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Correlation between hyperemesis gravidarum risk factors and body weight of first-trimester pregnant women

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ABSTRACT

Background: Nausea and vomiting early in pregnancy are experienced by around 70-80% of pregnant women. If nausea and vomiting occur too often, it will become a pathological condition called hyperemesis gravidarum. Many factors trigger hyperemesis gravidarum, necessitating more in-depth research regarding the risk factors for hyperemesis gravidarum and their impact on the weight of pregnant women in the first trimester.
Purpose: This study aimed to analyze the correlation between hyperemesis gravidarum risk factors and the body weight of first-trimester pregnant women in East Jakarta.
Methods: A quantitative study employing descriptive analysis and a cross-sectional case-control method was conducted, including 84 first-trimester respondents selected using targeted sampling techniques. Data collection was performed using questionnaires, and data analysis was conducted using Chi-square.
Results: There is a significant relationship between the risk factor variables for severe morning sickness, namely age, occupation, history of vomiting, anemia, and the outcome, which is the measurement of pregnant women's weight.
Conclusions: There is a relationship between age, occupation, pregnancy, history of vomiting, anemia, and mild stress with the results of weight measurement of pregnant women in the first 3 months of pregnancy.

Keywords: hyperemesis gravidarum, nausea, vomiting, body weight, pregnant

INTRODUCTION

During pregnancy, numerous changes occur in both the mother's body and the fetus during each trimester. For instance, in early pregnancy, various symptoms and discomforts arise due to hormonal adjustments. The primary hormonal changes contributing to pregnancy discomfort are high estrogen and Human Chorionic Gonadotropin (hCG), leading to nausea and vomiting in early pregnancy. Approximately 70-80% of pregnant women experience nausea and vomiting, typically at manageable levels based on individual conditions. However, if these symptoms worsen or become uncontrollable, and excessive vomiting occurs, it

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Nursing and Healthcare Practices

- *This can serve as a valuable resource for health students, especially those majoring in nursing, providing reading material, references, and insights for developing scientific papers on the measurement of pregnant women's weight in the first trimester.*
- *Public health services can benefit from the findings of this research by paying closer attention to first-trimester pregnant women, particularly those with risk factors for hyperemesis gravidarum, and being vigilant about their weight.*
- *This study can serve as a foundation for future research on hyperemesis gravidarum, with broader geographic coverage and larger sample sizes.*

progresses to a pathological condition known as hyperemesis gravidarum.

In 2015, the World Health Organization (WHO) reported 216 maternal deaths per 100,000 live births attributed to pregnancy and childbirth complications. Additionally, WHO noted that hyperemesis gravidarum accounted for 12.5% of all cases worldwide (WHO, 2015). The Indonesian Health Demographic Survey (SDKI) reported a 3% incidence rate of pregnancy complications involving hyperemesis gravidarum. Data from pregnancy visits in Indonesia in 2019 revealed that 14.5% of mothers experienced hyperemesis gravidarum in their pregnancies (Depkes RI, 2019). According to data from DinKes DKI Jakarta (2019), out of 4,670 pregnant women, 361 (7.75%) experienced hyperemesis gravidarum, while in 2015, out of 4,813 pregnant women, 393 (8.18%) experienced the condition. During the data collection process, researchers identified 10 pregnant women with hyperemesis gravidarum at the community health center in East Jakarta.

The exact cause of hyperemesis gravidarum remains unknown. However, theories suggest that potential factors contributing to this condition include first pregnancies, psychological disorders, genetic and metabolic factors, infectious diseases, and low hemoglobin levels in the blood. Several studies have also indicated that young age and primigravidas are more susceptible to hyperemesis gravidarum (Purwanti et al., 2020). In a study by Suriati & Yusnidar (2021), it was found that the mother's level of knowledge, age, and gravidity influenced the incidence of hyperemesis gravidarum. Additionally, other researchers (Hulu et al., 2022) have reported a correlation between gestational age and hyperemesis gravidarum.

Hyperemesis gravidarum is characterized by severe nausea and vomiting during pregnancy, leading to dehydration and weight loss. This weight loss can amount to 5% of the initial body weight, thereby hindering daily activities and posing risks to the fetus in the womb. In a study conducted by Kabir et al. (2018) involving 36 women with hyperemesis gravidarum, respondents' body mass index (BMI) ranged from 15.2 to 25.3 kg, with an average of 20.8 ± 2.0 kg. The difference in weight before and during pregnancy ranged from 3 to 10 kg, with weight loss ranging from 3 to 8 kg, and an average of 3.9 ± 1.4 kg. In the majority of cases (30 women, or 83.3%), weight loss fell between 5 to 10 percent, while in 5 women (13.9%), it ranged between 10 to 15 percent, and in 1 woman (2.8%), it was between 15 to 20 percent, with an average weight loss of 7.6 ± 2.8 kg. Hyperemesis gravidarum is one of the early complaints experienced during pregnancy. Given the various factors that can contribute to its onset, further research is needed to explore the risk factors associated with hyperemesis gravidarum and their impact on weight measurements in first-trimester pregnant women.

MATERIALS AND METHODS

Design

This study employs quantitative research methods. The design utilized is a cross-sectional case-control descriptive analysis to investigate the relationship between risk factors for morning sickness and weight gain in pregnant women during the first trimester.

Sample and Setting

Data collection was conducted from March 6, 2023, to May 6, 2023. The subjects of this study consisted exclusively of first-trimester pregnant women who received antenatal care at community health centers in Jatinegara, Kramat Jati, and Makassar. Each participant

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was categorized into either a control group or a case group using targeted sampling techniques. The required sample size was 42 respondents who gained or maintained weight during the first trimester of pregnancy and 42 respondents who lost weight during the first trimester of pregnancy, resulting in a total sample size of 84 participants.

Variable

The dependent variable in this study is the body weight during the first trimester of pregnancy in East Jakarta, while the independent variable is the risk factors for hyperemesis gravidarum.

Instruments

Data collection was conducted using a questionnaire. Questionnaire A was prepared by the researcher referring to and modifying the theory outlined in the literature review. It includes variables such as age, occupation, gravida, history of hyperemesis, type of pregnancy, anemia, and body weight.

Data Collection

Data collection was conducted from March 6, 2023, to May 6, 2023. The population for this study consisted of all pregnant women in their first trimester who attended antenatal care visits at the Jatinegara, Kramat Jati, and Makasar District Health Centers. Samples were selected from each community health center and grouped into control and case groups using purposive sampling techniques. The required sample size was 42 respondents who experienced weight gain or remained stable in the first trimester of pregnancy, and 42 respondents who experienced weight loss during the first trimester. The total sample size was 84 respondents.

Data collection utilized questionnaires. Questionnaire A was developed by the researcher by referring to and modifying theories outlined in the literature review, which included variables such as age, occupation, gravidity, history of hyperemesis, type of pregnancy, anemia, and body weight. Questionnaire B, the Perceived Stress Scale (PSS-10), was used to assess stress levels among mothers in the first trimester of pregnancy.

Data Analysis

Univariate analysis in this study described the frequency distribution of research variables, which included age, occupation, gravidity, history of hyperemesis, type of pregnancy, anemia, stress level, and body weight. Bivariate analysis used the chi-square test to determine whether there was a relationship between the independent variable (risk factors for hyperemesis) and the dependent variable (weight measurement results), and multinomial regression was employed to assess the odds ratio (OR) value.

Ethical Consideration

Researchers have carried out an ethical test which took place at Binawan University on December 21 2022 which has been validated by the ethical team with an ethical number 072/PE/FKK-KEPK/XII/2022.

RESULTS

Based on Table 1, it is evident that the majority of respondents fall within the age range of 20-35 years, comprising 63 (75.0%) of the total. Meanwhile, in the at-risk age group, there were 9 (10.7%) respondents aged <20 years and 12 (14.3%) aged >35 years. Regarding employment status, the majority of pregnant women work, accounting for 47 (56%). Primigravida constituted the majority, with 35 (41.7%) respondents. Additionally, the majority had no history of hyperemesis, totaling 43 (51.2%), and all pregnancies were singleton, accounting for 84 (100.0%). Moreover, the majority of pregnant women, 55 (65.5%), were found to have anemia.

Based on Table 2, the results of bivariate analysis using chi-square indicate significant findings for the maternal age variable in the <20 years age group (p-value: 0.037) with an odds ratio (OR) of 9.00, implying a ninefold risk of weight loss. In the 20-35 years age group, no significant relationship was observed (p-value: 0.103) with an OR of 3.19, indicating a threefold risk of weight loss. The variable “work” yielded significant results (p-value: <0.001) with an OR of 7.33, suggesting a sevenfold risk of weight loss for those who work. Regarding the gravida variable, a significant relationship was found in the primigravida group (p-value: 0.038) with an OR of 6.21, indicating a sixfold risk of weight loss. Conversely, no significant relationship was observed in the multigravida group (p-value: 0.651) with an OR of 1.50, suggesting a one-time risk of weight loss. The history of hyperemesis variable exhibited significance (p-value: 0.033) with an OR of 3.80, implying a threefold risk of weight loss for

Table 1. Distribution of Respondent variable, First Trimester of Pregnancy (n=84).

Variable	Category	n	%
Age	<20 years	9	10.7
	20-35 years	63	75.0
	>35 years	12	14.3
Work	No	9	25.7
	Yes	26	74.3
Level of Education	Elementary school	20	57.1
	Junior high school	3	8.6
	Senior high school	11	31.4
Gravida	Primigravida	1	2.9
	Multigravida	6	17.1
	Grande Multigravida	22	62.9
History of Hyperemesis	Yes	43	51.2
	No	41	48.8
Type of Pregnancy	Single	84	100.0
	Double	0	0.0
Anemia	No anemia Hb > 11	29	34.5
	Anemia Hb < 11	55	65.5
Stres Level	Light	63	75.0
	Currently	21	25.0

pregnant women with a history of hyperemesis compared to those without. Furthermore, the anemia variable showed significant results (p-value: 0.004) with an OR of 4.25, indicating a sevenfold risk of weight loss for mothers with anemia during pregnancy compared to those without.

DISCUSSION

The relationship between age and weight measurement results

Based on the results of this research, out of a total of 84 respondents, 8 mothers aged <20 years (19.0%) were found to be in the weight loss category. The statistical test results indicated a ρ-value of 0.024, signifying a relationship between the age of pregnant women in the first trimester and the results of weight measurements. With an OR value of 10.50, pregnant women aged <20 years are at a 10 times higher risk of experiencing weight loss because the OR value is >1. One of the factors influencing the high maternal mortality rate (MMR) is maternal age, particularly the risk of death among those aged less than 20 years. Age is a risk factor associated with the quality of pregnancy and the mother's physical readiness for reproduction. At a relatively young age, individuals may lack experience in acquiring information (Manuaba, 2010). Age is also indicative of a person's psychological and social maturity, which affects their ability to process acquired information and influences their knowledge (Dafiq et al., 2022).

The results of this study are consistent with research by Cha et al. (2018), which reported a percentage of individuals aged <20 years at 15.8%, with a ρ-value of 0.045 and an OR of 4.09. Abdulmalik et al. (2019) found a ρ-value of 0.033 and an OR of 3.80, indicating a threefold risk of weight loss for pregnant women with a history of hyperemesis compared to those without. Furthermore, the anemia variable exhibited significant results (p-value: 0.004) with an OR of 4.25, suggesting a sevenfold risk of weight loss for mothers with anemia during pregnancy compared to those without. Maternal age correlates closely with body weight measurement results. Pregnant women aged <20 years have a higher risk of experiencing weight loss, as evidenced by the 10-fold risk observed in this study. According to established theories, the optimal age for pregnancy falls within the 20-35 years range,

Table 2. Statistical test result of the relationship between risk factors for hyperemesis gravidarum and the body weight measurements in first trimester pregnant women.

Variable	Body weight measurement				p	95% CI	OR
	Increased / fixed		Decrease				
	n	%	n	%			
Age							
<20 years	2	4.8	7	16.7	0.024	1.36 - 81.05	10.50
20-35 years	31	73.8	32	78.6	0.113	0.76 - 12.51	3.09
>35 years	9	21.4	3	7.1			
Work							
Work	14	33.3	33	78.6	< 0.001	2.76 - 19.48	7.33
No Work	28	66.7	9	21.4			
Gravida							
Primigravida	14	33.3	21	50.0	0.038	1.11 - 34.79	6.21
Multigravida	13	31.0	16	38.1	0.651	0.25 - 8.68	1.50
Grande Multigravida	5	11.9	15	35.7			
History of Hyperemesis							
Yes	14	33.3	27	64.3	0.033	1.11 - 12.98	3.80
No	28	66.7	15	35.7			
Anemia							
Anemia hb < 11	21	50.0	34	81.0	0.004	1.59 - 11.31	4.25
No anemia hb >11	21	50.0	8	19.0			
Stress Level							
Light	23	54.8	40	95.2	< 0.001	3.525-77.427	16.52
Currently	19	45.2	2	4.8			

which is considered the ideal reproductive age. Conversely, individuals under 20 years of age are not considered suitable for pregnancy due to incomplete development of reproductive organs, which can lead to various complications. Weight loss during pregnancy in individuals under 20 years of age may stem from inadequate physical, mental, and social maturity, resulting in uncertainties regarding body image, love, care, and child-rearing. Consequently, pregnant women under 20 years of age require close monitoring during pregnancy due to the potential for various complications (Triguno et al., 2021).

Additionally, 32 individuals aged 20-35 years (78.6%) experienced weight loss in this study, with a p-value of 0.113 and an OR of 3.09, suggesting a threefold risk of weight loss for pregnant women in this age group. This risk is attributed, in part, to factors such as gravida. The majority of pregnant women aged 20-35 years were primigravidas, defined as those experiencing pregnancy for the first time (Manuaba, 2010). Weight loss is more common among primigravidas due to their lack of physical readiness for fetal growth and development, as they have not yet experienced childbirth and its associated bodily changes and hormonal fluctuations (Triguno et al., 2021). The risk of weight loss among pregnant women aged 20-25 years further supports the study's findings, highlighting the close relationship between age and weight loss outcomes in pregnant women. While both pregnant women aged <20 years and those aged 20-35 years face a risk of weight loss, the former group exhibits a higher risk. Therefore, all first-trimester pregnant women, regardless of age, should closely monitor their pregnancies, especially in terms of body weight measurements. Expectant mothers can begin by identifying foods that fulfill their nutritional needs and those of the fetus, as inadequate nutrient intake can impact maternal weight during pregnancy.

Relationship Between Work and Body Weight Measurement Results

Based on the results of this research, out of a total of 84 respondents, it was found that 33 working mothers (78.6%) were in the weight loss category. The statistical test results yielded a p-value of < 0.001, indicating a relationship between the employment status of pregnant women in the first trimester and the results of weight measurements. With an OR value of 7.00, working pregnant women have a 7 times higher risk of weight loss because the OR value is >1. According to the theory proposed by Nasution (2020), work encompasses all efforts made to obtain income or wages that can be valued monetarily. It distinguishes between physical activity and movement, noting that activities requiring movement demand more energy than sedentary tasks. Each job necessitates energy, and increased activity levels correspond to greater energy expenditure. Physically demanding work can impact a pregnant woman's well-being during pregnancy.

Engaging in employment typically involves time-consuming activities, leading pregnant women who work to experience more stress than their non-working counterparts. Work-related stress can heighten feelings of anxiety in pregnant women, leading to decreased appetite, physical weakness, and nausea. Heavy workloads can exacerbate psychological stressors, contributing to nausea and vomiting, both of which affect maternal health and fetal development (Anasari, 2019). These findings are corroborated by previous research. For instance, Suliga et al. (2018) reported that 55% of pregnant women were employed, with a ρ-value of 0.004 and an OR of 9.07. A separate study by Aji et al. (2022) found that 69.2% of pregnant women were employed, yielding a ρ-value of 0.004. Zhou et al. (2023) found that 88.9% of employed individuals experienced weight loss, with a ρ-value of 0.005. Similarly, Tingyuang & Yanwei (2019) reported a ρ-value of 0.001, with 63% of employed individuals experiencing weight loss.

Employment status is closely associated with the results of body weight measurements. Pregnant women who work face an increased risk of weight loss, as evidenced by the 7-fold risk observed in this study. Consistent with the aforementioned theory, all types of work require energy, with greater physical activity demanding higher energy expenditure. Moreover, heavy workloads can adversely affect maternal well-being during pregnancy. Pregnant women who work must take extra precautions to safeguard their health and prevent potential complications during pregnancy.

Relationship Between Gravida and Body Weight Measurement Results

Based on the results of this research, out of a total of 84 respondents, it was found that 21 (50.0%) primigravida mothers were in the weight loss category. The statistical test results showed that the ρ-value was 0.038, indicating a relationship between the gravida of pregnant women in the first trimester and the results of weight measurements. With an OR value of 6.21, primigravida mothers have a 6 times higher risk of weight loss because the OR value is >1. Weight loss is more often experienced by primigravidas than multigravidas, which is related to the level of stress and the age of the mother during her first pregnancy. Primigravidas lack physical readiness to accommodate the growth and development of the fetus in the womb. In other words, they lack experience in childbirth, making it difficult to adapt to the changes that occur during pregnancy, including changes in organs and hormones.

Another theory suggests that primigravida mothers have difficulty adapting to the hormonal changes, particularly the increase in estrogen and human chorionic gonadotropin (hCG). These hormonal fluctuations can lead to increased stomach acid levels, resulting in nausea, especially on an empty stomach in the morning when acid levels are higher and blood sugar levels are lower. This can cause dizziness, weakness, and nausea. These findings are supported by previous research. For example, a study by Waleetorncheepsawat et al. (2022) reported that 50.1% of pregnant women were primigravida, with a ρ-value of 0.049 and an OR of 3.32. Similarly, Abdulmalik et al. (2019) found that 61.8% of primigravida mothers experienced weight loss, with a p-value of 0.001 and an OR of 2.52. In another study by Choi et al. (2022), 64.4% of primigravida mothers experienced weight loss, with a ρ-value of 0.001. However, Meinich & Trovik (2020) found that 39.7% of primigravida pregnant women experienced weight loss, with a p-value of 0.720, which did not support the research.

There is a relationship between primigravida status and the results of body

weight measurements. Primigravid pregnant women have a risk of weight loss, and in this study, the risk was 6 times higher. Consistent with the theory, weight loss is more frequently experienced by primigravidas. Furthermore, primigravidas' lack of physical readiness for pregnancy contributes to this risk. Weight loss in primigravida mothers can be minimized through regular prenatal care and ensuring a nutritious diet that meets both maternal and fetal needs. In this study, it was also found that 16 (38.1%) multigravida mothers experienced weight loss, with a p-value of 0.65 and an OR value of 1.50, indicating a risk of experiencing weight loss once. The p-value results obtained were not as significant as those in the primigravida mother category, likely due to the majority of respondents being primigravida.

Multigravida mothers, defined as those who have been pregnant more than once, experience weight loss due to various factors, including stress. A study by Fatin et al. (2023) found that 58.3% of multigravida mothers experienced stress during pregnancy, while Thongsomboon et al. (2020) reported that 72.2% of multigravida mothers experienced stress during pregnancy. Stress in multigravida mothers is often attributed to increased demands and responsibilities, such as caring for multiple children and meeting additional needs. Furthermore, a history of previous pregnancies, particularly if hyperemesis gravidarum was experienced, can contribute to weight loss in multigravida mothers. Found that 76.6% of multigravida mothers experienced hyperemesis gravidarum, while Ernawati (2018) reported that 15.6% of multigravida mothers experienced hyperemesis gravidarum. Hyperemesis gravidarum tends to recur in subsequent pregnancies, leading to weight loss due to inadequate nutrient absorption by both the mother and fetus. Therefore, despite having previous pregnancy experience, multigravida mothers still face the risk of weight loss and require close monitoring during pregnancy.

Relationship Between History of Hyperemesis and Results of Body Weight Measurements

Based on the results of this study, out of a total of 84 respondents, 27 pregnant women (64.3%) were found to have a history of hyperemesis in the weight loss category. The statistical test results showed that the ρ-value was 0.033, indicating a relationship between the history of hyperemesis in pregnant women in the first trimester and the results of body weight measurements. With an OR value of 3.8, pregnant women with a history of hyperemesis have 3 times the risk of experiencing weight loss because the OR value is >1. This aligns with the theory proposed, which states that hyperemesis gravidarum tends to recur in subsequent pregnancies due to genetic factors predisposing individuals to the condition (Fiaschi et al., 2018). Additionally, women who have been hospitalized due to hyperemesis in a previous pregnancy are at increased risk.

According to another theory, hyperemesis can lead to weight loss because of inadequate absorption of nutrients by the mother and fetus. Furthermore, it can cause dehydration, which, if not properly treated, can endanger the lives of both the mother and baby. Apart from the physiological impact, hyperemesis gravidarum also has psychological, social, and spiritual effects. It not only threatens the woman's life but can also result in adverse effects on the fetus, such as abortion, low birth weight, premature birth, and newborn malformations. These findings are supported by research. For example, Adane et al. (2023) found that 37.0% of respondents had a history of hyperemesis, with a p-value of 0.001 and an OR of 10.2. Similarly, Kjeldgaard et al. (2018) reported that 28.9% of pregnant women had a history of hyperemesis, with a p-value of 0.001 and an OR of 1.49. In another study, Meinich & Trovik (2020) found that 52.5% of pregnant women with a history of hyperemesis experienced weight loss, with a p-value of 0.042. Based on the research results, theory, and related studies, it can be concluded that pregnant women with a history of hyperemesis are associated with the results of weight measurements. They are at risk of experiencing weight loss, and in this study, the risk was 3 times higher. This is consistent with the theory suggesting that hyperemesis gravidarum tends to recur in subsequent pregnancies and that it can lead to weight loss due to nutrient malabsorption by the mother and fetus.

Relationship Between Anemia and Body Weight Measurement Results

Based on the results of this research, out of a total of 84 respondents, it was found that the majority of mothers experienced anemia, with 34 (81.0%) falling into the weight loss category.

The statistical test results showed that the ρ-value was 0.004, indicating a relationship between anemia in pregnant women in the first trimester and the results of body weight measurements. With an OR value of 4.2, pregnant women with anemia have a 4 times higher risk of experiencing weight loss because the OR value is >1. One of the changes that occur in pregnant women is changes in the mother's blood circulation, including changes in blood cells. The number of red blood cells increases to balance the growth of the fetus in the womb, but the growth of red blood cells is not balanced with the increase in blood volume, resulting in hemodilution accompanied by physiological anemia. Anemia is a disease characterized by Hb levels in the blood that are less than normal (Manuaba, 2010).

Anemia during pregnancy will have adverse effects on the mother and fetus. The effects that can be caused to the mother include premature labor, prolonged labor due to uterine inertia, post-partum bleeding, shock, and infection both intra-partum and post-partum, while on the fetus, the effects that can arise include perinatal death, prematurity, and congenital defects. This influence has the potential to cause morbidity and mortality in the mother and fetus. The results of this study are supported by previous studies, which found that 20 (20%) pregnant women had anemia. The statistical test results showed a ρ-value of 0.008 with an OR of 9.92 (Waleetorncheepsawat et al., 2022). Other research found that the percentage of respondents who experienced anemia followed by weight loss was 78 people (36.4%) with a ρ-value of 0.015 and OR of 1.50 (Fejzo et al., 2019). Research conducted by Tan et al. (2018) found that 51 respondents with anemia (2.51) obtained a p-value of 0.005.

Anemia is related to the results of body weight measurements, where pregnant women who experience anemia are at risk of losing weight, and in this study, the risk was 4 times higher. Tan et al. (2018) stated that pregnant women are very susceptible to anemia because during pregnancy, the need for oxygen is higher, which triggers an increase in erythropoietin production. Additionally, to minimize the occurrence of weight loss in first-trimester pregnant women with anemia, it is necessary to monitor the nutrition of pregnant women because anemia in pregnant women is related to their nutritional status. Moreover, regularly consuming vitamin B6 can stimulate the formation of hemoglobin.

CONCLUSION

Based on the results of the data analysis and processing conducted, several key conclusions can be drawn. Firstly, maternal age exhibits a significant association with weight measurement outcomes, particularly evident in the <20 years age group with an odds ratio (OR) of 9.00. However, this association is not significant in the 20-35 years age group, where the OR is 3.19. Secondly, occupation demonstrates a notable relationship with body weight measurements, showing an OR of 7.33. Thirdly, gravida significantly correlates with body weight measurements, particularly in the primigravida group with an OR of 6.21, whereas no significant relationship is observed in the multigravida group with an OR of 1.50. Furthermore, a history of hyperemesis exhibits a significant association with body weight measurements, as indicated by an OR of 3.8. Lastly, anemia shows a significant relationship with body weight measurement outcomes, with an OR of 4.25. These findings underscore the importance of considering various factors, such as maternal age, occupation, gravida, history of hyperemesis, and anemia, in assessing weight measurement outcomes among pregnant women during the first trimester.

Declaration of Interest

The author declares that there is no conflict of interest.

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Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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