

# To Investigate The Prevalence And Incidence Of Anaemia And Its Comorbidities In The Gandhinagar Population

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## Abstract

**Background:** Anaemia is a major public health issue that affects 2 billion people worldwide, affecting people of all ages and genders. According to the WHO, iron deficiency anaemia is the leading cause of anaemia, accounting for 50% of all cases.

**Methodology:** An observational study was carried out at Gandhinagar, Gujarat from November 2015 to March 2016. A complete blood count (CBC) report of patients were collected directly from patient's laboratory report and entered in structured case report form. The Questionnaire, to obtain information regarding life style, food habits, socioeconomic status and medical history was filled by the patients.

**Results:** A total of 521 patient's data were collected in which 146 (48.66%) males and 154 (51.33%) females were suffering from anaemia. In anaemic patients 131 (43.66%) patient were microcytic anaemic, 125 (41.66%) were normocytic and 44 (14.66%) patient were macrocytic anaemic. Out of 300 anaemic patients, 231 (76.15%) were in age group of 16-50 years. Majority of patients seems to be suffering from the nutritional anaemia due to poor consumption of diet. Majority of anaemic patients belonged to upper-middle class and upper-lower class family. There were no significant differences of the smoking, tobacco, alcohol consumption with anaemia.

**Conclusion:** According to our data, poor dietary habits seem to be major cause for anaemia. Lack of awareness about the disease worsens the problem. Awareness programs at community levels by health agencies can significantly help in reducing the burden of the diseases.

**Keywords:** Anaemia causes, IDA, Iron deficiency anaemia, global public health, ACD

## INTRODUCTION

Anaemia is a medical condition in which the red blood cell (RBC) count or haemoglobin level is lower than normal.<sup>[1,2]</sup> Anaemia is mostly brought on by viral diseases including malaria, hookworm infections, and schistosomiasis, shortages of other important micronutrients like folate, vitamin B12, and vitamin A, or inherited disorders that damage red blood cells (RBCs), such thalassemia.<sup>[3-6]</sup> Iron is very essential for the formation of Red blood cells, anaemia can develop from a decrease in red blood cell formation caused by a lack of iron in the body.<sup>[7-9]</sup> It is a common condition, affecting an estimated 3.5 billion people worldwide, including both children and adults. Anaemia, which

affects 2 billion people globally and affects both sexes and all age groups, is a serious public health issue.<sup>[10-12]</sup> According to the WHO, iron deficiency anaemia was the main cause of anaemia in 50% of cases.<sup>[13-15]</sup>, but other factors can contribute to the development of the disease, such as chronic inflammation, blood loss due to menstruation or ulcers, and certain diseases or conditions.<sup>[16-18]</sup> In these circumstances, anaemia sets in because the body is unable to replenish lost red blood cells in a timely manner. As a result, anaemia was seen to be more common in developing countries (43%), compared to

developed countries (9%).<sup>[19-21]</sup> Anaemia can have serious implications for health, including fatigue, impaired cognitive function, and a weakened immune system.<sup>[13,22,23]</sup> The goal of the current study was to determine the prevalence of anaemia and its related complications in the residents of the Gandhinagar, Gujarat region by implementing observational research between November 2015 and March 2016. The data was collected in a structured case report format, a complete blood count (CBC) report for each patient was obtained directly from the patient's laboratory report and the patients filled out a questionnaire to provide details on their lifestyle, eating habits, socioeconomic background, and medical information.

## **MATERIALS AND METHODOLOGY**

The entire study is based on secondary analysis that relies on works of literature and research materials provided by eminent scholars and professional medical practitioners. The reference to the relevant articles and medical reports relating results from research conducted by the professional on a variety of cases of Anaemia and different demographic and conditional associations, followed by cases of exception, has helped in developing the discussion in the study. Hence, for the purpose of the study previous reports and articles are the main materials that would help in accomplishing the study, and the applied methodology encircles the case study-specific secondary research approach. A study protocol was created and submitted to the Gandhinagar-based K.B. Institute of Pharmaceutical Education and Research's institutional ethics committee. Project approval has been given (Protocol number: KBIEC/2015/59).

### ***Inclusion criteria***

- Patients undergoing full blood counts were involved in the trial,
- Patients' willingness to take part in the study and sign informed permission forms was also a requirement.

### ***Exclusion criteria***

- People who suffer from chronic renal failure
- Patients taking cytotoxic or anticancer medications
- People who have sickle cell anaemia, thalassemia, or other chronic haematological diseases that run in their families.
- Individuals who have recently been introduced to radioactive materials.

Based on a literature review, a self-generated questionnaire was created that asks about socio-demographic factors like age, educational attainment, family structure, monthly income, dietary history, and pertinent medical histories like hypertension, malaria, and worm infestation. In order to gather information about the patients' education, employment status, and family income, a modified Kuppusswami scale was used. A questionnaire was utilised to gather data from the patient regarding their socioeconomic status, sociodemographic characteristics, dietary habits, and medical history. The results were expressed in terms of number and percentage. The data were analysed by using the Spearman rank coefficient to determine a correlation between different risk factors and the severity of anaemia.

### ***Sample size:***

300–500 anaemic patients were enrolled in accordance with the inclusion criteria.

### ***Study procedure:***

The patients were selected on the basis of inclusion and exclusion criteria.



The patients filled the informed consent form prior to inclusion in the study.



The questionnaire was used to collect the information from patient about socioeconomic, socio-demographic, food intake and medical history.



The data analysis was done by using Spearman rank correlation and one way ANOVA test.

### ***Statistical analysis:***

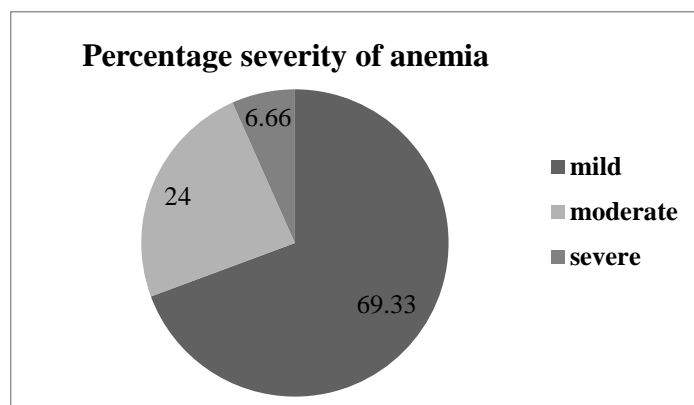
The results were expressed in terms of number and percentage. The data were analysed by using the Spearman rank coefficient to determine the correlation between different risk factors and the severity of anaemia. One-way ANOVA followed by post-hoc Tukey's test using graph pad prism was conducted to determine statistical significance between the two groups. P value of less than 0.05 was considered a significant difference.

## **RESULTS**

The complete blood count reported of subjects approaching the pathology lab was recorded. Additionally, a questionnaire on signs & symptoms and their lifestyle was provided to them. The data obtained through them were analysed and the obtained results are summarized here.

**1. Prevalence of anaemia in subjects undergoing haematocrit analysis:**

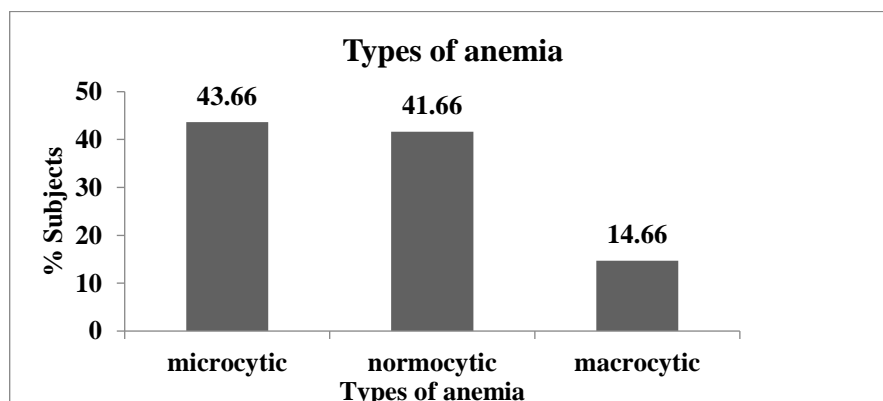
Three hundred of five hundred twenty one subjects were found to have haemoglobin levels less than 12 g and were closed as anaemic. One of this 300 anaemic subjects 208(69.33%) had mild anaemia (hb: 10-12g ), 72(24g) had moderate (hb: 10-7g ) and 20(6.66g) had severe anaemia (hb: <7g) (Figure 1).



**Figure 1** Percentage severity of anaemia

**2. Types of anaemia based on RBC size:**

Based on Mean Corpuscular Volume (MCV) value, the anaemic subjects were further categorized as microcytic, normocytic and macrocytic anaemic subjects. Microcytic anaemia in 131 subjects (43.66%), Normocytic anaemia was found in 125 subjects (41.66%) and Macrocytic anaemia was found in 44 subjects (14.66%) (Figure 2).

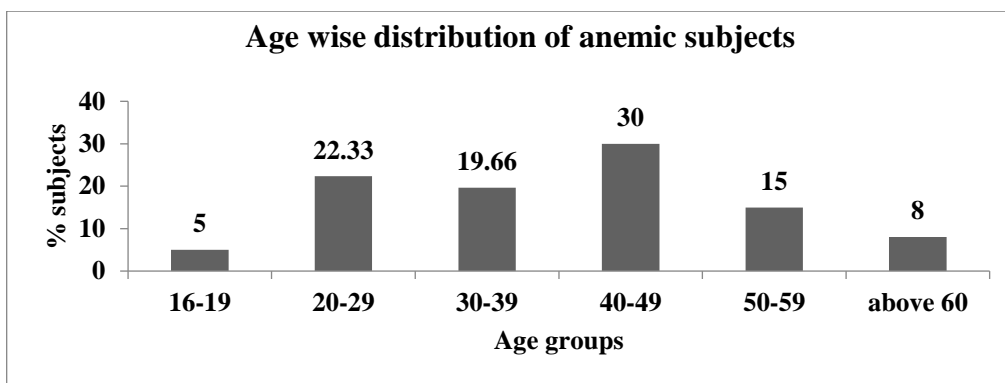


**Figure 2:** Types of anaemia

**Demographic details of subjects:**

**Age wise distribution of anaemic subjects:**

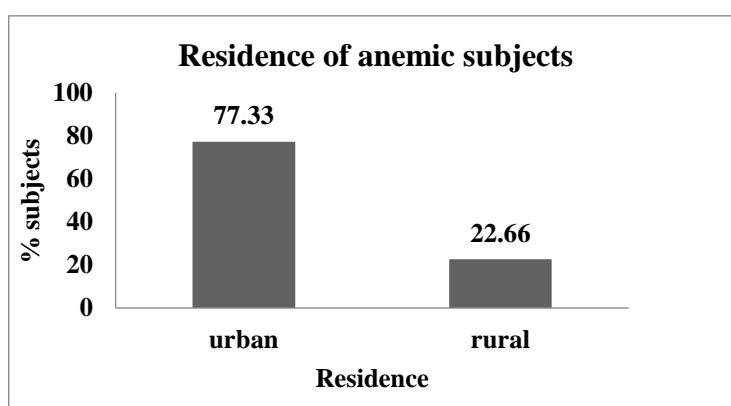
Most subjects who had anaemia fall in to the age group of 40-49 years (30%). Only 5% fall into 16-19 years age group and 8% fall in the age above 60 years group. The age wise prevalence of anaemia is summarized in the (Figure 3).



**Figure 3** The figure represents distribution of anaemic subjects in various age groups. Each bar represents percentage of anaemic subjects in particular age groups.

**Residence status of anaemic subjects:**

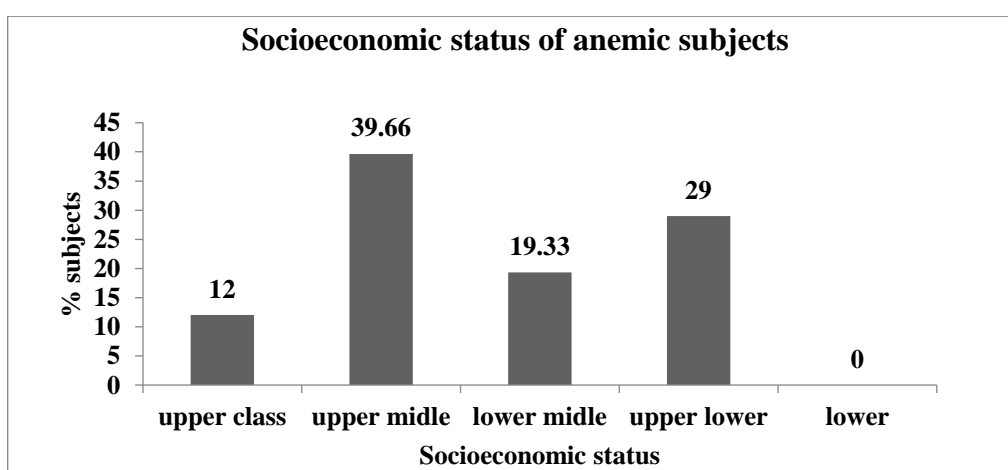
The numbers of anaemic patients enrolled in the study according to their residence were categorized in to urban and rural in which 77.33% patients belonged to urban area whereas 22.66% patients belonged to rural area (Figure 4).



**Figure 4** Residence status of anaemic subjects

**Socioeconomic status:**

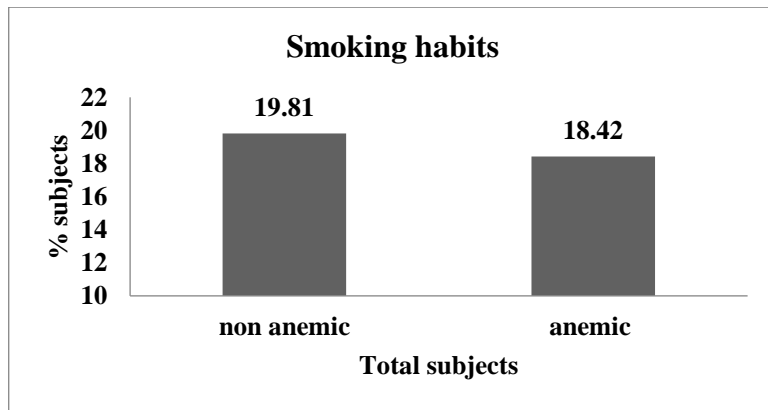
Each bar in the (Figure 5) indicates the socioeconomic status of the subjects. The maximum number of subjects enrolled in the study was from the upper middle class 39.66% the patients who belonged to the upper class were 12%, the lower middle class were 19.33% and the upper lower class was 29% respectively. The lower class could not report their status due to their financial inability.



**Figure 5** Socioeconomic status

**3. Addiction: Smoking habits:**

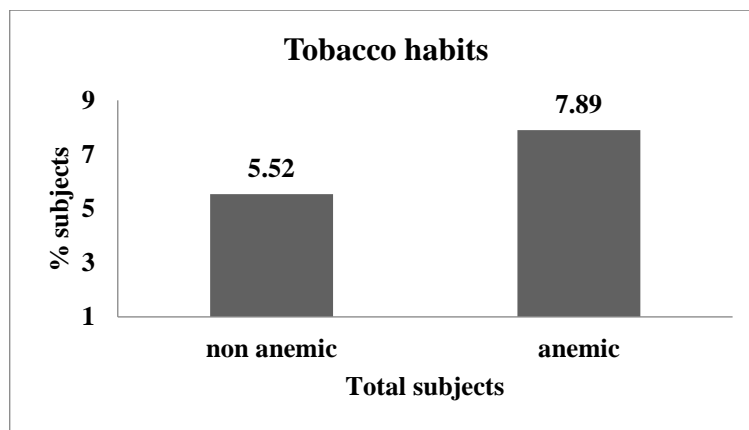
The figure indicates the smoking habits of the subjects. The subjects with the anaemic conditions had smoking habits of 18.42% and non-anaemic subjects had 19.81% (Figure 6).



**Figure 6** Smoking Habits

**Tobacco habits:**

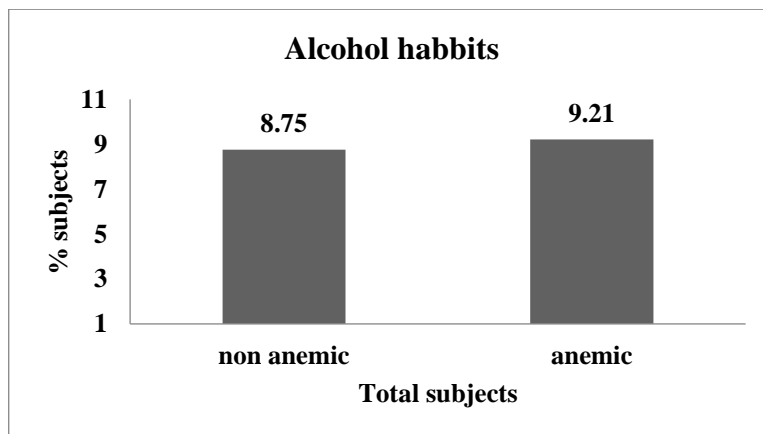
The figure indicates the Tobacco habits of the subjects. The subjects with the anaemic conditions had tobacco habits of 7.89% and non-anaemic subjects had 5.52% (Figure 7).



**Figure 7** Tobacco Habits

**Alcohol consumption:**

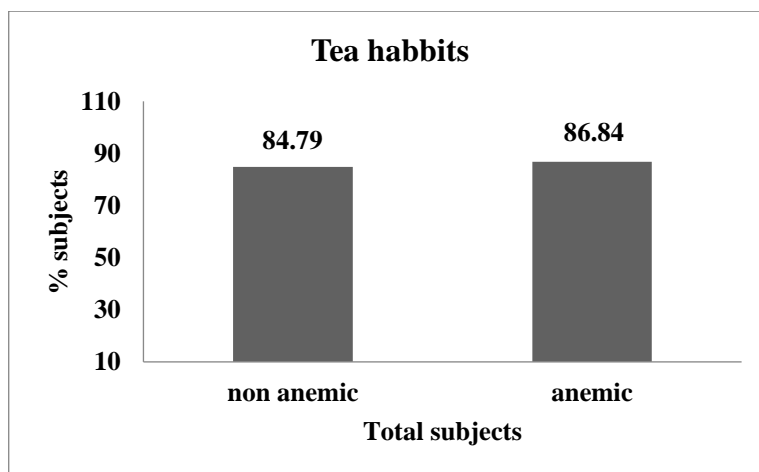
The figure indicates the alcohol consumption of the subjects. The subjects with the anaemic conditions had alcohol consumption habits of 9.21% and non-anaemic subjects had 8.75% (Figure 8).



**Figure 8** Alcohol Habits

**Tea habits:**

The figure indicates the tea consumption habits of the subjects. The subjects with the anaemic conditions had tea consumption habits of 86.84% and non-anaemic subjects had 84.79% (Figure 9).

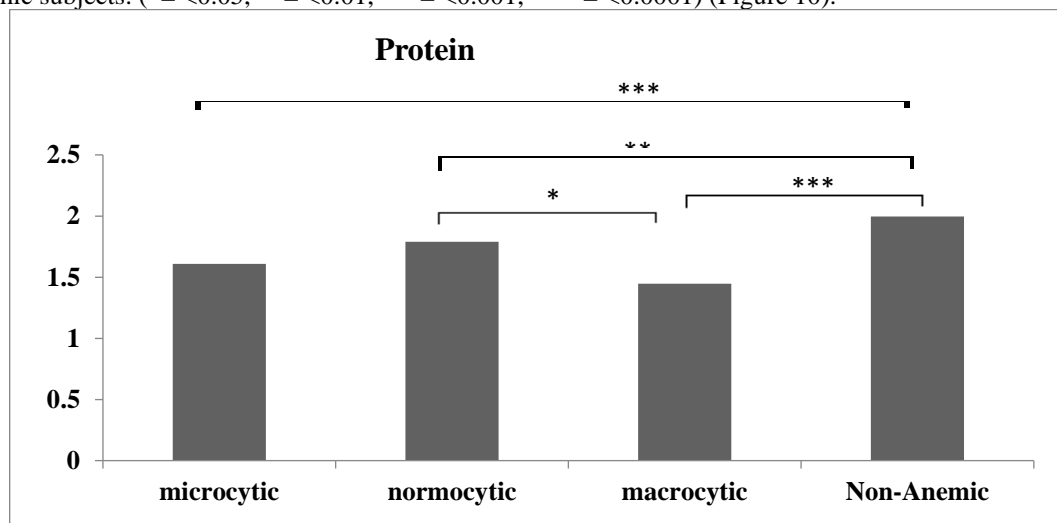


**Figure 9** Tea Habits

**Diet:**

Comparison of the frequency of consumption of macronutrient rich diet in anaemic and non-anaemic subjects is given below:

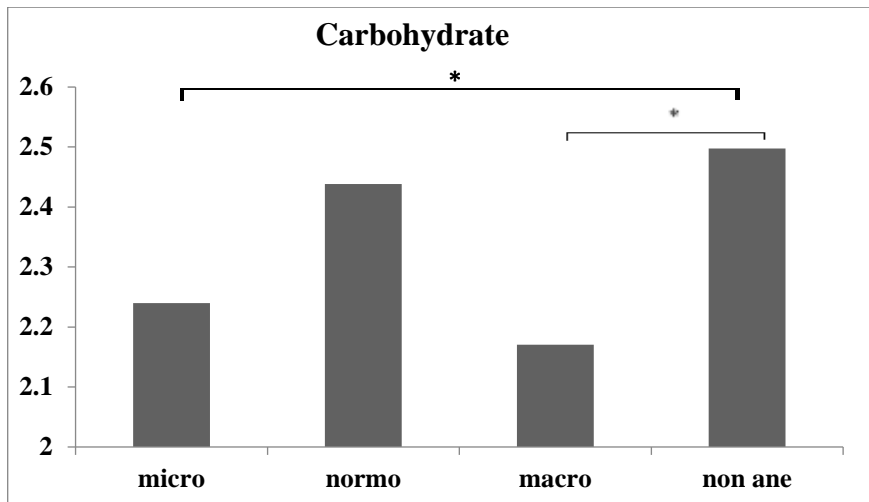
**Protein:** The frequency of consumption of protein was found to be higher in normocytic anaemic subjects than in the microcytic and macrocytic subjects. In addition to that the protein in consumption was observed significantly higher in non-anaemic subjects. (\*= <0.05, \*\*= <0.01, \*\*\*= <0.001, \*\*\*\*= <0.0001) (Figure 10).



**Figure 10** Consumption of Protein

**Carbohydrate:**

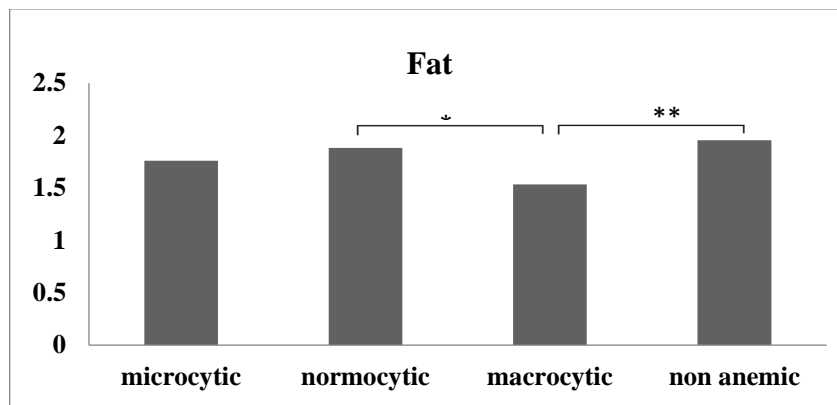
The frequency of consumption of carbohydrates was found to be higher in non-anaemic subjects than the microcytic and macrocytic subjects. In addition to that carbohydrate in consumption was observed significantly in microcytic and non-anaemic subjects. (\*= <0.05, \*\*= <0.01, \*\*\*= <0.001, \*\*\*\*= <0.0001) (Figure 11).



**Figure 11** Consumption of carbohydrates

**Fat:**

There was a significant difference in macrocytic and non-anaemic subjects. (\*= <0.05, \*\*= <0.01, \*\*\*= <0.001, \*\*\*\*= <0.0001) (Figure 12).

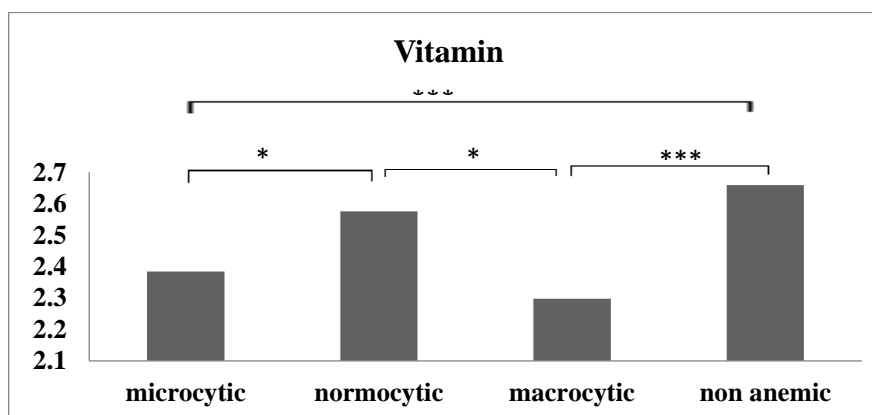


**Figure 12** Consumption of fat

**6. Comparison of frequency of consumption of macronutrient rich diet in anaemic and non-anaemic subjects:**

**Vitamins:**

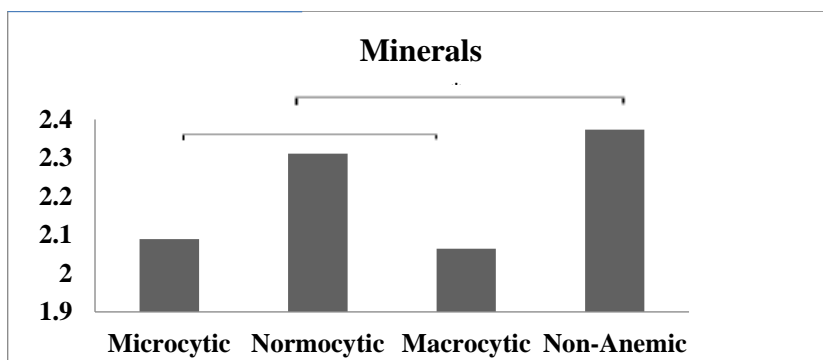
The consumption of vitamins in subjects shows a significant difference in microcytic anaemia and non-anaemic subjects. (\*= <0.05, \*\*= <0.01, \*\*\*= <0.001, \*\*\*\*= <0.0001) (Figure 13).



**Figure 13** Consumption of vitamins

**Minerals:**

The frequency of consumption of minerals in subjects was a significant difference in normocytic anaemia and non-anaemic subjects. (\*= <0.05, \*\*= <0.01, \*\*\*= <0.001, \*\*\*\*= <0.0001) (Figure 14).



**Figure 14** Consumption of minerals

**7. The distribution of subjects according to their co-morbidity:**

The percentage indicates the co-morbidity found in anaemic subjects, in which it was found that the majority of subjects were suffering from chronic hypertension and considerable (10.33%) subjects were suffering from diabetes mellitus. It was observed that 48% of subjects were having no co-morbidities (Table 1) (Figure 15).

**Table 1** Co-morbidity

No.	Co-morbid	Percentage (%)
1	Chronic hypertension	<b>17.33</b>
2	Diabetes Mellitus	<b>10.33</b>
3	Renal diseases	6.00
4	Rheumatoid arthritis	5.33
5	Hypothyroid	4.06
6	Malaria	3.66
7	Jaundice	3.00
8	T.B	2.00
9	General warm infection	1.66
10	Depression	0.66
11	cardiac diseases	0.66
12	History of bleeding other than menstruation and delivery	0.66
13	Amebiasis infection	0.33
14	None	48

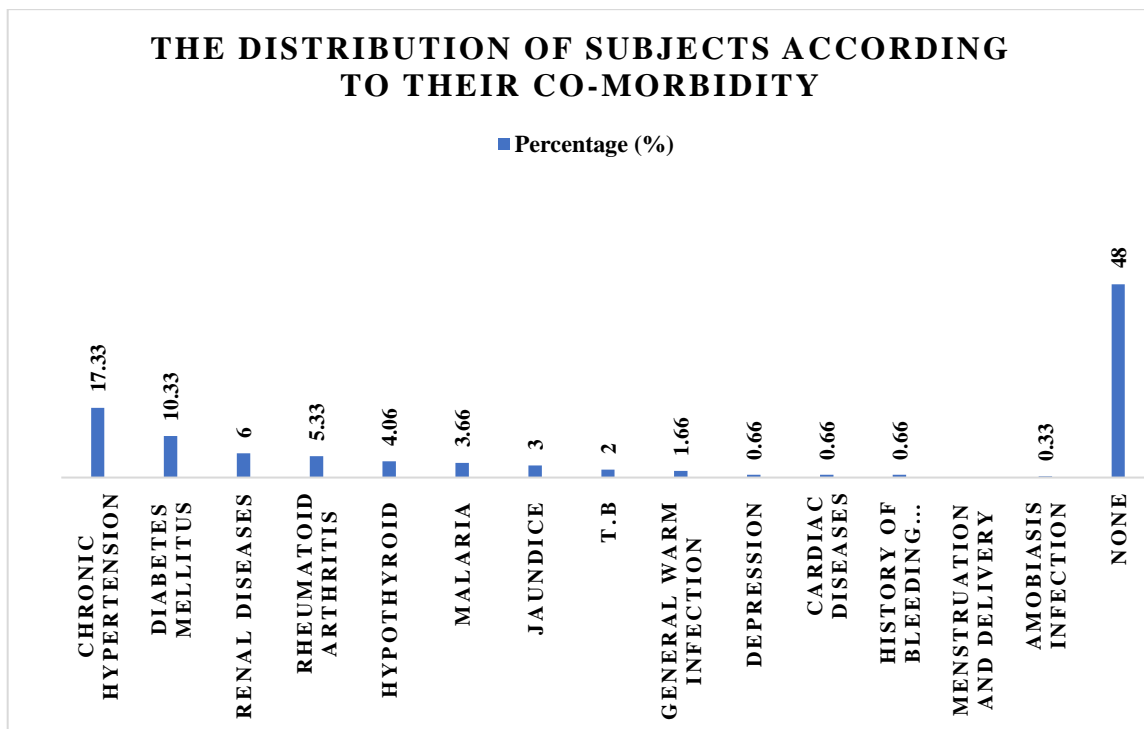


Figure 15 Co-morbidity

8. *Symptoms of anaemia*: Percentage severity of symptoms of anaemia are given below (Table 2) (Figure 16):

Table 2 Percentage (%) severity of symptoms in anaemia

Symptoms	Non-anaemia (n=221)	Mild anaemia	Moderate anaemia	Severe anaemia
Chest pain	6.91	10.62	20.27	13.04
Shortness of breath	7.83	8.21	18.91	30.43
Palpitation	15.20	18.84	35.13	26.08
Irritability	23.04	27.53	44.59	34.78
Decrease exercise tolerances	6.91	10.62	25.67	17.39
Fatigue	20.27	29.46	54.05	47.82
Dizziness	15.20	47.82	39.18	21.73
Weakness	51.15	69.56	74.32	65.21
Vertigo	10.13	12.07	36.48	26.08

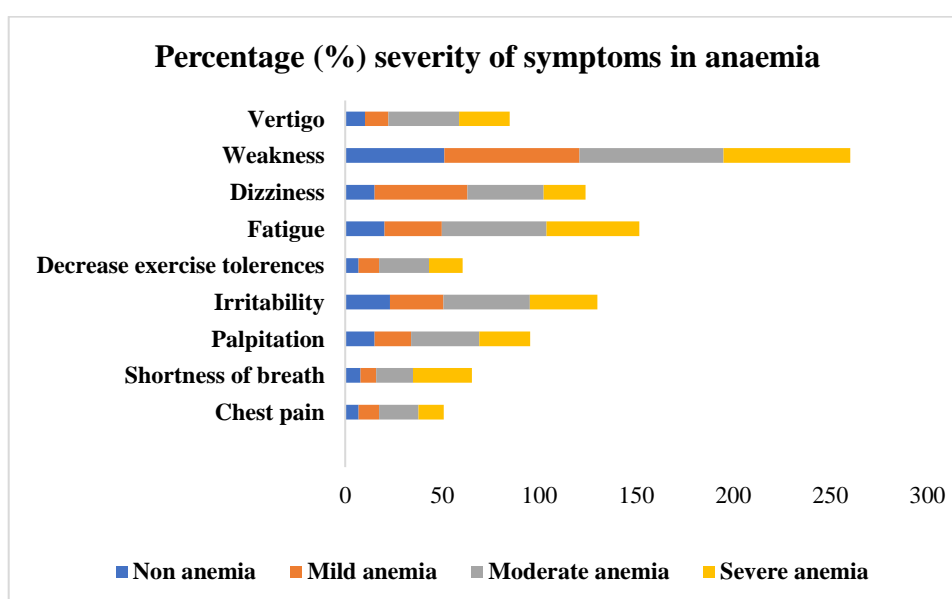


Figure 16 Percentage (%) severity of symptoms in anaemia

## DISCUSSION:

Anaemia is a common and potentially serious disorder that can have a significant impact on the health and well-being of an individual [24,25] and can also have a significant influence on an individual's quality of life. [26] It has been linked to a wide variety of symptoms, some of which include fatigue, weakness, and impaired cognitive functioning. [27-30] While there are numerous causes of anaemia, the most common is iron deficiency. Iron deficiency anaemia can be treated through dietary interventions, supplementation and in severe cases, blood transfusions. [27,31-33] While anaemia can be diagnosed, it is a treatable condition with an excellent prognosis. [34-36] It is therefore important for healthcare practitioners to be aware of the signs, symptoms and treatments associated with anaemia, so that early diagnosis and management can be achieved. [37-39] Through proper diagnosis and treatment, individuals can return to their previous levels of health and functioning. It is important to recognize the signs and symptoms of anaemia in order to identify those at risk and ensure they receive the appropriate medical care. With proper diagnosis and management, anaemia can be managed and individuals can lead healthy lives free from its debilitating effects. [39-42] It is important to remember that anemia is multifactorial, and its occurrence may be due to the presence of cancer, inflammatory diseases, kidney disease, diabetes, hypertension, and the use of several drugs commonly required in the elderly population. [43-47] Nevertheless, further investigations of the cause of anemia and the completion of treatment may help to improve clinical conditions in the elderly population.

## CONCLUSION AND FUTURE PROSPECTIVE:

In our study, we included a total of 521 patient records, and anaemia was present in 146 (48.66%) of the male patients and 154 (51.33%) of the female patients. In anaemic individuals, 44 (14.66%) had macrocytic anaemia, 131 (43.66%) had microcytic anaemia, and 125 (41.66%) had normocytic anaemia. Total number of 231 (76.15%) of the 300 anaemic patients were between the ages of 16 and 50. The majority of individuals appear to have nutritional anaemia as a result of poor diet consumption and also vitamins, minerals, and proteins all significantly correlated with most anaemic patients came from upper-middle class or upper-lower class families. The relationship between anaemia and smoking, drinking, or using tobacco was not significantly different.

In the future, further research needs to be conducted on anaemia in order to better understand its causes, symptoms and possible treatments. Additionally, research should look into how to better educate individuals on anaemia prevention and management strategies. [48-50] The future prospect should also focus on the development of novel treatments for anaemia. As the understanding of anaemia increases, so too will our ability to develop effective treatments and improve the quality of life for those living with the condition.

## CONFLICT OF INTEREST:

The authors declare no conflict of interest regarding this work.

## FUNDING:

None

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