would be

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different among low birth weight infants but have no difference in normal birth weight infants.

The results of the study show that the estimation of fetal weight by using Johnson's method can estimate initial fetal weight and be a role for nurses to use it to estimate initial fetal weight before receiving special examinations.

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