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Comparison of Estimation Fetal Weight (EFW) using the Niswander Method and the Risanto Formula on Birth Weight

Dian Kusumaningtyas[1], Abkar Raden[2], Farida Kartini[3]

[1]The Department of Midwifery, Faculty of Medicine, Universitas Brawijaya, Indonesia
[2]The Department of Midwifery, Faculty of Health Science, Universitas 'Aisyiyah, Indonesia
[3]The Department of Midwifery, Faculty of Health Science, Universitas 'Aisyiyah, Indonesia

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CORRESPONDENCE

Phone: +6282134477470

E-mail: dian.kusuma@ub.ac.id

A B S T R A C T

Fetal growth monitoring can be observed by measuring the Symphysis-Fundal Height (SFH). To determine fetal growth, the SFH measurement is calculated into the Estimation Fetal Weight (EFW) formula. EFW formulas using SFH measurements include the Niswander method and the Risanto formula. This study aims to compare the results of the calculation of the EFW formula which is closest to the birth weight of the baby. This study is a comparative descriptive study with a cross-sectional design, which measures the SFH and weighs the baby's birth weight directly. The population of this research is pregnant women who will give birth at RSUD Soewondo Kendal. A total of 176 samples were taken using a consecutive sampling technique. The results of the independent t-test showed that the Risanto formula had no difference in the birth weight of the baby, while the Niswander method had a significant difference in the actual birth weight of the baby.

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I. INTRODUCTION

Antenatal Care (ANC) is one of the important things that must be done during pregnancy to monitor the growth and development of the fetus in the womb. Midwives need to carry out prenatal care to maintain the condition of the fetus and pregnant women so that they do not experience complications or possible diseases that can appear during pregnancy, childbirth, and after delivery. During antenatal care, one of the actions that the midwife must take is an abdominal examination/palpation. Abdominal palpation is performed to determine the location/position of the fetus and to measure the symphysis-fundal height which can be used to calculate the interpretation of fetal weight. The concordance between the age and weight of the fetus indicates the well-being of the fetus in the womb. Fetal growth that is too large or too small compared to the gestational age of the mother, can cause serious problems for the mother during labor and the fetus after birth (Cunningham et al., 2005).

Low or excess fetal weight increases the risk of complications in the baby. One of the factors causing perinatal morbidity is Low Birth Weight (LBW). Meanwhile, excess fetal weight has the potential to cause complications during delivery for both the baby and the mother. Complications that can occur in infants are shoulder dystocia, brachial plexus, bone injury, and intrapartum asphyxia. As for the mother, it can cause perineal lacerations and pelvic injuries, increase vaginal surgery, increase the number of cesarean sections, and postpartum hemorrhage (Charles Njoku et al., 2014).

To avoid these complications, an accurate interpretation of fetal weight is needed so that it can be used as a basis for making decisions regarding childbirth. The accuracy of the interpretation of fetal weight affects the success of planning and management of the delivery process so that medical personnel can estimate complications that may occur (Satria et al., 2014). In addition to avoiding maternal and neonatal complications, the interpretation of fetal weight can also provide an overview of the quality of the fetus, because the growth and development of the fetus indicate the quality of the baby to be born (Mardeyanti et al., 2013).

The estimated fetal weight can be calculated using two methods, namely ultrasonography (USG) and clinical methods (Ugwa et al., 2014). Examination using ultrasound requires a fairly high cost, trained personnel, and requires a longer time. Meanwhile, the clinical method can be done easily and without cost (C Njoku et al., 2015).

Calculation of the interpretation of fetal weight using the clinical method was carried out by measuring the symphysis-fundal height (SFH). SFH measurement is measuring from the top edge of the symphysis to the top of the uterine fundus by following the uterine curvature using a measuring tape (Siswosudarmo & Emilia, 2008).

EFW calculation can be done by entering the results of SFH measurements into various formulas, including the Niswander Method and the Risanto Formula. The difference between the two formulas lies in the formula so that it produces a different EFW.

This study was conducted to compare the results of the two formulas which are closest to the actual birth weight of the baby.

II. METHODS

This research was a comparative descriptive study with a cross-sectional design. The data was taken directly through the measurement of the SFH of pregnant women who were entering the inpartu phase or whose pregnancy was about to be terminated so that in a short time the weight of the baby born could be known. The SFH measurement was done with a measuring tape, while the baby's weight was measured using a digital baby scale. The population of this research was pregnant women who would give birth. Samples were taken using consecutive sampling techniques according to predetermined criteria. The number of samples in this study was 176 pregnant women and their babies. The inclusion criteria for this study were pregnant women

with gestational age 37 weeks, head presentation, giving birth to live babies either by cesarean section or normally. The exclusion criteria for this study were twin pregnancy, polyhydramnios or oligohydramnios, PROM, there are congenital abnormalities in the baby, or the mother refusing to be a respondent in the study. Analysis of the data used in bivariate analysis with an independent t-test.

III. RESULT

Table 1. Frequency Distribution of Estimation Fetal Weight (EFW) using Niswander Method

The EFW using Niswander method	Frequency	Percentage
< 2500 grams	2	1,1
2500-4000 grams	144	81,8
> 4000 grams	30	17,0
Total	176	100,0

Table 1 shows the results of EFW using the Niswander Method, mostly found in the range of 2500-4000 grams, namely 81.8%.

Tabel 2. Statistic Calculation of Estimation Fetal Weight (EFW) using Niswander Method

Description	Mark
Respondents	176
Mean	3615,02
Median	3597,00
Modus	3597
Range	2265
Minimum	2087
Maximum	4352

Table 2 shows that from 176 respondents, the average EFW was 3615.02 grams with the smallest EFW being 2087 and the biggest being 4352 grams.

Table 3. Frequency Distribution of Estimation Fetal Weight (EFW) using Risanto Formula

The EFW using Risanto Formula	Frequency	Percentage
< 2500 grams	21	11,9
2500-4000 grams	155	88,1
> 4000 grams	0	0
Total	176	100

Table 3 shows the results of EFW using the Risanto formula mostly found in the range of 2500-4000 grams, namely 88.1%.

Table 4. Statistic Calculation of Estimation Fetal Weight (EFW) using Risanto Formula

Description	Mark
Respondents	176
Mean	2884,91
Median	2870,00
Modus	2870
Range	1875
Minimum	1620
Maximum	3495

Table 4 shows that from 176 respondents, the average EFW was 2884.91 grams with the smallest EFW being 1620 and the biggest being 3495 grams.

Table 5 Frequency Distribution of Birth Weight

Birth Weight	Frekuensi	Persentase
< 2500 gram	24	13,6
2500-4000 gram	152	86,4
> 4000 gram	0	0
Total	176	100

Table 5 shows the highest birth weight in the range of 2500-4000 grams, which is 86.4%.

Table 6 Statistic Calculation of Infant Birth Weight

Description	Mark
Respondents	176
Mean	2923,44
Median	2960,00
Modus	3200
Range	2390
Minimum	1510
Maximum	3900

Table 6 shows that from 176 respondents, the average EFW was 2923.44 grams with the smallest EFW1510 and the biggest 3900 grams.

Table 7. Difference between EFW Formula and Birth Weight

Formula	Average	Formula – Birth Weight
Niswander Method	3615,02	691,58
Risanto's formula	2884,91	38,53
Birth Weight	2923,44	

Table 7 shows the difference in the average that is close to the birth weight of the baby in the Risanto formula.

Table 8 The Results of Independent t-test

Formula	P-value
Metode Niswander-BBL	0,000
Rumus Risanto-BBL	0,308

Table 8 shows that there is no difference between the Risanto formula and the birth weight of the baby (p-value > 0.05).

IV. DISCUSSION

The population of this study was 195 pregnant women. After being selected according to inclusion and exclusion criteria, the sample used was 176 pregnant women, because 19 other pregnant women experienced premature rupture of membranes, premature birth, oligohydramnios, breech position abnormalities, and multiple/twins pregnancies.

The estimation of fetal weight is one of the important things that must be considered in the delivery process, especially for pregnant women who have a risk of giving birth to babies with low or excessive birth weights (Cunningham et al., 2005).

In this study, the interpretation of fetal weight was measured based on the symphysis-fundal height during pregnancy. In addition to using the symphysis-fundal height, to determine the interpretation of fetal weight, ultrasound can be used to measure the biparietal diameter and the circumference of the mother's abdomen (Pillitteri, 2002). Fetal weight cannot be measured directly, but fetal weight can be estimated using the formula for interpreting fetal weight by examination or palpation of the abdomen, measurement of uterine fundal height, and ultrasound (Khani et al., 2011).

In this study, it was shown that most of the babies born had a normal birth weight of 2500-4000 grams (86.4%). Normal newborns are babies born from term pregnancy with a normal weight of 2500-4000 grams which are weighed 24 hours after birth (Saifuddin, 2006).

Niswander has modified the Mc Donald formula to calculate the interpretation of fetal weight as uterine fundal height minus 13, then multiplied by 151, then added 1030 grams. The thing that underlies the modification of the formula is the results of research conducted by Niswander which shows an error in the average birth weight of 1030 grams (Walyati, 2012).

Based on the results of the independent t-test, the calculation of the estimated fetal weight using the Niswander method showed a p-value of 0.000 which means that there is a significant difference between the results of the calculation of the estimated fetal weight using the

Niswander method and the actual birth weight of the baby. The difference between the average results of the Niswander method and the actual birth weight of babies is quite far, which is 691.58 grams.

The Niswander method is not valid enough to estimate the weight of the fetus because the result is generally higher than the actual weight of the fetus. The formula for interpreting fetal weight from western researchers is not suitable for the population of pregnant women in Indonesia (Gayatri & Afiyanti, 2004).

The calculation of the estimation of fetal weight using the Risanto formula has been modified by the inventor by adjusting the condition of the population in Indonesia, to be 125 times the symphysis-fundal height in centimeters and then subtracting 880 (800 is a constant) (Siswosudarmo & Titisari, 2014).

Based on the independent t-test, the Risanto formula showed a p-value of 0.308, which means that there was no significant difference between the average Risanto formula and the birth weight of the baby. The difference between the results of the interpretation of the fetal weight and the baby's weight is not much different, namely 38.53 grams.

The results of this study are in line with Esmaeilou's (2016) study which compared the accuracy of clinical methods with birth weight. The clinical method used in this study was the measurement of the symphysis-fundal height. The results showed a significant positive correlation between actual birth weight and estimated birth weight using clinical methods. The conclusion in this study was that abdominal palpation and the Risanto formula were more accurate in predicting the baby's birth weight. This method is considered fast, easy and inexpensive to estimate fetal weight so that it can be used as an alternative to ultrasound (Esmaeilou & Mohamadi, 2016).

V. CONCLUSION

In this study, the use of the Risanto formula was stated to be more accurate than the Niswander method in estimating the birth weight of a baby. This is caused by genetic factors and the physical condition of the western population which is different from the population in Indonesia. The Risanto formula was found by Indonesian researchers using a population or sample of Indonesian citizens in their research, so that the application to estimate fetal weight in the Indonesian population will be more precise than the Niswander method which uses the western population as a sample in its research to interpret the weight of the baby to be born. In this study, the Niswander method also showed an overestimation of the actual birth weight of the baby.

In this study, the measurement of the symphysis-fundal height is not only done by one person, so it is hoped that in future studies the measurement of the height of the uterine fundus can be carried out by the same officer to avoid bias or differences in the measurement of the symphysis-fundal height.

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