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(RESEARCH ARTICLE)

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Iron Deficiency Anemia among Women Residing in a Village of Buleleng Regency, Bali, Indonesia, in 2023

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Abstract

Anemia is considered as a significant public health issue worldwide, that especially impacts women. Iron deficiency is a known leading cause of anemia, and may affect overall well-being and negatively impact pregnancy. Iron deficiency anemia frequently shows non-specific symptom; therefore, to prevent and promptly treat anemia in women, screening is recommended. This study aimed to identify women with anemia, especially iron deficiency anemia (IDA), who resided in a rural village in Buleleng Regency, Bali Province, Indonesia. Sample collection was performed in 2023 during community development program in a village situated in Buleleng Regency, Bali Province, Indonesia. Thirty-nine non-pregnant women age 15-59 years old were enrolled in this study. Blood samples were collected using fingerstick method, and subjected to hemoglobin (Hb) and hematocrit (Hct) levels determination. Nineteen participants were considered anemic (48.72%), and no significant correlation was found between IDA with age, marital status, education level, and number of children. Revisiting and redesigning anemia screening policy for all women of reproductive age despite the presence of risk factor, should be considered, in order to deliver required intervention.

Keywords: Anemia; Hemoglobin; Hematocrit; Women; Indonesia

1. Introduction

Anemia is a condition characterized by a lower-than-normal count of red blood cells or reduced levels of hemoglobin (Hb). Anemia is a significant public health issue worldwide, that especially impacts women. The World Health Organization in 2021 estimated 30% of women aged 15–49 and 37% of expecting mothers suffered from anemia.[1]

Iron deficiency is a known leading cause of anemia among children and women of reproductive age. Iron deficiency may be due to inadequate iron consumption and/or malabsorption, or excessive bleeding.[2] Aside from iron deficiency, anemia often arises due to chronic inflammation or disease, where inflammatory cytokines and hepcidin dysregulation hinder the release and recycling of iron and inhibit erythropoietin-driven erythropoiesis. Anemia can also be caused by deficiencies of essential hematopoietic micronutrients, including vitamin B12 and folate.[3]

Anemia affects overall well-being by lowering immunity, hinders physical and mental growth, and diminishes physical fitness. Women of reproductive age suffering anemia may have higher risks pregnancy, which impact fetal growth and development, and increase pregnancy complications.[4]

Anemia, especially progressing from iron deficiency, frequently shows non-specific symptoms such as fatigue, weakness, and reduced exercise capacity, which can be wrongly ascribed to other factors or typical aging, resulting in postponed clinical identification. In primary care settings where regular anemia screening is not consistently suggested,

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numerous people with low iron levels or early-stage anemia went unnoticed. Research has indicated that inadequate screening lead to overlooked diagnoses and postponed treatment for anemia [5].

To prevent and promptly treat anemia in women, all non-pregnant women of childbearing age are recommended to be screened for anemia between 15 and 25 years of age. Screening should be repeated every 5 to 10 years where no risk factors for anemia is present.[6] Several Asian countries, including India, Thailand, and Cambodia, have established regulations for anemia screening at local level; however, Indonesia has yet developed such regulation.[7] This study aimed to identify women with anemia, especially iron deficiency anemia (IDA), who resided in a village in Buleleng Regency, Bali Province, Indonesia.

2. Methods

2.1. Sample collection

Sample collection was performed in July 2023 during community development program held by Universitas Airlangga in "Village K", which situated in Buleleng Regency, Bali Province, Indonesia. Participating non-pregnant women age 15-59 years old who have not reached menopause were recruited for this study. Following the provision of written informed consent, capillary blood samples were collected from each participants, using fingerstick method.[8] Blood samples were then subjected for Hb and hematocrit (Hct) levels examination using Fora 6 Plus Multi-Functional Monitoring System (TaiDoc Technology Corporation, Taipei, Taiwan). Iron deficiency anemia was defined as Hb and/or Hct levels below 12g/dL and 36%, respectively.[6,9,10] Demographic data, including age, marital status, education levels, and number of children were collected using interviewer-administered questionnaire. Data was then summarized descriptively.

2.2. Statistical analysis

Statistical analysis was performed using SPSS Statistics 17.0 (Advanced Analytics, Tokyo, Japan). Spearman correlation test was performed to identify correlation between age, education levels, and number of children with IDA. Chi-squared test was performed to identify correlation between marital status with IDA. Test results were considered significant with $p<0.05$.

3. Results

A total of 39 participants were enrolled in this study. Most participants were between 40-49 years old (14/39; 35.89%), and most were married (32/39; 82.05%). Based on Hb and Hct levels, 19 participants were considered anemic (48.72%). No significant correlation was found between age, marital status, education level, and number of children with iron deficiency anemia ($p > 0.05$) (Table 1).

Table 1 Demographic characteristics and iron deficiency anemia among study participants

Variable	**Iron Deficiency Anemia**		**Normal**		***p***
	n	%	n	%	
Age					0.426
15-29	4	10.26	4	10.26	
30-39	5	12.82	3	7.69	
40-49	5	12.82	9	23.07	
50-59	5	12.82	4	10.26	
Marital status					0.055
Single	4	10,26	1	2,56	
Married	13	33,34	19	48,71	
Widow	2	5,13	-	-	
Education level					0.264

Primary Education	11	28,21	8	20,51	
Secondary Education	7	17,95	10	25,64	
Higher Education	1	2,56	2	5,13	
Number of children					0.254
0	2	5,13	2	5,13	
1-2	7	17,95	8	20,51	
>2	10	25,64	10	25,64	

4. Discussion

Iron deficiency anemia in non-pregnant women is defined as Hb lower than 12g/dL and/or Hct levels below 36%.[5,8,9] Anemia is considered as a global threat among women, especially those in childbearing age. In developing countries, the prevalence of anemia was fourfold higher compared to developed countries. Study in low- and middle-income countries identified 45.2% and 39.5% anemia among pregnant and non-pregnant women, respectively, during 2010–2021.[11]

This study estimated 48.72% non-pregnant women of childbearing age who suffered iron-deficiency anemia. More recent study (2024) identified anemia among 54,2% women age 18-49 residing in a village situated in the same regency.[12] Burden of anemia underlines the need for commitment and movement to reduce the prevalence.[11] Anemia, especially due to iron deficiency in women, correlates to infertility, lower live birth rates, and higher risk of miscarriage. Sufficient iron levels are needed for reproductive success and sustaining pregnancy.[13] Iron deficiency anemia in expectant mothers heightens the risk of maternal complications, such as preterm labor, postpartum hemorrhage, cesarean delivery, and other morbidity markers compared to pregnancies without anemia. Regular screening for anemia in pregnant women is advised due to these links, as identifying and treating it early can reduce serious maternal risks.[14,15]

Anemia can also hinder physical ability, mental performance, and tolerance for daily activities, all of which are critical elements of work productivity. Anemia is linked to tiredness, decreased concentration, and lower productivity, which together can result in diminished job performance, higher absentee rates, and an increased likelihood of work-related mistakes among women across different industries. These impacts not only reduce individual economic capacity but also carry wider socioeconomic consequences in groups with a significant occurrence of anemia among employed women [16,17].

This study found no significant association between age, marital status, education levels, and number of children. Most recommendation for anemia screening is directed to pregnant women and those with risk factor(s). Presently, no guidelines recommend routine anemia screening in healthy, non-gravid women.[9] However, considering the results of this study, and several other studies highlighting considerable anemia prevalence among women in Indonesia,[12,18,19] revisiting and redesigning anemia screening policy for all women of reproductive age, should be considered.

5. Conclusion

More than 40% non-pregnant women of childbearing age residing in a village situated in Buleleng Regency, Bali Province, Indonesia, were identified with IDA. No significant association between age, marital status, education levels, and number of children. Revisiting and redesigning anemia screening policy for all women of reproductive age despite the presence of risk factor, should be considered, in order to deliver required intervention.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no potential conflict of interests.

Statement of informed consent

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

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