



Original Article

Supplementation with sweet corn for weight gain in pregnant women

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ABSTRACT

Background: Inadequate nutrient intake during pregnancy can cause insufficient weight gain, chronic energy shortage, and difficulties for both the mother and the baby. This study highlights the benefits of sweet corn supplementation in improving weight gain and nutritional condition for pregnant women, addressing nutrient deficiencies and chronic energy shortages.

Purpose: This study aims to determine the effect of sweet corn supplementation on increasing body weight in pregnant women.

Method: The study employed a pre-experimental one-group pre-test-posttest design. Conducted in August 2024 at Posyandu in Jatikalang Village, it involved 18 pregnant women in their second and third trimesters who had not gained weight, with 15 selected purposively. Data analysis included a T-test statistical approach and the Subjective, Objective, Assessment, and Plan (SOAP) method for each participant.

Results: The results showed that the average weight of pregnant women before the intervention was 63.87 kg; the average weight increased to 67.33 kg after the intervention ($p < 0.05$). SOAP analysis found that after eating sweet corn, 67% of pregnant women obtained balanced nutrition, 60% gained weight, and the number of pregnant women with chronic energy deficit (CED) decreased from two to one (7%). In addition, 73% of pregnant women had a favorable opinion.

Conclusion: The study suggests that sweet corn supplementation improves pregnant women's weight gain and overall nutritional condition.

INTRODUCTION

Nutritional deficiencies during pregnancy raise the risk of long-term energy insufficiency due to insufficient consumption of critical macro and micronutrients.^{1,2} Chronic energy insufficiency can lead to serious complications for pregnant women.³ In 2022, the prevalence of chronic energy insufficiency among pregnant women in Indonesia was 8.7%, meeting the objective of 14.5%.⁴ According to the World Health Organization, Indonesia continues to suffer a moderate health hazard in this sector, with a prevalence rate ranging from 5% to 9.9%. In East Java, the prevalence was 9.2%.⁵ A variety of factors contribute to chronic energy shortage, including nutritional intake, age, activity levels, illnesses, knowledge, dietary habits, and socioeconomic position.⁶

Age, parity and interpregnancy intervals are all important factors in determining the occurrence of chronic energy deficit in pregnant women.⁷ It is customary for a woman to

gain 11–16 kg during pregnancy; in the first trimester, this weight gain is around 0.05 kg, and in the second and third trimesters, it is around 0.5 kg per week.⁸ Given that the pregnant woman's increased energy needs must be satisfied to avoid a chronic energy shortfall; this weight gain is essential in assessing her nutritional status.⁹ Pregnant women require an extra 300 calories per day in the first trimester, 340 calories in the second, and 452 calories in the third.⁴ During pregnancy, the need for minerals and micronutrients. However, those with chronic energy insufficiency must intake an extra 500 kcal and 25% more protein to meet their demands.¹

Supplementing the food of pregnant women who are not gaining weight aims to help them gain weight and avoid chronic energy shortage.¹⁰ Sweet corn is a great energy source, combining carbs, protein, and fat, while also offering antioxidants and carotenoids like zeaxanthin and lutein. It has 96 calories, 73% water, 21 carbs, 4.5 grams of sugar, 2.4% fiber, and 1.5 grams of fat. Additionally, it includes easily digestible starch, crude fiber, and pentose.¹¹ While numerous studies have looked into the effects of

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various dietary supplements on pregnant women's health, there is a significant void in research that focuses especially on sweet corn supplements.¹² Previous research has focused mostly on the impact of different nutritional supplements and dietary treatments on mother and fetal health.^{13,14} This study seeks to address this gap by looking into the specific effects of sweet corn supplementation on pregnant women's weight growth and overall nutritional status. The study's unique focus on sweet corn, combined with the use of the Subjective, Objective, Assessment, and Plan (SOAP) technique for prenatal care, sets it apart from past research, providing new insights into sweet corn's potential as a nutritional intervention for pregnant women. This study aims to assess the effect of sweet corn supplements on pregnant women's weight growth.

METHOD

Study Design

This study used two approaches: a pre-experimental one-group pretest-posttest design.

Setting and Respondents

The study, which took place in August 2024 in Posyandu in Jatikalang Village, Prambon District, Sidoarjo, aimed to identify all pregnant women in their second and third trimesters who had not gained weight, with a total of 18 participants. A sample of 15 pregnant women was chosen based on inclusion criteria such as being in the second or third trimester, having no weight gain, and agreeing to participate in the study. Exclusion criteria included being in the first trimester, gaining weight, and declining to participate. Samples were selected using purposive sampling.

Experimental Procedures

Participants received 200 grams of freshly boiled sweet corn daily for 14 consecutive days. The sweet corn was prepared in a standardized manner and distributed daily to ensure freshness and adherence to the protocol. Participants were instructed to consume the sweet corn as a mid-morning snack or incorporate it into their daily meals. Consumption was monitored through a daily food diary and verbal confirmation during follow-up visits.

Variables, Instruments, and Measurements

The variables in this study were weight gain. The instruments included an observation checklist (using yes and no weight measurements every week for 14 days), a weight scale, an upper arm circumference measuring tape, and a SOAP method format for documenting participant feedback, weight measurements, and adherence data.

Data Analysis

Body weight data before and after the intervention were analyzed using paired t-tests to evaluate the statistical significance of weight changes among participants.

Ethical Consideration

The study was ethically approved under the number 117/KET/II.3.UMG/KEP/A/2024.

RESULTS

Table 1 shows that most respondents were aged 20–35 (73.3%), with 6.7% aged ≤ 20 years and 20% aged ≥ 35 years. Most had 1–2 children (80%), while 20% had more than 2 children. Regarding education, 60% graduated from high school, 33.3% graduated from junior high school, and 6.7% had university education.

Table 2 presents the results of the weight change analysis before and after the intervention. The mean body weight prior to the intervention was 63.87 ± 5.718 kg, while the mean body weight after the intervention increased to 67.33 ± 8.059 kg. The mean difference in body weight was 3.467 ± 4.984 kg, reflecting an average weight gain among participants. A paired t-test was conducted, yielding a test statistic of $t = 2.694$ and a p-value of 0.017. These findings indicate that the observed weight gain was statistically significant at the 0.05 significance level.

The results from Table 3 highlight significant improvements across various domains following the supplementation with boiled sweet corn. Subjective data revealed a marked increase in the proportion of participants with balanced nutrition, rising from 27% before the intervention to 67% after.

Table 1. Characteristics of Respondents (n = 15)

Characteristics	Result
Age	
≤ 20 years	1(6.7%)
20-35 years	11(73.3%)
≥ 35 years	3(20%)
Number of Children	
1-2 children	12(80%)
≥ 2 children	3(20%)
Education	
Junior High	5(33.3%)
Senior High	9(60%)
University	1(6.7%)

Table 2. Difference in Body Weight Before and After Intervention

Weight	Mean \pm SD	Mean diff	t	p-value
Before	63.87 ± 5.718	3.467 ± 4.984	2.694	0.017
After	67.33 ± 8.059			

Table 3. Analysis of Pregnancy Care Results Using the SOAP Method

SOAP Method	Result	
	Before	After
Subjective Data		
Balanced Nutrition	4 (27%)	10(67%)
Unbalanced Nutrition	11(73%)	5(33%)
Objective Data		
Weight Gain	0(0%)	9(60%)
No Weight Gain	15(100%)	6(40%)
Data Analysis		
Pregnant Women without CED	13(87%)	14(93%)
Pregnant Women with CED	2(13%)	1(7%)
Management		
Positive Attitude	3(20%)	11(73%)
Negative Attitude	12(80%)	4(27%)

Similarly, the prevalence of unbalanced nutrition decreased from 73% to 33%. Objective data demonstrated that 60% of participants experienced weight gain post-intervention, compared to 0% at baseline. Additionally, the prevalence of Chronic Energy Deficiency (CED) decreased from 13% to 7%, suggesting a positive impact on maternal nutritional status. Management outcomes showed a substantial improvement in participants' attitudes, with those exhibiting a positive attitude increasing from 20% pre-intervention to 73% post-intervention. Negative attitudes correspondingly declined from 80% to 27%.

DISCUSSION

The study found that specific characteristics of pregnant women can significantly influence their nutritional status through weight gain. For instance, young mothers (≤ 20 years) and older mothers (≥ 35 years) are at risk of chronic energy deficiency, which may lead to complications during pregnancy, childbirth, and the postpartum period, endangering both mother and baby.¹⁵ Having more than three children is also considered high-risk, as it can result in an energy imbalance due to insufficient nutritional intake, affecting weight gain and upper arm circumference.¹⁶ Additionally, a pregnant woman's education level impacts her knowledge of balanced nutrition, which is crucial in improving nutritional status and preventing complications during pregnancy.¹⁷

The results of this study show that sweet corn supplementation considerably boosts weight gain ($p < 0.05$). The study found that pregnant women's average weight before taking sweet corn was 63.87 kg, which climbed to 67.33 kg following sweet corn supplementation. Previous research has demonstrated that corn-based foods can be processed in a variety of ways, including corn milk drinks, which are beneficial for enhancing nutrition and encouraging infant development.¹⁸ Corn's nutritional makeup includes carbs, protein, fat, fiber, vitamins, minerals, and other substances. 100 grams of boiled sweet corn has 355% calories, 73.7 grams of carbohydrates, 12 grams of water, 9.2 grams of protein, 3.9 grams of fat, 10 grams of calcium, 256 grams of phosphorus, 2.4 grams of iron, 510 S1 of vitamin A, 0.38 mg of vitamin B, 12% folic acid, and 12 grams of water.¹⁹

Sweet corn benefits include carotenoids like lutein and zeaxanthin, which assist the body combat free radicals. It contains vitamin C, a potent antioxidant. Corn's insoluble fiber aids digestion, relieving constipation and lowering the risk of heart disease, stroke, type 2 diabetes, and colon cancer. Vitamin B1, commonly known as thiamine, promotes the creation of acetylcholine, which is required for proper memory function. Pregnant women require an additional 300 calories for fetal growth and development, which is comparable to 1-2 servings of snacks. Pregnant women with chronic energy shortage should consume two biscuits per day as a nutritional supplement during the first trimester, and three biscuits per day during the second and third trimesters.²⁰

Helping pregnant women improve their nutritional status is an important step in preventing chronic energy shortage

and related problems throughout pregnancy.²¹ Pregnant women's nutritional health can be considerably improved if they understand their dietary patterns and consume a balanced diet.²² Weight increase during pregnancy is used to determine nutritional status, with a minimum gain of 9.5 kg during the pregnancy and typically 0.5 kg per week throughout the second and third trimesters.⁸ Continuous monitoring of pregnant women's weight growth is recommended, ideally on a weekly basis, using body mass index (BMI) and upper arm circumference (UAC) measures. A UAC of ≤ 23.5 cm suggests chronic energy shortage in pregnant women.²³

Corn is ground into flour for use in cakes and biscuits, which serve to improve the immune system. A hundred grams of maize flour has 455.42 calories, 20.84% fat, 62.33% carbs, 2.52% ash, and 5% water.²⁴ When a blend of maize flour and snakehead fish flour was used as supplementary food for stunted toddlers, the average quantities of carbohydrates, protein, fat, moisture, and energy were higher than in processed cookies.²⁵ Sweet corn, when used in ready-to-eat local cereals, is a convenient breakfast option that meets nutritional demands while also improving nutrition, immunity, and productivity. Consuming sweet corn can lower the risk of obesity and diabetes.²⁶ Corn, a traditional food in Indonesia, has a lot of carbohydrates and fiber and has a lower glycemic index than rice. It contains minerals that are necessary for the development of red blood cells, including potassium (K), calcium (Ca), iron (Fe), zinc (Zn), magnesium (Mg), and copper (Cu).²⁷

This study demonstrates that sweet corn supplementation is an excellent way for pregnant women to gain weight and improve their nutritional status. Consuming 200 grams of sweet corn per day for 14 days was intended to help pregnant women gain weight. The findings of this study show that the average weight before consuming sweet corn was 63.87 kg, which climbed to 67.33 kg after consumption. This is an average weight gain of 346 grams over 14 days.

The SOAP technique was used to analyze pregnancy care and found that, subjectively, the majority of pregnant women (73%, or 11 persons) reported unbalanced nutritional intake prior to getting sweet corn supplements. Following the supplementation, 67% (or ten people) ate a balanced diet. This study found that pregnant women who received sweet corn supplementation had a higher level of balanced nutritional intake because they were more aware of the necessity of balanced nutrition and the health advantages of sweet corn supplementation. Other researches support this finding, indicating that a considerable number of pregnant women with chronic energy shortage suffer from inadequate nutritional intake.²⁸

The SOAP method of pregnancy care entails evaluating pregnant women's complaints about their dietary intake and determining their nutritional requirements. Inadequate diet can cause chronic energy shortage during pregnancy, leading in problems.²⁹ Objective data revealed that none of the pregnant ladies gained weight before eating sweet corn (100%). After consuming sweet corn, 60% (9 people) gained weight. This study found that eating sweet corn contributes to weight gain. Dietary patterns are critical in efforts to gain weight and reduce the risk of chronic energy

shortage. Prior to ingesting sweet corn, 13% (2 people) of pregnant women experienced chronic energy shortage, which dropped to 7% (1 individual) following supplementation.³⁰

These data indicate that sweet corn eating may minimize the incidence of chronic energy deficit in pregnant women. Supplemental meals, according to prior study, can improve weight gain in pregnant women with chronic energy insufficiency. Before getting sweet corn supplements, 80% (12 people) of pregnant women had negative sentiments, whereas 73% (11 people) had positive attitudes afterward.³¹ This study shows an increase in positive views toward balanced eating, emphasizing the role of sweet corn supplements in preventing chronic energy shortage during pregnancy.³²

CONCLUSIONS AND RECOMMENDATION

Supplementing with sweet corn greatly improves the weight gain and nutritional condition of expectant mothers, resulting in more balanced meals, a decrease in chronic energy deficiencies, and better attitudes toward eating. This demonstrates how integrating sweet corn into prenatal care can be a successful way to enhance maternal health, especially for women who consume inadequate amounts of nutrients. Such dietary treatments can help practitioners achieve improved health results. In order to offer a thorough understanding of the advantages of sweet corn supplementation, future researchers should look into its applicability across a range of people, nutritional circumstances, and interactions with other dietary components. The theoretical framework and real-world applications in maternal nutrition may also benefit from a closer look at the underlying mechanisms and sociocultural elements affecting its efficacy.

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