

Research Article

Accuracy of Fetal Weight Estimation Using Hadlock II Formula

Keakuratan Taksiran Berat Janin Menggunakan Rumus Hadlock II

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Abstract

Objective : To investigate the accuracy of estimated fetal weight using Hadlock II formula in RSUD Dr Moewardi.

Methods : This cross-sectional study was conducted at RSUD Dr Moewardi in June 2017. Subjects were women who gave birth at RSUD Dr Moewardi from August 2014 to March 2017. The method of collecting data by quoting the medical record as required. Data analysis was done by using linear regression statistic test.

Results : By distribution, the number of samples that, according to the standard, is 81.67 %. With the value of $R = 0.706$ which means that the relationship between two research variables are strong and the value of R Square = 0.499 which means that estimated fetal weight using Hadlock II formula has contribution 49.9 % on fetal birth weight and 50.1 % others by other factors.

Conclusions : Fetal weight estimation using Hadlock II formula in RSUD Dr Moewardi has low accuracy. Operator skills training is required to improve the accuracy of estimated fetal weight.

Keywords : fetal birth weight, fetal weight estimation, Hadlock II.

Abstrak

Tujuan : Mengetahui keakuratan taksiran berat janin menggunakan rumus Hadlock II di RSUD Dr Moewardi.

Metode : Penelitian ini adalah penelitian potong lintang. Penelitian ini dilaksanakan di RSUD Dr Moewardi pada Juni 2017. Subjek penelitian ini adalah data rekam medis dari ibu hamil yang mengalami partus di RSUD Dr Moewardi pada Agustus 2014 – Maret 2017. Metode pengumpulan data dengan mengutip data rekam medis pasien sesuai ketentuan. Analisis data dilakukan dengan uji statistik regresi linier.

Hasil : Secara distribusi, jumlah sampel yang memenuhi standar yaitu 81,67 %. Dengan nilai $R = 0,706$ yang artinya bahwa hubungan kedua variabel penelitian ada dalam kategori kuat dan nilai R Square = 0,499 yang berarti taksiran berat janin menggunakan rumus Hadlock II memiliki pengaruh kontribusi sebesar 49,9% terhadap berat bayi lahir sedangkan 50,1 % lainnya dipengaruhi oleh faktor lain.

Kesimpulan : Taksiran berat janin menggunakan rumus Hadlock II di RSUD Dr Moewardi kurang akurat. Perlu dilakukan pelatihan ketrampilan operator sehingga diharapkan dapat meningkatkan keakuratan taksiran berat janin.

Kata kunci : berat bayi lahir , Hadlock II , taksiran berat janin.

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INTRODUCTION

Fetal weight estimation is an essential component for antenatal care, counselling, diagnosis, and delivery. The accuracy of fetal weight estimation is one of the most important measurements at the onset of labor.¹

Accuracy of fetal weight is an important parameter in predicting neonatal morbidity and mortality and guidelines for determining the next obstetric management.² Accurate estimation

of fetal weight also has an effect on clinical management, the outcomes of pregnancy, delivery and adaptation of the newborn, especially in cases of macrosomia, delayed fetal growth (PJT), breech presentation, vaginal labour after previous caesarean section.^{3,4}

There are two main methods for determining fetal weight estimation, i.e. clinically and using sonography. Clinical estimates are based on abdominal palpation and fundal height.⁵ The sonographic estimates are based on Biparietal

Diameter (BPD), Abdominal Circumference (AC), Femur Length (FL) and Head Circumference (HC).

There are many published formulas for calculating fetal weight estimation based on one or more measurements (BPD, HC, AC, FL).^{6,7} The most popular formulas are Shepard, Warsof's & Shepard's modifications, and Hadlock's.⁸

Accurate estimation of fetal weight is something that doctors still find difficult to understand.⁹ Sonographic estimates are superior to clinical estimates, but require good tools and trained operator.¹⁰

Estimated fetal weight using ultrasound has the best standard deviation followed by two clinical examinations, Johnson formula and Dare formula.¹¹ The objective of this study is to investigate the accuracy of fetal weight estimation using Hadlock II formula in RSUD Dr Moewardi.

METHODS

This cross-sectional study was conducted at RSUD Dr Moewardi in June 2017. We reviewed the medical records data of women who gave birth at RSUD Dr Moewardi between the period of August 2014 and March 2017. The sample selection technique used is simple random sampling. The hypothetical tests used were the Kolmogorov-Smirnov test, paired T, and linear regression test. All statistical analyses were performed using SPSS Statistics 23.0 for Windows.

RESULTS

We recruited 52 subjects in total. From this study, there were 63 subjects who met the criteria and 72 subjects who did not meet the inclusion and exclusion criteria for several reasons, 53 subjects were incomplete in biometric measurements, 2 subjects of Intra Uterine Fetal Death (IUFD), 9 subjects oligo / polyhydramnios, 5 subjects with gestational age <37 weeks, and 3 subjects with anatomical, congenital and chromosomal abnormalities. From 63 subjects who met these criteria, 60 subjects were selected in a simple random sampling by the researcher. The results obtained from this study are.

Table 1. Description of the Subjects

Variable	n	Mean (grams)	Standard Deviation
EFW using Hadlock II formula	60	2997.06	± 321.411
Birth weight	60	2986.67	± 357.234

EFW: Estimated Fetal Weight
N: Number of subjects

Based on the data in table 1, the average estimated fetal weight with Hadlock II formula of 60 subjects was 2997.06 grams while the average of weight babies born from 60 subjects was 2986.67 grams.

From the results of the study, the mean difference between the estimated fetal weight using Hadlock II formula with a birth weight of 60 subjects was 206.41 ± 159.85 gram or 7.02 ± 5.67%. The highest difference of fetal weight estimation using Hadlock II formula with birth weight in RSUD Dr Moewardi was 776.35 gram or 31.05% and lowest was 2.20 gram or 0.08%.

Table 2. Distribution of Subjects Differences

Characteristic	n	Mean (grams)	Standard Deviation
Weight (grams)			
< 300	49	136.72	±75.00
> 300	14	452.69	±141.44
Percentage (%)			
< 10	50	5.06	±3.51
> 10	13	15.46	±5.88

N: Number of subjects

Table 2 showed that there were 48 subjects with the difference less than 300 grams and 12 subjects with the difference of more than 300 grams. In the percentage of the difference estimated fetal weight using Hadlock II formula with the birth weight, 49 subjects had a difference less than 10% and 11 subjects with the difference more than 10%.

There was no significant difference between fetal weight estimation using Hadlock II formula and the birth weight ($p = 0.76$). In linear regression test obtained SPSS calculation results with the value of $R = 0.706$, which can be interpreted

that the relationship between the two research variables are in a strong category. In addition, the results of R Square = 0.499, which means the estimation fetal weight using Hadlock II formula has a contribution influence of 49.9% on birth weight and other 50.1% influenced by other factors beyond the estimation fetal weight using the formula Hadlock II.

DISCUSSION

From this study, it was found that there was no significant difference between the fetal weight estimation using the Hadlock II formula with the birth weight. This is in line with the research was conducted that explained that the fetal weight estimation using the Hadlock II formula was not more different from the birth weight of the baby because the formula using three biometric parameters in the measurement, Biparietal Diameter (BPD), Abdominal Circumference (AC), and Femur Length (FL)¹².

Factors that affect the size of the difference between the fetal weight estimation using the formula Hadlock II with the birth weight of 60 subjects studies were various, such as the formula used, operator skills, ultrasound, pregnancy conditions, and others.^{4,11,13} Table 2 showed the distribution of difference between the fetal weight estimation using Hadlock II formula and the birth weight of 60 subjects. In the table, 48 subjects or 80% of the subjects were met the standard because the results were ≤ 300 grams.⁸ When viewed from the percentage, the difference between the fetal weight estimation using Hadlock II formula and the birth weight, there were 49 subjects or 81.67% who met the standard because they had the difference less than 10%.¹⁴ It means, in distribution, fetal weight estimation using the Hadlock II formula in RSUD Dr Moewardi is less accurate because of the number of samples that meet the standard (the difference between fetal weight estimation using Hadlock II formula and birth weight ≤ 300 gram or $\leq 10\%$) is 81.67%. While the standard of accuracy of fetal weight estimation using Hadlock II formula is 93%.⁸

Based on paired T-test obtained Sig. value ie $p = 0.760$, it means that there is no significant difference between the fetal weight estimation using the Hadlock II formula and the birth weight, this is in accordance with described that the result of the fetal weight estimation using the Hadlock II formula were not more different from birth weight¹¹. While on the linear regression test obtained value of $R = 0.706$, it means that the relationship between two research variables are in a strong category.⁷ In addition, obtained the value of R Square = 0.499, which means that estimation fetal weight using Hadlock II formula has a contribution influence of 49.9 % to the birth weight and other 50.1% is influenced by other factors beyond the estimation fetal weight using the Hadlock II formula.

The accuracy of fetal weight estimation in RSUD Dr Moewardi is not only influenced by the formula that used to calculate the fetal weight estimation. Other factors such as operator skills, ultrasonography and pregnancy may also affect the accuracy of fetal weight estimation.^{9,13} This is supported by the results of this study that R Square = 0.499, which means that fetal weight estimation using Hadlock II formula has an influence contribution of 49.9% to the birth weight and another 50.1% is influenced by other factors beyond the fetal weight estimation using the Hadlock II formula.

CONCLUSION

Fetal weight estimation using Hadlock II formula in RSUD Dr. Moewardi is less accurate, because the distribution of the samples that meet the standard (the difference of fetal weight estimation using Hadlock II formula with birth weight ie ≤ 300 gram or $\leq 10\%$) is 81.67%, less than 93%.⁸ From the results of the study, it can be concluded that the fetal weight estimation using Hadlock II formula in Dr Moewardi Hospital is overestimated or greater than baby birth weight. In addition, the fetal weight estimation using the Hadlock II formula in RSUD Dr. Moewardi has an influence on the birth weight of 49.9%, while the other 50.1% is influenced by other factors.

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