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PREVALENCE OF ANEMIA AND ASSOCIATED RISK FACTORS AMONG SAUDI PATIENTS IN KSA: A CROSS-SECTIONAL STUDY

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Abstract:

Background: *Multiple factors contribute to Saudi Arabia's severe anemia epidemic. The incidence of anemia has been widely studied in Saudi Arabia, with consistent results showing a high rate of occurrence among young people, young adults, and women of childbearing age. This study aimed to establish the prevalence and risk variables among Saudi patients.*

Methods: *The current study aims to determine the prevalence of anemia among adult Saudi patients at a single point of measurement as reported by parents. The most suitable design is cross-sectional study. It was descriptive and correlational study. This enables the researcher to measure the effect and the outcome at a single point of time. This study design gives reliable results with short time and less effort. The study was conducted at (place). The participants were selected during the period from October to November 2022. This study included adults aged 19 years or more via non-probability convenient sampling technique at a confidence level of 95% using Epi Info software equation.*

Results: *Study included 832 participants. Among them, 61.3% were males (n= 510) and 322 participants were females (38.7%). Most of study participants were more than 35 years (n= 357, 42.9%). More than half of study participants had a normal body mass index (BMI) (n= 468, 56.3%) while 61 participants were categorized as underweight (7.3%). Hypertension was the most prevalent comorbid condition (n= 92, 11.1%). Participants were asked about medical issues that might cause anemia. Hemorrhoid was present among 93 participants (11.2%) while menorrhagia was found among 48 female. Furthermore, 189 participants reported having iron deficiency anemia (22.7%). Anemia was prevalent among female participants more than male participants (P<0.001) and among participants older than 35 years (P= 0.035).*

Conclusion: *Our research revealed a significant incidence of anemia among study participants. When compared to the male population, anemia is more common among females. Microcytic anemia was the most frequent kind of anemia in women, especially in the reproductive age range of 15 to 49, whereas normocytic anemia was more common in men. Both men and women were more likely to have mild or moderate anemia, although more women than men were affected with severe anemia. The government of Saudi Arabia has to take action to reduce the rate of anemia among its citizens.*

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INTRODUCTION:

World health organization (WHO) defines anemia as a disease in which the number of red blood cells (RBCs) or the quantity of hemoglobin (HGB) inside the RBCs falls below a specified reference range (12 g/dL in nonpregnant women and 13 g/dL in men) [1]. However, individual and environmental variables may affect the optimal threshold for healthy individuals.

Poverty and poor socioeconomic position are significant causes to anemia, which is the most prevalent type of micronutrient deficiency disease worldwide [2, 3]. According to estimates from the Global Burden of Diseases, Injuries, and Risk Factors 2013 Study (GBD 2013) [4,] anemia affects almost 1.93 billion people, or 27 percent of the world's population. Anemia is more prevalent among people with lower earnings, namely among children under five, pregnant and lactating mothers, and the elderly [3]. Despite a slight decline in absolute prevalence and years lived with disability (YLD) from 1990 to 2010 [3, 5], anemia continues to place a significant physical burden on society (61.5 million YLDs) and financial cost on health care systems (an additional $7,000-$30,000 than the same condition without anemia). According to the Global Burden of Disease 2013 (GBD 2013) [4], Iran has an estimated age-standardized prevalence rate of 23%, putting it in the WHO category of moderate anemic prevalence [6]. 10 to 30 percent of the Iranian population is anemic [7], with the greatest incidence among children and adolescents, women, and the elderly.

Distribution, severity, pattern of underlying pathophysiology, susceptibility, and outcomes of anemia may be influenced by a complex interaction of multiple concomitant factors (such as biological factors, demographics, lifestyle, personal habits, socioeconomic status, and geographical differences) [8, 9]. More than half of all cases of anemia worldwide may be traced back to inadequate iron intake [3]. Parasitic diseases and infections (malaria, hookworm infections, and schistosomiasis), inherited hemoglobinopathies (sickle cell disease, and thalassemia), and chronic diseases (cancer, autoimmune disease, chronic kidney disease, and congestive heart failure) are additional potential causes of anemia in low- and middle-income countries [8].

Both the prevalence of anemia and its accompanying symptoms may be troublesome. For instance, anemia may be a prelude to a more serious condition such as cancer. Untreated anemia may manifest as chronic fatigue, lethargy, difficulty focusing, low blood pressure, shortness of breath, and even diminished mental health [10,11,12,13]. Anemia affects individuals of all ages and from all over the globe, regardless of their socioeconomic situation or access to health care [2].

Numerous research have addressed anemia in the Saudi population. According to a research performed in Riyadh on non-pregnant women, the average person consumes less food than necessary on a daily basis (DRI). Analyses of correlation and logistic regression demonstrated that socioeconomic level had a substantial, negative influence on anemia proxies. Moreover, a significant and positive correlation was discovered between daily food intake and anemia proxies, suggesting that the nutrients important for the improvement of anemia proxies were not consumed in sufficient quantities [14]. The incidence of mild (10–11 g/dL), moderate (7–10 g/dL), and severe (Hb 7 g/dL) anemia was 45%, 49%, and 6%, respectively, in another research of female university students. 81% of anemic pupils were microcytic (MCV 80 fL), whereas 1.6% were macrocytic (MCV >96 fL) [15]. Two earlier studies shown that anemia is a significant burden for the Saudi people.

Adult anemia has a significant effect on productivity and economic growth [16], much as fetal anemia causes growth retardation of the fetus and putting pregnant women at risk for difficulties, slows the growth and development of children, and has a

negative effect on economic growth. According to a research analyzing the cost of iron insufficiency in 10 developing nations [17], the median value of physical productivity losses per year owing to iron deficiency was around $2.32 per capita, or 0.57% of the gross domestic product. Taking into consideration the cognitive effects of iron deficiency, the overall economic loss was calculated to be US$16.78 per capita, or 4.5% of the GDP. The World Health Organization (WHO) reports that 12.7% of adult men globally are anemic [18]. According to the most recent National Family Health Survey (NFHS-4) [19], 22.7% of men between the ages of 15 and 49 suffered from anemia. The frequency of anemia among men in this age group has consistently increased from 17.6% in 2005-2006 to 20.1% in 2015-2016 [20]. Consequently, adult men are often excluded from anemia control efforts, despite the fact that anemia's frequency and economic effect are on the increase.

Many instances of anemia are attributable to poor food habits. People's food preferences are influenced by both cultural norms and ideas on the health advantages of particular diets. According to research, pregnant women and adolescent girls are aware that anemia is caused by a bad diet or a lack of food, but they do not know how to avoid it by altering their diet [21-22]. Economic restrictions on dietary improvement were mentioned as the major obstacle to a food-based strategy to reducing anemia symptoms. Many responders also lacked knowledge about the severity and repercussions of anemia [11]. The views and opinions of rural people, especially males, about anemia and the role of various meals in its development are little understood. Consequently, the goal of this research was to establish the prevalence of anemia among adults (18 years) in KSA and to investigate the relationships between anemia and other sociodemographic and clinical parameters. Therefore, the purpose of the present research was to establish the prevalence and risk variables among Saudi patients.

METHODOLOGY:

Study design and settings:

The current study aims to determine the prevalence of anemia among adult Saudi patients at a single point of measurement as reported by parents. The most suitable design is cross-sectional study. It was descriptive and correlational study. This enables the researcher to measure the effect and the outcome at a single point of time. This study design gives reliable results with short time and less effort. The study was conducted at (place). The participants were selected during the period from October to December 2022.

Population, sampling and sample size:

This study included adults aged 19 years or more via non-probability convenient sampling technique at a confidence level of 95% using Epi Info software equation.

Data collection:

Data was collected using a questionnaire filled through a self-administered approach from participants or in an administered manner by the researcher.

Instrument:

Study instruments consists of the following domains:

- Sociodemographic data
- Identification of presence of anemia based on hemoglobin level

Statistical analysis:

Data obtained from questionnaire were entered and analyzed using SPSS program version 23 computer software. Sociodemographic data are presented using descriptive statistics as means, median, percentages and standard deviation. Independent T test and one-way Anova are used to show statistical significance among participants characteristics. Chi square test is used to show relationship between categorical variables.

Ethical consideration:

An approved permission was gained from (institution) to collect quantitative data from study participants regarding anemia condition and risk factors. After explanation of study objectives, participants were asked to volunteer to participate at our study. In addition, verbal informed consent was gained from participants before asking questions.

RESULTS:

Study included 832 participants. Among them, 61.3% were males (n= 510) and 322 participants were females (38.7%). Most of study participants were more than 35 years (n= 357, 42.9%). Figure 1 shows age groups distribution among study participants. Majority of study participants were Saudi (n= 801, 96.3%) and the rest of participants were non-Saudi (n= 31, 3.7%).

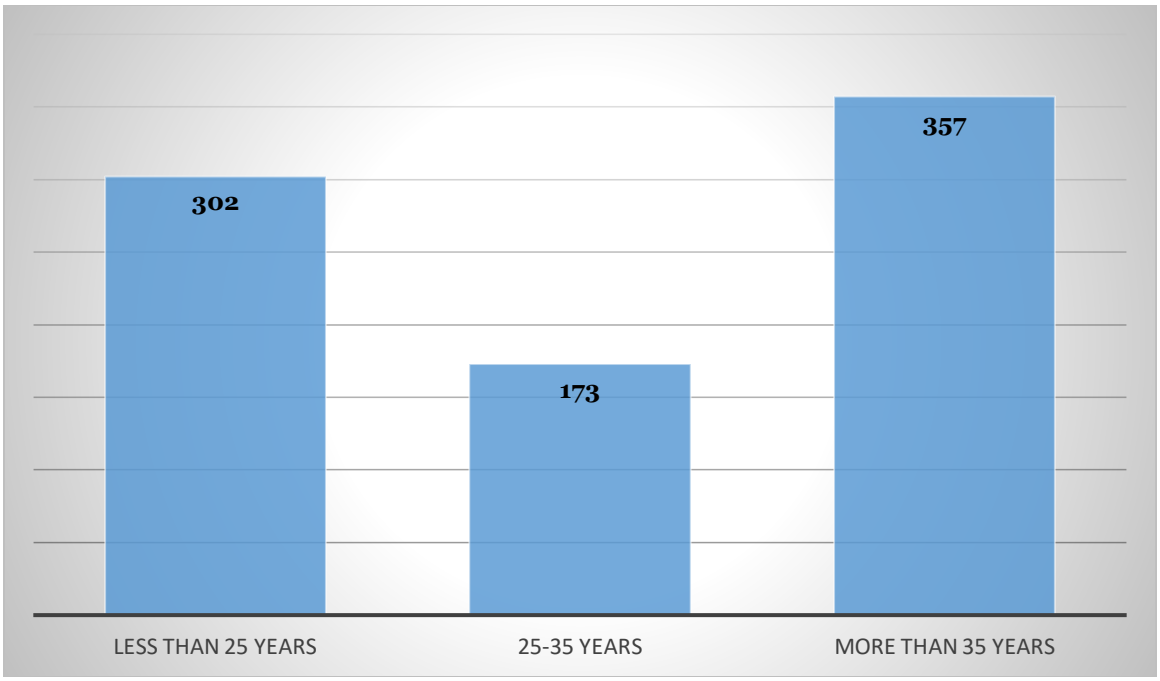

Figure 1: Age groups distribution among study participants

About two thirds of study participants had high educational level as shown in figure 2 (n= 558, 67.1%). More than half of study participants had a normal body mass index (BMI) (n= 468, 56.3%) while 61 participants were categorized as underweight (7.3%). Figure 3 shows frequency of BMI categories among study participants.

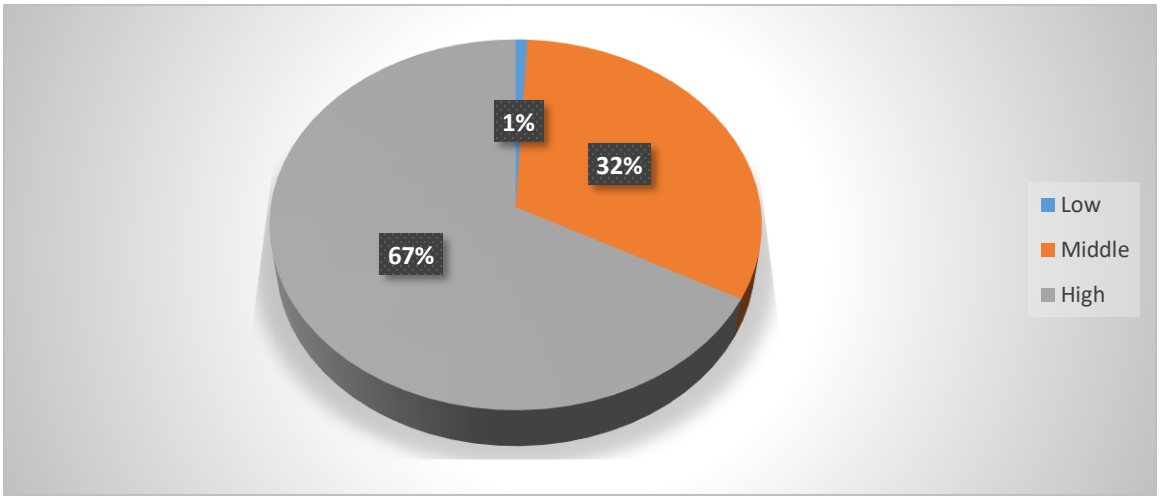

Figure 2: Educational level distribution among study participants

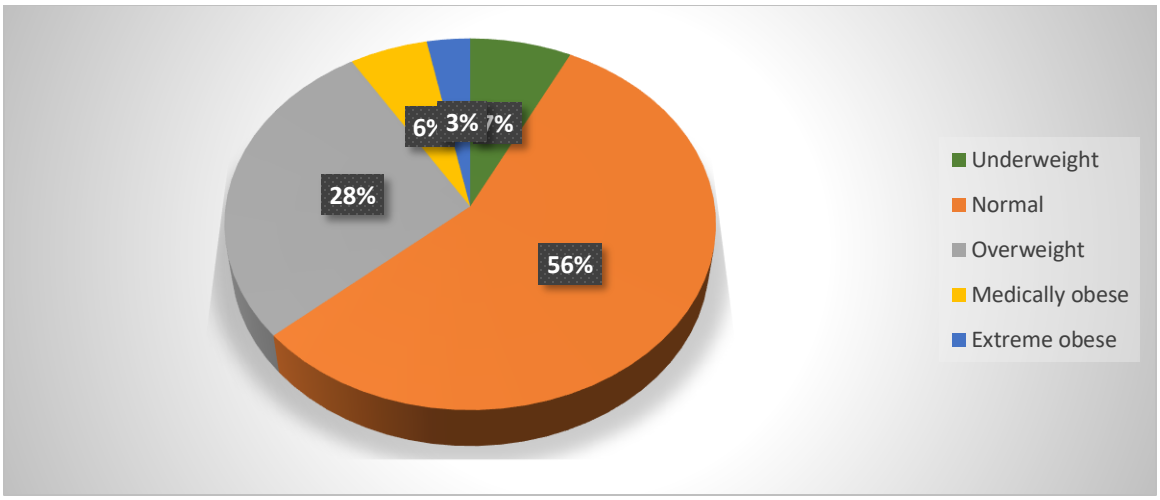

Figure 3: Body mass index distribution among study participants

Participants were asked about their eating and health habits as well as their comorbid conditions as shown in table 1 and 2. It is noticed from table 1 that quarter of participants are smokers (n= 214, 25.7%)

Table 1: Health and lifestyle among study participants		
Health status	Yes	No
Healthy food intake	478 57.5%	354 42.5%
Smoking	214 25.7%	618 74.3%
Doing physical activity up to 3 times per week	429 51.6%	403 48.4%

Table 2 shows the comorbid conditions among study participants. Hypertension is the most prevalent comorbid condition (n= 92, 11.1%).

Table 2: Comorbid conditions frequency among study participants		
Comorbid conditions	Frequency	Percentage
Diabetes Mellitus	70	8.4%
Hypertension	92	11.1%
Chronic kidney disease	12	1.4%
Autoimmune disease	31	3.7%
Vitamin D deficiency	267	32.1%

Participants were asked about medical issues that might cause anemia. Hemorrhoid was present among 93 participants (11.2%) while menorrhagia was found among 48 female. Furthermore, 189 participants reported having iron deficiency anemia (22.7%). Anemia was prevalent among female participants more than male participants (P<0.001) and among participants older than 35 years (P= 0.035). Figure 4 shows last hemoglobin check level among study participants.

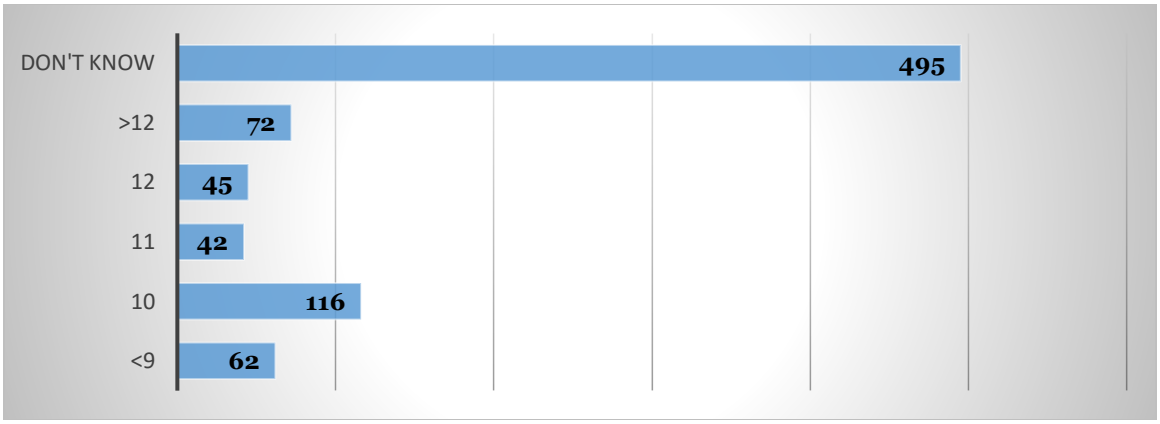

Figure 4: Hemoglobin level distribution among study participants

DISCSUSSION:

Nutritional and non-nutritional factors and processes both contribute to anemia's complexity. The eastern Mediterranean is home to a number of Arab nations, including Saudi Arabia and its Gulf neighbors. As much as 69.6 percent of reproductive-age women in the eastern Mediterranean area suffer from anemia [23]. The incidence of anemia is highest among pregnant women (range: 22.6%-63.6%) [24]. The results showed that a significant number of the patients in this research suffered from anemia. It was shown that microcytic anemia was quite common among women of childbearing age, and that this was most likely due to an iron deficit [24]. Possible root causes of this illness include iron deficiency, anemia, and excessive blood loss during pregnancy or menstruation [25]. However, we were unable to verify the results by checking the serum hemoglobin level. Numerous studies in Saudi Arabia have shown that women of childbearing age have an alarmingly high prevalence of iron deficiency anemia (IDA). As reported by Alsheikh [26] and Alswalem AM [27], respectively, IDA affects 38.3 and 41.6% of female medical students at Saudi universities. The World Health Organization estimates that 2 billion individuals worldwide have anemia, with half of these instances attributable to iron deficiency. Most people throughout the globe suffer from iron deficiency [28-29].

According to Owaidah et al. [30], the Makkah area has the greatest incidence of iron deficiency and IDA. Although IDA appeared to be common among our patients, we were unable to determine whether or not any of them were iron deficient. According to AlAssaf [31], the general prevalence of anemia was 21% in females and 2.3% in males, whereas according to AlQuaiz et al. [29], the prevalence of anemia was 40% among women of reproductive age in Riyadh. Tabuk's female college students aged 19–25 were the only participants in the only research to find a low incidence of 12.5% [32]. Children under 5, school-aged children, young adults/adolescents, pregnant women, and women of reproductive age have been the primary study populations in the vast majority of Saudi Arabian research [28, 29, 32, 33-36]. The frequency of anemia varies by demographic in different regions of Saudi Arabia. Few studies have been done on the general population, especially on adults and the elderly [37, 38].

Numerous risk factors for the development of IDA in Saudi women of reproductive age have been identified [28]. Dietary habits, menorrhagia, a history of NSAID usage, and a personal or family history of IDA are also risk factors [27, 29, 36, 38]. There is substantial evidence suggesting a negative relationship between reduced meat intake and an increased risk of acquiring IDA [26]. As noted in other research, irregular meals and missing meals, especially skipping breakfast, are risk factors for IDA [28]. The rate of anemia is related to how often people skip breakfast [36]. Citrus fruits are rich in vitamin C, and vitamin C has been found to improve iron absorption from nonheme meals [32]. Several investigations have shown a strong association between IDA and a family history of genetic abnormalities; however, further studies are required to corroborate this [36]. The Saudi population consumes significantly fewer multivitamin and mineral supplements compared to many other countries, which may contribute to the high prevalence [39]. Microcytic anemia is more frequent in females owing to malnutrition, increased blood loss related with pregnancy and menstruation, and a shortage of iron absorption, while normocytic anemia is more common in males due to blood loss and chronic diseases [25]. Similarly conducted research corroborate our findings. It was found that 11.68% prevalence of anemia in the elderly [24] is in line with a report by Alsaeed who observed a 12.9% prevalence among the elderly (>60 years) [38]. Research [24] results showed that the

incidence of anemia grew with age in men, but decreased steadily in women from the fifth to the ninth decades. The prevalence of anemia was highest in women of reproductive age. Interestingly, normocytic anemia was more prevalent in the fifth to ninth decades, suggesting that anemia is caused by more than iron deficit [24]. This finding is in line with findings from another Saudi Arabian study [40], which found that macrocytic anemia accounted for less than 2% of reported instances of anemia.

There has to be new research done to find out what causes anemia in the elderly. As polyphenols are found in abundance in tea, drinking it may help prevent anemia in the elderly. Inhibition of non-heme iron absorption by polyphenols. In Saudi Arabia, it is customary to consume tea before and after meals [35]. According to a study conducted in China, the high prevalence of anemia among the middle-aged population and elderly was caused by factors such as insufficient consumption of citrus fruits, reduced consumption of red meat, eggs, vegetables, and dairy, and excessive consumption of cereals, cooking oil, and salt, all of which were prevalent among the middle-aged and elderly population in China [27]. The radical move away from the traditional Saudi diet of dates, milk, rice, fresh vegetables, and seafood toward junk food and less green vegetables and fruits is another factor to consider [33]. Anemia is also associated with obesity and malnutrition [33, 41], two other well-known risk factors. Being overweight or obese is linked to anemia because it is a chronic inflammatory process [41]. Among the elderly, anemia is common, and it's been linked to higher mortality, disability, and diminished functional capacity [38]. Early identification of anemia in the elderly is crucial for timely intervention and therapy since the features of a person's red cells are influenced by several variables, including a person's ethnicity, smoking status, nutritional deficiency, and altitude of residence. Anemia is not always visible in the elderly, so it's important to try to figure out what's causing it. The blood levels of erythropoietin, ferritin, folic acid, and vitamin B12 should be checked. Additionally, Saudi Arabia has high incidence of risk factors such as obesity and an unhealthy lifestyle [33].

The World Health Assembly (WHA) has set the year 2025 as a target date for a worldwide effort to reduce anemia via nutrition [23]. There is a lack of studies tracking regional improvements in anemia burden reduction and the methods and treatments that have been used. Anemia rates have not significantly decreased over the last decade in Saudi Arabia [23], and the trend over the past decade does not suggest a significant increase. The deteriorating state of public health in the country may be traced back to below-par public awareness campaigns [35]. For anemia prevention and control, Saudi Arabia should use a community-based, multi-sectoral approach. Along with dietary deficiencies, non-nutritional causes of anemia such as acute and chronic parasite infections and genetic disorders such as thalassemia, G6PD deficiency, and sickle cell trait must be treated [23].

CONCLUSION:

Our research revealed a significant incidence of anemia among study participants. When compared to the male population, anemia is more common among females. Microcytic anemia was the most frequent kind of anemia in women, especially in the reproductive age range of 15 to 49, whereas normocytic anemia was more common in men. Both men and women were more likely to have mild or moderate anemia, although more women than men were affected with severe anemia. The government of Saudi Arabia has to take action to reduce the rate of anemia among its citizens.

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