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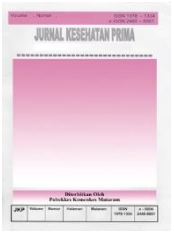

# The Effect of Maternal Weight Gain During Pregnancy on Uterine Contraction and Fetal Weight

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**Abstrak**
Hemorrhage is the second cause of maternal death—the occurrence of hemorrhage increases in prolonged labor. The duration of labor is influenced by three main factors: power, passage, and passenger. Maternal weight gain during pregnancy allegedly affects these factors. This study aims to determine the effect of maternal weight gain during pregnancy on uterine contractions (power) and fetal weight (passenger) at Srikandi IBI Public Hospital, Jember, East Java. This research involved 92 mothers giving birth at Srikandi General Hospital in Jember, which was determined by systematic random sampling. This study observed and assessed maternal weight gain as an independent variable and uterine contraction and fetal weight as dependent variables at the same time during labor by using partographs. Collected data was analyzed by inferential analysis using path analysis. It was found that the maternal weight gain during pregnancy had a significant effect on the fetal weight (t-value 3.77 with an estimated value of 0.37) but did not affect uterine contractions either in frequency (t-value 1.62) or duration (t -t-value 0.69). So, it can be concluded that the more significant maternal weight gain during pregnancy, the greater the fetal weight. Based on the results of this study, it is hoped that health workers will assist pregnant women in paying attention to increasing body weight during pregnancy based on BMI so that there are no labor complications due to passenger factors.

**Keywords: Weight Gain; Uterine Contraction; Fetal Weight**

## INTRODUCTION

The duration of labor is influenced by three main factors, namely power (uterine contractions and pushing force), passage (conditions of the birth canal), and passenger (fetus, placenta, and amniotic fluid) (Saifuddin, 2016). Control of these factors is likely to influence the duration of labor. Yohanna (2016) conducted a case-control study on 296 respondents, finding a significant relationship between uterine contractions, position, and fetal weight on the duration of labor. Weak uterine contraction, abnormal fetal position, and fetal weight above 4000 grams significantly increase prolonged labor. Prolonged labor results in delivery complications, including hemorrhage. This was proven by Baktiyani et al. (2016), who found that there was 72% of prolonged labor experienced primary postpartum hemorrhage. This was confirmed by Wijayati (2020), who stated that prolonged labor increased the risk of primary postpartum hemorrhage 9,03 times.

Bleeding is the second cause of maternal death in East Java, as many 127 out of 226 maternal deaths (Profil Kesehatan Indonesia, 2021). In Jember Regency, 22 out of 61 maternal deaths are caused by bleeding, it is also the leading cause of maternal death (Dinas Kesehatan Provinsi Jawa Timur., 2020). It was recorded that 139 patients were

diagnosed with the prolonged first stage, and 125 patients were diagnosed with the prolonged second stage of labor in 2021 at Srikandi General Hospital, Jember (RSU Srikandi Jember, 2022).

Maternal nutritional status, one of which is the weight gain during pregnancy, allegedly affects power and passengers as factors that play an essential role in labor. In their research, Hong and Paek (2018) stated that maternal weight gain during pregnancy affects labor through increased uterine contractions. Several studies have found that maternal weight gain during pregnancy is associated with birth weight (Aryani & Annisa, 2016). Thus, indirectly, maternal weight gain during pregnancy may influence the duration of labor through the power and passenger factors. By knowing the effect of maternal weight gain during pregnancy on uterine contractions and fetal weight, health providers can prevent prolonged labor and hemorrhage.

This study aims to determine the effect of maternal weight gain during pregnancy on uterine contractions and fetal weight at Srikandi IBI Public Hospital, Jember, East Java.

## METHOD

### Ethical Considerations

This research was conducted after respondents received an explanation of the research procedures and expressed their willingness to be respondents in the research by signing an informed consent.

### Population and Sample:

This research is an observational analytic study, a cross-sectional approach, observing and assessing maternal weight gain as an independent variable and uterine contraction and fetal weight as dependent variables simultaneously during labor. Thus, the appropriate research subjects were mothers giving birth at Srikandi General Hospital, Jember, with a population according to the average number of births per month, namely 119 mothers giving birth. The sample size was determined based on the Slovin formula, with a margin of error of 5%,

The research sample was determined through the Systematic Random Sampling technique. The mothers giving birth with the medical intervention of accelerated labor were excluded from this study because it could affect the uterine contraction variable.

The data of the research were collected using instruments in the form of observation sheets and partographs, which are commonly used in the supervision of ordinary delivery care (Adriandz, 2016). Collected data was then analyzed by inferential analysis using path analysis because it has more than one dependent variable. The analysis results are concluded based on t-value, where t-value> 1.96 is equivalent to a p-value <0.05, indicating a significant influence between variables (Latan H, 2013).

Researchers did not control several factors that influence fetal weight and uterine contractions, which could be a potential limitation of this study.

## RESULT AND DISCUSSION

In this study, maternal weight gain is the independent variable, whereas uterine contractions and fetal weight are the dependent variables. They were ratio data, with the results of univariate analysis shown in Table 1.

Table 1. Results of univariate analysis

| Variable | Mean | Standard deviation |
|---|---|---|
| Maternal weight gain | 10,44 kg | 3,11 |
| Frequency of contraction | 3,62 x/ 10’ | 0,69 |
| Duration of contraction | 38,53 seconds | 7,01 |
| Fetal weight | 3097,07 grams | 385,08 |

Based on the results of univariate analysis, it is known that the average weight gain of respondents during pregnancy is 10.44 kg. According to the Ministry of Health of the Republic of Indonesia (2021), Maternal weight gain during pregnancy should be adjusted according to pre-pregnancy body mass index. Recommendations for maternal weight gain during pregnancy for undernourished women between 12.5-18 kg, normal nutritional status between 11.5-16 kg, over nutritional status ranging from 7-11.5 kg, while obese nutritional status is only recommended to increase 5- 9 kg. The frequency of contractions averages 3.62x in 10 minutes, with an average duration of 38.53 seconds. This shows that the average respondent's contraction frequency is expected. However, the contraction duration still needs to be improved. As stated by the World Health Organization (2017), adequate contractions in the first active phase of labor occur thrice in 10 minutes with a minimum duration of 40 seconds. The average fetal weight was 3097.07 grams. This is in the normal range of a baby's weight at term, which is between 2500-4000 grams, indicating the fetus can live outside the womb (Saifuddin, 2016).

The results of the bivariate analysis used to determine the effect of maternal weight gain during pregnancy on contractions and fetal weight are presented in Table 2.

Table 2. The effect of maternal weight gain during pregnancy

| Dependent Variable | t-value | Estimation | Information |
|---|---|---|---|
| Contraction frequency | 1.62 | 0.17 | Not significant |
| Contraction duration | 0.69 | 0.07 | Not significant |
| Fetal weight | 3.77 | 0.37 | Significant* |

Description: * indicates significant at the level of α = 5%

Table 2 shows that the maternal weight gain during pregnancy significantly affects fetal weight with a positive t-value, which means that the more significant the maternal weight gain during pregnancy, the greater the birth weight of the fetus. This is based on previous research that states that maternal weight gain during pregnancy significantly affects fetal weight (Lumbanraja et al., 2013; Aryani & Annisa, 2016). Research by Tela et al. (2019) found that maternal weight gain significantly affects fetal weight; an increase of 1 kilogram of body weight during pregnancy is associated with an increase of 94 grams of birth weight. In their research, Ludwig & Currie (2010) stated that mothers who experienced weight gain during pregnancy > 24 kilograms were at risk of giving birth to babies over 4000 grams. It can affect the delivery process, as research by Uliyatul Laili and Ratna Ariesta Dwi Andriani (2020) shows that an increase in body weight according to BMI is associated with a standard delivery process.

The mechanism of placental function may explain the maternal weight gain during pregnancy related to fetal weight. Pregnant women with malnutrition found the smaller size of the placenta have a tendency to give birth to premature babies and babies with low birth weight (Murliyanti, 2015). The placenta has functions in the respiratory system, excretory nutrition, and hormone production. These various functions certainly support the growth and development of the fetus while in the womb (Saifuddin, 2016). The better maternal nutritional status, the better the quality of the placenta and the impact on fetal growth.

However, maternal weight gain during pregnancy has no significant effect on both the frequency and duration of uterine contractions. McEvoy and Sabir (2022) discuss the physiology of uterine contractions, which involves many things, including electrochemical gradient, calcium sensitization,

desensitization, mechanical stretch, inflammatory mediators, and hormones. The complex mechanism of uterine contractions causes the nutritional status of a mother giving birth and the frequency and duration of uterine contraction during labor.

In addition, this study only assessed maternal weight gain during pregnancy as an independent variable. In contrast, as other nutritional indicators, body mass index and nutritional intake during labor were not assessed, which may be a limitation of this study. Hadianti and Resmana (2018) explained that uterine contractions are more influenced by the nutritional conditions of the mother during childbirth, as research shows a significant relationship between maternal nutritional intake during labor and delivery progress. This explains that proper nutritional intake during labor affects uterine contractions and makes birthing processes more efficient (World Health Organization, 2018). This may require further research to determine other nutritional factors influencing uterine contraction during labor.

## CONCLUSION

Based on the results of this study, it can be concluded that the more significant maternal weight gain during pregnancy, the greater fetal weight. Health workers should assist pregnant women in paying attention to weight gain during pregnancy based on BMI so there will be no labor complications due to the passenger factor.

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