

ORIGINAL ARTICLE

Multiple Micronutrients Supplementation Among Premarital Women in Surabaya, Indonesia

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ABSTRACT

Introduction: Stunting as a global problem caused by poor maternal nutrition before and during. UNICEF recommends multiple micronutrient supplementation (MMS) to mitigate the risks of low birth weight (LBW) and stunting. **Objective:** This study aims to assess MMS consumption patterns among brides-to-be in Surabaya as a preventive measure against stunting. **Materials and methods:** An analytical observational study was conducted with a cross-sectional design involving 585 brides-to-be. Statistical analysis of the relationships between variables was performed using chi-square tests. The observed variables were anthropometry, knowledge, family support and MMS consumption. **Results:** Among the 585 respondents, 83.6% exhibited normal mid-upper arm circumference (MUAC), while 16.4% were at risk of chronic energy deficiency (CED). Additionally, 55.6% had a normal body mass index (BMI), and the majority (55.6%) had attained secondary education. Nutritional knowledge was predominantly low, with only 28.2% of participants demonstrating good understanding. Regular MMS consumption was reported by 11.6%, whereas 40.3% consumed MMS occasionally. A significant relationship was found between MMS consumption and both nutritional knowledge ($p = 0.049$) and family support ($p = 0.000$). However, education level did not show a significant association with MMS consumption ($p = 0.09$). **Conclusion:** The consumption of MMS among brides-to-be is significantly influenced by their level of nutritional knowledge and family support, highlighting the need for targeted educational interventions to promote better dietary practices and improve maternal health outcomes.

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INTRODUCTION

Stunting is short or very short based on length or height according to age which is below -2 standard deviation (SD) on the WHO growth curve which occurs due to conditions of inadequate nutritional intake and the presence of recurrent infections that occur within 1000 First Day of Life (1). The 1000 First Day of Life period is also called the golden period because it is the golden period for children's growth and development. The target groups for 1000 First Day Of Life include newborns, toddlers, pregnant women and breastfeeding mothers (2). Factors that increase the risk of stunting include the family economy, clean water facilities, health services and nutritional intake (3,4). The prevalence of stunting in Indonesia over the last 5 years has decreased quite significantly. Data from the Indonesian nutritional

status survey, the stunting rate in Indonesia in 2018 was 30.8%, in 2019 it was 27.7%, in 2021 it was 24.4%, and in 2022 it decreased to 21.6%. So a reduction of 3.8% per year is needed to achieve the stunting rate target of 14% in 2024 (5).

Factors causing stunting in developing countries include low levels of exclusive breastfeeding, low birth weight, premature birth, infectious diseases, socioeconomic conditions, and low levels of parental knowledge (6). In 2023 there were 84.3% of newborns, 3.9% of whom were LBW, a significant increase from 2022, when 2.5% of babies were LBW. LBW is the condition of babies with a birth weight of less than 2500 grams. LBW condition is caused by the mother's condition during pregnancy chronic energy deficiency (CED), etc., premature birth and placental disorders that result in disruption in the process of nutrient transportation in the placenta. For this reason, it is very important to prepare as early as possible the condition of a healthy and fit mother for pregnancy from the bride-to-be and adolescence. In addition to being one of the causes of high mortality in

newborns, LBW also increases the risk of stunting (7).

Pregnant women who experience nutritional problems can have an impact on the health and safety of the mother and baby and the quality of the baby born. Chronic Energy Deficiency (CED) can occur due to a prolonged nutritional imbalance (energy and protein). Pregnant women with CED are at risk of reducing the muscle strength that assists the labor process, which can lead to prolonged labor, post-saline bleeding, and even maternal death. The number of infant deaths caused by LBW and prematurity was 193 cases. The number of maternal deaths in 2023 was 4,482 cases, an increase from 2022 of 3,572 (7).

In 2023, 83.8% of pregnant women at risk of CED received supplementary food. The incidence of CED risk is characterized by low energy reserves over a long period of time as measured by the upper arm circumference (MUAC) during pregnancy. Pregnant women are said to be at risk of CED if the upper arm circumference (MUAC) is less than 23.5 (7). MUAC that is less (<23 cm) has more than double the risk of developing anemia (8). Based on the research of Sari et al. (2022) there is a relationship between Hb production and MUAC, part of somatic growth (9). Anemia in adolescence and preconception is also a determining factor for stunting. Anemia during pregnancy can cause miscarriage, premature birth, and maternal and fetal death (10,11). In 2023 from the health checks of prospective brides in Surabaya out of 21,133, as many as 18.5% of prospective brides had LiLA < 23.5.

Health services and preparations carried out after the conception period may cause delays in preventing fetal development such as fetal defects, low birth weight (LBW) and fetal death. Therefore, stunting detection must be carried out from adolescence, preconception (before marriage), pregnancy and after birth until the child is two years old. Strong systemic and multi-sector collaboration is needed to reduce stunting rates effectively and quickly (12,13).

UNICEF recommends the use of multiple micronutrient supplements (MMS) as an effort to improve the quality of nutritional services for pregnant women and prevent LBW and stunting. MMS contains 15 essential vitamins and minerals including vitamin A, vitamin D, vitamin E, vitamin B1, vitamin B2, vitamin B3, vitamin B6, folic acid, vitamin B12, vitamin C, iron, zinc, copper, selenium and iodine. which is useful for supporting quality pregnancy outcomes (14). According to Bourassa et al. consuming MMS every day during pregnancy was able to improve anemia and was 13% more effective in reducing LBW rates compared to supplementation with blood supplement tablets alone (15). Multi micronutrients have benefits during pregnancy including

gametogenesis, fertilization and embryo development before implantation. Not only for pregnant women, giving MMS to women in the preconception period contributes to improving the body length of the baby at birth. This is supported by Sumarmi, Wirjatmadi and Kuntoro, Abdul Razak Thaha in which group of women who were given MMS supplements gave birth to babies with a higher average body length compared to the group of women who were given blood supplement tablets (16). Pre- and postnatal MMS administration to mothers is effective in reducing infant mortality, LBW and increasing maternal Hb levels, increasing length-for-age-z score (LAZ) and reducing the risk of stunting in children born (17,18).

The level of compliance with MMS consumption can be influenced by many things. Based on research by Abidah and Sumarmi, the level of compliance with MMS consumption is influenced by the level of knowledge and acceptance of MMS tablets (19). Apart from that, Risva and Rahfiludin IFA (Iron Folic Acid supplement consumption among teenagers are influenced by the culture of consuming blood supplement tablets and support from the environment for consuming IFA (20).

MATERIALS AND METHODS

Study design

This research is a type of analytical observational research with a cross-sectional design.

Population and Samples

The population in this study were prospective brides in the Surabaya City health center area during the last 3 months. The total sample was obtained through calculations using the Slovin method and the results obtained were 585 brides-to-be. The research was carried out from September to December 2023. Sampling was carried out using simple random sampling by taking respondents at random with the inclusion criteria being recorded as prospective brides and checking at the community health center.

Data Collection

The data collection process was carried out using a questionnaire as a research instrument. The questionnaire used contained information about height, weight, BMI, upper arm circumference (MUAC), education level, knowledge level, MMS consumption. The MUAC category consists of at risk of chronic energy deficiency (CED): <23.5 cm and Normal: ≥23.5 cm. The BMI category consists of normal (18,5 – 25 kg/m²), underweight (<18,5 kg/m²) dan overweight (>25 kg/m²).

Table I shows that the questionnaires on knowledge level, MMS consumption and family support are reliable questionnaires to be used in the study.

Table I: Reliability test results of knowledge level, MMS consumption and family support

Questionnaire	Cronbach's alpha min	Cronbach's alpha
Knowledge level	0.7	0.818
MMS consumption	0.7	0.757
Family support	0.7	0.801

Data analysis

The research data were analyzed using chi square to see the description of the characteristics of the prospective bride's height, MUAC, education level and MMS consumption. This research has received approval Ethics of the Health Research Ethics Committee Faculty of Dental Medicine, University of Airlangga No. 1183/HRECC.FODM/X/2023.

RESULTS

The MUAC category in this study consisted of Normal and at risk of CED (MUAC<23.5 cm). 83.6% were classified as normal and 16.4% were at risk of CED. 55.6% of respondents had a normal BMI, while 12.3% had a BMI that was classified as underweight and 32.1% was classified as overweight.

Table II: Description of MUAC and BMI respondent

Variable	Frequency		Mean	Minimum	Maximum
	n	%			
MUAC			25.9	20	35
CED Risk	96	16.4			
Normal	489	83.6			
BMI			23.7	14.5	39.5
Underweight	72	12.3			
Normal	325	55.6			
Overweight	188	32.1			

The average circumference of the upper arm of the prospective bride in Surabaya is 25.9 cm with a minimum value of 20 cm and a maximum value of 35 cm. While the average BMI of a prospective bride is 23.7 kg/m² with a minimal value of 14.5 kg / m² and a max value of 39.5 kg / m².

Based on the level of education, 55.6% of prospective brides were classified as having a secondary education level. As many as 30.3% of prospective brides have a high level of education, while 11.6% have a low level of education. The level of nutritional knowledge among prospective brides is mostly low (71.8%), with only 28.2% having good nutritional knowledge. MMS consumption among prospective brides was 40.3% classified as occasional consumption during the last 3 months. 33.7% were classified as rarely consuming MMS and those who regularly consumed MMS in

the last 3 months were 11.6%. As many as 86.5% of prospective brides received support from their families for consuming MMS. Meanwhile, those who did not receive support from their families were only 13.5%.

Table III: Description of respondent characteristics

Variable	Frequency	
	n	%
Knowledge level		
Low	420	71.8
Good	165	28.2
MMS consumption		
Routine	75	26
Sometimes	117	40.3
Seldom	96	33.7
Level of education		
Low	68	11.6
Intermediate	340	58.1
High	177	30.3
Family support		
Get support	506	86.5
Didn't get support	79	13.5

There are results of data analysis, namely the relationship between the level of education, family support and level of knowledge with the MMS consumption of prospective brides. Based on the results of the chi-square test, it was found that two variables had a significant relationship, including family support (p=0.000) and the level of knowledge of the prospective bride (p=0.049) with the MMS consumption of the prospective bride. Meanwhile, the variable of the prospective bride's education level does not have a significant relationship with MMS consumption (p=0.099).

Table IV: Description of the relationship between MMS consumption and several variables

Variable	MMS Consumption						Total	P value
	Routine		Some-times		Seldom			
	n	%	n	%	n	%		
Level of education								
Low	17	11.2	29	12.3	22	11.2	273	46.7
Interme- diate	94	61.8	145	61.4	101	51.3	147	25.1
High	41	27	62	26.3	74	37.6	165	28.2
Total	152	100	236	100	197	100	585	100
Family support								
Not getting support	12	7.9	8	3.4	59	29.9	79	13.5
Get sup- port	140	92.1	228	96.6	138	70.1	506	86.5
Total	152	100	236	100	197	100	585	100

CONTINUE

Table IV: Description of the relationship between MMS consumption and several variables (CONT.)

Variable	MMS Consumption						Total	p value	
	Routine		Some-times		Seldom				
	n	%	n	%	n	%			
Knowledge level									
Low	103	67.8	163	69.1	154	78.2	420	71.8	0.049
Good	49	32.2	73	30.9	43	21.8	165	28.2	
Total	152	100	236	100	197	100	585	100	

DISCUSSION

83.6% of prospective brides in this study had upper arm circumference (MUAC) which was classified as normal (≥ 23.5 cm). MUAC is one of the indicators used to assess malnutrition in women. Pregnant women with MUAC who are classified as at risk of chronic energy deficiency (CED) may give birth to LBW babies (low birth weight babies) (21). Based on research Sukmawati et al. there is a relationship between MUAC in pregnant women and the incidence of stunting in toddlers ($p=0.01$) (22). The BMI of most prospective brides and grooms is normal (55.6%) and 32.1% have a BMI classified as overweight. Monitoring nutritional status can be done by assessing BMI. Being underweight can increase the risk of developing infectious diseases while being overweight carries the risk of degenerative diseases (23). Based on Widiastuti, women who are overweight are at risk of experiencing preeclampsia. Pregnant women with a low BMI are at risk of giving birth to LBW babies (24). There is a relationship between BMI in pre-pregnant women and the birth weight of toddlers ($p=0.006$) (25). MMS consumption among prospective brides is mostly classified as occasional consumption (40.3%). 26% of prospective brides regularly consume MMS, 33.7% rarely consume it and the majority consume MMS occasionally (40.3%). As many as 71.8% of prospective brides have low nutritional knowledge. Respondents with good nutritional knowledge were only 28.2%. However, the majority of prospective brides have a secondary level of education (58.1%) and 32.1% of prospective brides have a higher level of education. Only 11.6% have a low level of education. Knowledge can be influenced by the level of education. The higher a person's level of education, the better their knowledge will be. Someone with higher education can absorb information rationally (26). As many as 86.5% of prospective brides received support from their families for consuming MMS. Meanwhile, only 13.5% did not receive support from their families. Family support plays an important role in preventing and treating an illness. Hypertensive patients who received family support showed increased care compared to patients who did not receive family support (27).

The results of analysis also show that there is a significant relationship between family support and MMS

consumption ($p=0.000$). The percentage of respondents who received family support and regularly consumed MMS was 92.1% or 140 respondents out of 152 respondents. This can prove the theory Rahayuningtyas, Indraswari and Musthofa (28) that family support can increase to IFA consumption in adolescents and is in line with research Estiyani (29) which stated that respondents who received high levels of support from their families for consuming IFA did not experience anemia. Abidah and Sumarmi showed that the MMS group had a higher average level of family support at 34.9 compared to the TTD group at 32.2. In the MMS group, the highest distribution in the supportive category was 66.7%, while in the TTD group the highest distribution in the non-supportive category was 54.2%. Family support affects the level of compliance of pregnant women in consuming MMS / TTD because there is emotional support and other forms of support so that mothers comply with the therapy provided (30).

The results of data analysis show that there is a significant relationship between the level of knowledge and MMS consumption ($p=0.049$) which was tested using the chi-square test. The percentage who have a good level of knowledge and regularly consume MMS is 32.2%. This is in line with the research results Bakhtiar et al. (31) that 62.96% of pregnant women who have good knowledge will comply with IFA consumption and research results Runiari and Hartati (32) which stated that 29 respondents out of 51 respondents who had good knowledge were quite compliant in consuming IFA. This research is also in line with the results of research conducted by Sab'ngatun and Riawati regarding the relationship between the level of knowledge and the consumption of blood supplement tablets in young women, which shows that there is a significant relationship between the two ($p=0.010$), where 20% of respondents have good knowledge and regularly consume IFA (33). The results of data analysis showed that there was no significant relationship between education level and MMS consumption ($p=0.099$). This research is in line with research Shofiana, Widari and Sumarmi which states that there is no significant relationship between education level and compliance with IFA consumption in pregnant women (34). However, this research inversely proportional to study by Mardi Yanti et al. which states that there is a significant relationship between education level and compliance with blood supplement tablet consumption ($p=0.049$) (35). Education is one of the factors that influence health knowledge and behavior, including compliance with supplement consumption (35). There is research in Ethiopia which states that pregnant women with upper secondary education are 3.44 times more likely to comply with the consumption of blood supplement tablets compared to pregnant women with lower secondary education. In this research, it was stated that education can increase awareness of the consequences of iron deficiency anemia (36).

CONCLUSION

MMS consumption habits in the group of prospective brides studied in the period September-December 2023 in Surabaya were influenced by the level of knowledge and family support. In this study, education did not affect MMS consumption habits because consumption habits can also be influenced by other factors. Increasing knowledge and family support can be done by providing holistic health education starting from adolescence and health supervision at the time of prospective brides, pregnant women, mothers giving birth to toddlers. Health education is expected to increase awareness, understanding of the importance of MMS so that it can lead to better dietary practices so as to prevent the risk of maternal mortality, infant mortality, prematurity, birth defects and stunting cases in the future. In the future, education should be provided to increase awareness and benefits of MMS for healthy pregnancy outcomes.

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