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Email : editorijhess@gmail.com

The Effectiveness Of Soy Milk Extension On The Influence And Protein Consumption For Pregnant Women 4t

Megawati[1], Eka Agustina[2], Jennifer Angely Dwytomi Putri[3], Khoirunnisa[4]
[1234]Program Studi Kebidanan, Institut Citra Internasional

*Corresponding Author
Email : ekaagustina29082004@gmail.com

Abstract

Stunting is a chronic nutritional problem that may begin during pregnancy and is strongly influenced by maternal nutritional status, particularly adequate protein intake. Pregnant women with 4T risk factors (too young, too old, short birth spacing, and high parity) are more vulnerable to nutritional problems that can affect fetal growth. This community service activity aims to improve the knowledge and skills of high-risk pregnant women in fulfilling protein intake through nutrition education and training on soy milk (PUSUI) preparation as an alternative source of plant-based protein. A quasi-experimental design without a control group was applied using a participatory educational approach. The activity was conducted in Tanjung Gunung Village, Central Bangka Regency, involving 25 pregnant women with 4T risk factors. The intervention consisted of interactive educational sessions, discussions, and hands-on demonstrations and practice in soy milk preparation. Evaluation was carried out descriptively through observation and post-test assessments to measure participants' understanding. The results showed an improvement in participants' knowledge regarding the role of protein during pregnancy and their ability to independently prepare soy milk. In addition, participants demonstrated good acceptance of soy milk as an alternative protein source. In conclusion, this community service program is effective and feasible as a supportive strategy to increase protein intake among high-risk pregnant women and contribute to stunting prevention from the prenatal period.

Keywords: Stunting, High-Risk Pregnancy, Protein Intake, Soy Milk, Nutrition Education.

INTRODUCTION

Stunting is a public health problem caused by chronic malnutrition, particularly in children under five. This condition is defined as a child's height or length falling below -2 standard deviations (<-2 SD) according to WHO growth standards. Stunting can have short- and long-term impacts, such as decreased academic performance, increased risk of infection, and increased risk of chronic diseases in adulthood.(Health, 2025).

Stunting remains a global health problem, with Southeast Asia recording the highest proportion of stunting among the six WHO intervention zones, at around 30.1%. Indonesia has a relatively high stunting rate in the region, although it has shown a downward trend, from 24.4% in 2021 to 21.6% in 2022.(Laksono et al., 2024)Globally, the prevalence of child stunting is estimated to decline from 26.4% in 2012 to 23.2% in 2024, but this achievement is still far from the target of a 40% reduction originally set for 2025, so the WHO and its member countries decided to extend the target to 2030.(Assembly & States, 2025). In Indonesia, the prevalence of stunting in 2022 was still above the threshold of public health problems according to WHO (20%), relatively stagnant at 21.5% in 2023 based on the Indonesian Health Survey (SKI), and only showed a decline in 2024 to 19.8% according to SSGI, although this figure still has not fully reached the 2025 national target of 18.8% (Ministry of Health, 2025).

The incidence of stunting in the Bangka Belitung Islands Province has shown a downward trend in the last three years, where in 2021 the prevalence of stunting in children aged 0–59 months was 19.1%, decreased to 18.4% in 2022, and decreased again significantly in 2023 to 3.51%, with the distribution of cases in 2023 covering Bangka Regency with 311 children (1.27%), Belitung Regency with 684 children (6.26%), West Bangka Regency with 1,173 children (8.95%), Central Bangka Regency with 328 children (2.82%), South Bangka Regency with 448 children (3.37%), East Belitung Regency with 386 children (4.7%), and Pangkalpinang City with 134 children (0.79). Based on age groups, in 2022 the highest prevalence of stunting was found in children aged 24–35 months at 26.2%,

followed by those aged 36–47 months at 22.5% and those aged 12–23 months at 22.4%, while the age group 0–5 months had the lowest proportion at 11.7%, and in 2023 a relatively similar pattern was still seen with the highest prevalence in the age group 24–35 months at 25.8%, followed by those aged 36–47 months at 23.6% and those aged 12–23 months at 22.7%. In the working area of Benteng Health Center, Central Bangka Regency, the number of children aged 0–59 months who experienced stunting in 2021 was recorded at 60 children (8.67%) and decreased in 2022 to 52 children (4.92%), however, Tanjung Gunung Village as the area with the highest cases showed fluctuations, where in 2021 there were 34 stunted children (13.55%), decreased in 2022 to 30 children (9.77%), and increased again in 2023 to 30 children (10.71%).

Stunting prevention efforts are inseparable from fulfilling nutritional needs during pregnancy and breastfeeding. Pregnant women are encouraged to consume a balanced, nutritious diet that meets the needs of energy, high-biological protein, vitamins, minerals, and fluids to ensure optimal pregnancy and the birth of a baby with good physical and mental growth and development potential. Similarly, during breastfeeding, mothers need to meet their nutritional needs to maintain good health and be able to provide optimal breastfeeding, as maternal malnutrition can affect the nutrient composition of breast milk. Exclusive breastfeeding for six months is an important strategy in preventing stunting early on. Although the prevalence of stunting has decreased and is below the national target of 14% by 2024, efforts to reduce it still need to be intensified.(Astuti, 2023).

The Indonesian government set food and nutrition development targets through the 2010–2014 National Medium-Term Development Plan (RPJMN) and the 2011–2015 National Action Plan (RAN-PG), with a focus on reducing the prevalence of malnutrition, particularly stunting in children. Various programs have been implemented, one of which is the provision of supplementary feeding (PMT) for toddlers aged 6–59 months and pregnant women in accordance with Indonesian Minister of Health Regulation No. 51 of 2016. The PMT program aims to meet nutritional needs to improve children's nutritional status and prevent stunting from pregnancy by fulfilling the nutritional needs of pregnant women.(Pada et al., 2024).

Stunting in toddlers is a condition that can begin during pregnancy and is greatly influenced by the health and nutritional status of the pregnant woman. Insufficient energy and protein intake during pregnancy can lead to impaired fetal growth in the womb, which increases the risk of low birth weight (LBW). This condition is often associated with chronic energy deficiency (CED) and anemia in pregnant women, which are characterized by, among other things, a lower mid-upper arm circumference (MUAC) than the standard.(Fadlilah et al., 2022).

In addition to nutritional factors, mothers' low nutritional knowledge, non-compliance with iron supplementation, and limited utilization of antenatal care services also increase the risk of stunting. A history of maternal infectious diseases during pregnancy also plays a role in stunting fetal growth. This combination of factors leads to growth failure during pregnancy, which can persist into toddlerhood and lead to stunting.

Stunting has both short- and long-term impacts on children's growth and development, so preventative measures are needed to ensure adequate protein intake. One alternative source of plant-based protein is soy milk, made from soybeans and containing approximately 3.5 g of protein per 100 g, relatively equivalent to cow's milk, and is lactose-free. This adequate protein content makes soy milk potentially beneficial for supporting child growth as part of stunting prevention efforts.(Desvitasari et al., nd).

Based on the still low understanding and practice of fulfilling protein intake among pregnant women with 4T who are at risk of nutritional problems and stunting, therefore this study aims to increase the knowledge of pregnant women with 4T regarding the importance of protein for maternal health and fetal growth. In addition, this study aims to equip pregnant women with 4T with practical skills in making soy milk (PUSUI) as an alternative source of vegetable protein that is easily accessible and economical. This study also aims to measure changes in protein consumption behavior, both in

terms of frequency and quantity, after the implementation of the training, as well as assess the level of acceptability and feasibility.

RESEARCH METHODS

This community service activity was implemented using a quasi-experimental design without a control group, utilizing a participatory educational approach. The intervention was delivered through interactive outreach and two-way discussions between facilitators and participants to enhance understanding of the target group. This activity took place in Tanjung Gunung Village, Pangkalan Baru District, Central Bangka Regency, which is one of the stunting hotspots according to BNBA data from February 2025.

The program was supported by the use of various educational media, including leaflets, banners, LCD projectors, projection screens, microphones, and speakers to support clear and easy-to-understand delivery. Furthermore, the program utilized practical materials such as stoves, pans, sieves, matches, soybeans, and water to demonstrate nutritious food processing. Village midwives and integrated health post (Posyandu) cadres acted as implementing partners to support the program's smooth and successful implementation.

The population of this activity was all pregnant women within the working area of the Tanjung Gunung Village Integrated Health Post (Posyandu), with a sample size of 25 pregnant women determined using a total sampling technique. The target group was pregnant women with the 4T risks: too young, too old, too closely spaced pregnancies, and too many births. Data collection was conducted through observation and filling out a simple instrument before and after the counseling session to assess changes in participants' understanding. The data obtained were analyzed descriptively and presented in narrative and tabular form to provide a systematic overview of the results of the activity implementation.

RESULTS AND DISCUSSION

The results of this community service program illustrate the characteristics of the participants, who were pregnant women meeting the 4T criteria in the target area. Most participants were at-risk, had relatively short pregnancies, and had limited educational and socioeconomic backgrounds. These conditions resulted in limited access to information and understanding regarding balanced nutrition during pregnancy, particularly regarding the importance of protein intake as a macronutrient that plays a role in fetal growth and development. Prior to the intervention, based on initial discussions and observations during the program, most participants lacked an adequate understanding of readily available and affordable alternative protein sources.

Nutrition education was delivered through PowerPoint presentations, followed by an interactive question-and-answer session. Evaluation of the educational outcomes was conducted through a post-test administered after the completion of all activities. The post-test results indicated that most pregnant women had good knowledge of the role of protein during pregnancy. Participants were able to explain the function of protein in supporting fetal tissue formation, maintaining maternal health, and its role in preventing nutritional problems, including stunting. Furthermore, pregnant women were able to identify soy milk (PUSUI) as an alternative source of plant-based protein that can be consumed during pregnancy.

The results of the community service also showed that the soy milk production training was well-received by the participants. Based on observations during the activity, pregnant women were able to understand the stages of soy milk production, from selecting raw materials and processing them to preparing them safely for consumption. The participants' ability to practice making soy milk demonstrated that the practice-based learning approach provided hands-on experience, making it easier for participants to understand the material. The use of soybeans as a local food ingredient is

considered relevant because it is readily available in the surrounding environment and has a high vegetable protein content, making it a potential alternative for fulfilling protein needs for pregnant women with 4T needs.

In terms of behavioral change, post-test results and observations during the program indicated an increase in pregnant women's interest in consuming soy milk as part of their daily diet. Most participants expressed a willingness to try and consume soy milk regularly at home. Factors supporting this acceptance included acceptable taste, a simple preparation process, and relatively affordable cost compared to certain animal protein sources. These findings suggest that interventions based on practical skills and local foods can increase pregnant women's readiness to adopt better nutritional behaviors.

The level of acceptability of soy milk (PUSUI) was quite good, as indicated by the positive responses of participants during the discussion and practical sessions. Participants considered soy milk easy to consume and had the potential to be an alternative beverage during pregnancy. From a feasibility perspective, this intervention was deemed feasible for pregnant women to implement independently at home without requiring special equipment or high costs. However, the community service results also identified several obstacles, such as limited time and consistency of consumption, which could potentially impact the sustainability of behavior change. Therefore, continued support and guidance from health workers is needed to ensure the sustainable implementation of soy milk consumption.

The discussion of the results of this community service demonstrates that nutrition education combined with training in making soy milk is an effective approach in improving the understanding and skills of pregnant women regarding the 4T (four-point five) regarding protein intake during pregnancy. These results align with various other community service activities that emphasize the importance of nutritional interventions during pregnancy through the utilization of local food sources as an effort to prevent nutritional problems and stunting. Although the evaluation in this service was only conducted through a post-test without pre-intervention measurements, the results obtained indicate that the education and training activities have a positive impact on the knowledge, attitudes, and behavioral readiness of pregnant women.

Overall, this community service demonstrated that the nutrition education and soy milk production training (PUSUI) program was well-received and feasible for implementation among the 4T pregnant women group. This intervention has the potential to be a supporting strategy for increasing protein intake and preventing stunting during pregnancy. Developing similar activities with a more robust evaluation design and ongoing support is expected to yield more optimal long-term impact.

Figure 1. Explanation of the Material

Figure 2.Making Soy Milk

1. **Figure 3.**Documentation

CONCLUSION

Community service activities conducted through nutrition education and training on making soy milk (PUSUI) for pregnant women in the 4T category have shown positive results. These activities have increased pregnant women's understanding of the importance of protein intake during pregnancy and introduced soy milk as an easily accessible and affordable alternative source of plant-based protein. In addition to increasing knowledge, pregnant women have also demonstrated the ability to independently make soy milk and have demonstrated positive acceptance of the product.

The results of this community service demonstrate that an educational approach combined with practical skills based on local foods has the potential to promote readiness for nutritional behavior change in at-risk pregnant women. Although the evaluation was conducted descriptively through a post-test without pre-intervention measurements, this activity suggests that the soy milk production education and training program (PUSUI) is feasible as a support for protein intake and the prevention of nutritional problems, including stunting, from pregnancy onward.

Based on the results of the community service, it is recommended that nutrition education and training activities on soy milk production (PUSUI) be implemented sustainably, involving local health workers and cadres to improve consistency of implementation at the household level. Furthermore, future similar activities are recommended to use a pre-test and post-test evaluation design to more comprehensively measure the effectiveness of the intervention.

For health agencies and relevant stakeholders, the program utilizing soy milk as an alternative source of vegetable protein can be a supporting strategy for improving the nutrition of pregnant women

with 4T needs. Developing more varied educational materials and ongoing support is expected to strengthen the program's impact and support optimal stunting prevention efforts.

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