(RESEARCH ARTICLE)

Anemia among Women of Reproductive Age Residing in a Stunting Locus Village of Banjar District, Buleleng Regency, Bali Province, Indonesia

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Abstract

Stunting is the most prevalent form of undernutrition, and possessed both immediate and long-term impacts. Higher risk of developing non-communicable diseases, the likelihood infection, and impaired physical and cognitive development, are frequently observed in stunted children. High prevalence of stunting was reported in Indonesia. Maternal anemia is a known contributor of stunting; therefore, in order to provide sufficient intervention, screening of anemia in women of reproductive age residing in a stunting locus can be considered important. Twenty-four women age 18 to 49 years old residing in "Village K", a stunting locus village in Banjar District, Buleleng Regency, Bali Province, Indonesia, who enrolled in a community development program in August 2024, were participated in this study. Anthropometric measurements were performed, including weight, height, and mid-upper arm circumference (MUAC), and blood collection for hemoglobin (Hb) and hematocrit (Hct) determination was performed using fingerstick method. Based on body mass index (BMI), 54.2% (13/24) participants were considered obese (BMI ≥25 kg/m^2). Fourteen participants (58.3%) were considered anemic, due to Hb and Hct levels below 12 g/dL and 36%, respectively. No significant correlation was identified between MUAC and BMI with both Hb and Hct levels. This study suggested that anemia screening in women of reproductive age may be important, especially in areas designated as stunting locus, in order to provide adequate intervention for women and further contribute to stunting reduction.

Keywords: Anemia; Women of reproductive age; Stunting; Hemoglobin; Hematocrit

1. Introduction

Stunting, a linear growth failure in childhood, is the most prevalent form of undernutrition [1]. It is defined as length or height below -2 SDs from the World Health Organization (WHO) Child Growth Standards median for the same age and sex [2]. The impacts of stunting are both immediate and long-term. Stunted children are more likely to remain stunted by age 15 [3]. Higher risk of developing non-communicable diseases, the likelihood infection, and impaired physical and cognitive development, are frequently observed in stunted children [1,4].

Indonesian Health Survey in 2023 reported approximately 21.5% children age 0-59 months were stunted [5]. This indicated a high prevalence of stunting [6]. Addressing contributing factors of stunting is necessary. Inadequate feeding and infections are crucial determinants. Children of households with low-income, limited healthcare access, poor sanitation, and food insecurity are at higher risk in developing stunting [7–9]. Prenatal nutrition and maternal factors, such as body mass index and anemia, are also important in determining fetal development [7].

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Iron deficiency, a major cause of maternal anemia, may lead to poor fetal growth, low birth weight, intrauterine growth restriction, and premature labor, which can result in stunting. Breastfeeding mothers with anemia transfer insufficient iron through breastmilk, therefore increasing the risk of anemia and stunting in their children [10–12].

Stunting was among strategic issues being addressed in Indonesia's 2020–2024 RPJMN (National Medium Term Development Plan) policy, mainly to accelerate prevalence reduction through specific and sensitive nutrition interventions. Intervention policies included the designation of stunting locus areas, including stunting locus villages, in which become the target of multisectoral integrated intervention [13]. Prevalence of anemia among pregnant Indonesian women was estimated around 27.7% in 2023. Providing adequate nutrition in both child and pregnant women is necessary to prevent stunting, and it is also necessary to determine women of reproductive age with maternal health problems such as anemia to provide adequate health assistance. Therefore, identify maternal factors contributing to stunting, including anemia, is necessary in stunting prevention and intervention, especially in stunting locus area [5,13]. This study aimed to identify anemia among women of reproductive age (WRA) residing in a stunting locus village in Banjar District, Buleleng Regency, Bali Province, Indonesia.

2. Methods

2.1. Sample collection

Women age 18-49 years old residing in "Village K", a stunting locus village in Banjar District, Buleleng Regency, Bali Province, Indonesia, who enrolled in a community development program held by Universitas Airlangga in August 2024, were recruited to participate in this study. Each participants provided a written informed-consent prior to examination. Capillary blood samples were collected using capillary fingerstick method in accordance to World Health Organization (WHO) guideline [14]. Fingerstick blood sample is considered as a useful estimator of venous Hemoglobin (Hb) and hematocrit (Hct) [15]. The levels of Hb and Hct were then determined using Fora 6 Plus Multi-Functional Monitoring System (TaiDoc Technology Corporation, Taipei, Taiwan). Height, weight, and mid-upper arm circumference measurement were also performed on each participants, using procedures as described previously [16]. Body mass index (BMI) was calculated using weight and height measurement results, and categorized according to WHO BMI classification for Asian [17].

2.2. Statistical analysis

Statistical analysis was performed using SPSS Statistics 17.0 (Advanced Analytics, Tokyo, Japan). A Chi-squared test of categorical variables was employed, and test results with p<0.05 were considered significant.

3. Results

Twenty-four women age 18 to 49 years old were enrolled in this study. Most participants were between 40-49 years old (13/24; 54,2%). No participant was pregnant during the study. According to MUAC measurement, one participant (4.2%) was considered undernourished (MUAC <23.5 cm). Most participants (13; 54.2%) were considered obese (BMI ≥25 kg/m²). Fourteen participants (58.3%) were considered anemic, due to hemoglobin and hematocrit levels below 12 g/dL and 36%, respectively. Demographic characteristic and measurement results are presented in Table 1.

Table 1 Demographic characteristic and measurement results of study participants

Parameter	n	%
Age (years old)		
18-29 years old	4	16.7
30-39 years old	7	29.2
40-49 years old	13	54.2
Mid-upper arm circumference		
<23.5 cm	1	4.2
≥23.5 cm	23	95.8
Body Mass Index		

Normal (18-22.9 kg/m²)	6	25.0
Overweight (23-24.9 kg/m²)	5	20.8
Obese (≥25 kg/m²)	13	54.2
Hemoglobin		
<12 g/dL	14	58.3
≥12 g/dL	10	41.7
Hematocrit		
<36%	14	58.3
≥36%	10	41.7

There was no statistical correlation between age, MUAC, and BMI with Hb and Hct levels (p≥0.05). All participants with Hb <12 g/dL exhibited Hct levels <36%; therefore, showing the correlation between Hb and Hct levels (p<0.05).

4. Discussion

Anemia in non-pregnant WRA is defined as Hb levels <12 g/dL, or Hct levels <36% [18]. The prevalence of anemia among women aged 15-49 was decreased globally between 2000 to 2013, but then increased from 2013 to 2019 [19]. Anemia is considered as a global threat among WRA in both developed and developing countries. Recent study analyzing national data of low- and middle-income countries revealed a considerably high prevalence of anemia in both pregnant (45.2%) and non-pregnant (39.5%) WRA [20].

This study identified more than 50% WRA with anemia based on Hb and Hct levels measurement. Similarly, previous study found 45.7% anemic WRA working as palm plantation worker in Central Kalimantan, Riau, and South Papua Province of Indonesia [21]. Indonesian Health Survey in 2023 reported around 27.7% women were reported with Hb levels <11 g/dL during pregnancy [5]. These findings suggested the relevance of maternal health, especially in the effort of improving child's health.

Stunting in children is related to maternal health, including the presence of anemia prior to conception, and also during pregnancy and breastfeeding. Pre-pregnancy anemia increased the risk of childhood anemia. Iron deficiency anemia during pregnancy may lead to poor fetal growth, low birth weight, intrauterine growth restriction, and premature labor, resulting in stunting. During breastfeeding, anemic mothers may transfer inadequate iron through breastmilk, and increase the risk of anemia and stunting in their children [10–12]. Adequate interventions are needed to address anemia in WRA, especially in area or region designated as stunting locus.

This study shown that despite more than 50% WRA residing in a village designated as stunting locus, no significant correlation was found between other anthropometric parameters such as MUAC and BMI with Hb and Hct levels. These results indicated that despite considered as overweight or obese, WRA are susceptible to anemia [22]. Other study also reported similarly high prevalence of anemia and obesity occurring in women of same population [21]. Therefore, prevention and intervention of anemia should be accessible for all WRA, especially those residing in stunting locus area.

5. Conclusion

Most WRA residing in a village designated as stunting locus in Banjar District, Buleleng Regency, Bali Province, Indonesia, were considered anemic. Anemia screening in women of reproductive age may be important, especially in areas designated as stunting locus, in order to provide adequate intervention to reduce the prevalence of anemia in WRA and to further contribute in stunting reduction.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no potential conflict of interests.

Statement of informed consent

Written informed consent was obtained from all participants included in the study.

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