Original Article

A Study of Correlation between Sociodemographic Data and Anaemia Proxies among Women and Children

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Abstract - The aim of this prospective cohort study, which was carried out over a period of six months at the government district headquarters medical college hospital in Nagapattinam, is to examine the relationship between sociodemographic information and proxies for anaemia in women, children, and the elderly. The most prevalent disease, anaemia, affects up to one-third of the world's population. Children under the age of 5, infants, and young children under the age of two, as well as women who are of reproductive age, are the population groups most at risk for anaemia. In the study, 60 people with anaemia and only 53 people from 11 to over 50 years old had their Spearman correlation performed. Severe anaemia is the most prevalent type of anaemia, and in this study, women over 50 were the age group most frequently affected. The relationship between various sociodemographic parameters and laboratory characteristics is demonstrated by the spearman correlation. The frequency distribution of anaemia proxies, sociodemographic factors, and lifestyle traits are found to correlate directly with anaemia in patients.

Keywords - Anaemia, Anaemia proxies, Children, Sociodemographic parameters, Spearman correlation, Women.

1. Introduction

One third of the world's population suffers from anaemia, which increases morbidity and mortality, leads to poor birth outcomes, lower productivity at work, and impairs cognitive and behavioural development.[1]anaemia is a common condition that affects both developing and wealthy nations and is seen as a public health concern.[6]A reduction in either haemoglobin concentration (Hgb) or red blood cell volume (RBCs), which lowers the blood's capacity to carry oxygen, defines a group of illnesses known as anaemia.[4]Women and young children are the main populations impacted by anaemia.[3]Anaemia is most frequently identified by low HB concentration or low hematocrit readings, however it can also be identified by RBC count or mean corpuscular volume.[1]Fatigue, poor appetite, shortness of breath, throbbing pulses or palpitations, as well as conjunctival and palmar pallor, are some of the most prevalent clinical signs of anaemia that are explained by Hb's function in transporting oxygen to the tissues.[1,7,8,9,11] The following are the typical ranges of haemoglobin [Hb]:Women: 12.5 to 15.0 g/dL, Children: 11.0–16.0 g/dL.[2] Anaemia may be a separate risk factor for mortality, according to retrospective and observational studies of hemodialysis patients and people with congestive heart failure.[4] Over 20% of those over the age of 85 have anaemia. About 50%–60% of residents of nursing homes have anaemia.[2] RBC size determines whether anaemia is macrocytic, normocytic, or microcytic. Macrocytic anaemias include vitamin B12 insufficiency and folic acid inadequacy. Iron deficiency is one cause of microcytic anaemia, but a chronic illness or recent blood loss might result in a normocytic anaemia.[4]Reduced production due to iron and folic acid deficiencies, as well as a rare deficit in vitamin B12, are prominent causes of anaemia in India.[16] Other rare types of anaemia includes Sickle cell anaemia, Diamond-Blackfan anaemia, Mediterranean anaemia, and Fanconi anaemia.[13]Anaemia can be caused by a lack of red blood cells (RBCs), an increase in RBC destruction, an acceleration in the loss of RBC bulk, or it can be a symptom of a variety of systemic diseases such infections, chronic kidney diseases, or any type of cancer.[4] Food deficits in nutrients required for healthy erythropoiesis, such as iron, folic acid, and vitamin B12 (cyanocobalamin), are the root cause of nutritional anaemias. [5]Iron supplements and diet modification are used to treat Iron deficiency anaemia, and Vitamin or folic acid supplements are used to treat Vitamin-B12 or Folate deficiency anaemia. [14] The purpose of this study was to examine the correlation between anaemia proxies and sociodemographic information in anaemic patients. The study's further goals include examining anaemia's causes, severity, related comorbidities and recommended medications.

2. Materials and Methods

In this prospective cohort study, which took place from April 2022 to September 2022 at the government district medical college hospital in Nagapattinam, data were gathered from children (under the age of 10) and women (over the age of 20) who were hospitalised after being diagnosed with anaemia. The statistical package for social sciences (SPSS Inc., Chicago, IL, USA) version 16.0 was used to analyse the data. The correlation between anaemia proxies and sociodemographic characteristics was tested using Spearman correlation coefficients.

3. Results

3.1. Information About the Study Population in General

According to the criteria for enrolment, 61 patients out of the numerous ones were included in the study. Children were found to make up 13.11% [n = 8] of the study group, and women made up 86.89% [n = 53]. According to the patients' age distribution, the age group >50 years has the highest percentage of patients (32.8 [n = 21]), followed by the age group 40–49 years (19.7 [n = 12]). The age group distribution revealed that women [> 20 years] are more impacted, at 77.0% [n = 47].

3.2. Frequency Distribution of Aneemia Proxies

Severe anaemia was more common than normal according to Hb values [73.8%]. HCT levels were discovered to be low [100%]. RBC levels are discovered to be low [78.7%]. MCV levels are discovered to be low [93.4%]. MCH levels are discovered to be low [93.4%]. Low [85.2%] amounts of MCHC are discovered. Ferritin levels were not found [98.4%]. According to BMI, normal people have developed anaemia [36.1%] and are underweight [31.1%].

3.3. Characteristics of Sociodemographic and Lifestyle

Class 4 was most impacted [36.1%] in terms of family income. Patients with no formal schooling are severely impacted regarding educational status [31.1%]. Women who are married are more likely to be affected [47.5%]. A greater percentage of homemakers [50.8%] are affected. Women who are menstruating are severely affected [44.3%]. Women with children in the normal category are severely impacted [42.6%].In nuclear families, anaemia is more prevalent [73.8%]. Dietary habits involving non-vegetarian meals frequently result in anaemia [95.1%].

3.4. Knowledge of the Study Participants Regarding Anaemia

Anaemia is most frequently brought on by an improper diet (44.26%), followed by unknown causes (24.59%), and iron deficiency (13.11%). The most typical kind of anaemia found in anaemia patients is unclassified severe anaemia (72.13%). According to findings from peripheral smear tests, microcytic hypochromic anaemia [49.18%] is the most prevalent kind. The most frequent comorbidity with anaemia is systemic hypertension (19.67%), followed by diabetes mellitus (11.47%).

3.5. Treatment of Anaemia

The most popular therapies for anaemia are vitamin B supplements [98.36%], iron supplements [96.72%], and blood transfusions [67.21%]. The most often given medications to patients for the treatment of anaemia are T. ferrous sulphate [73.77%], followed by T. vitamin B complex [98.36%]. The medication most frequently provided for anaemia brought on by infection is tab. albendazole (70.49%).

4. Statistical Analysis

4.1. Spearmen Correlation Between Laboratory Data And Sociodemographic Factors

4.1.1. Hb and sociodemographic Data

Family type is correlated with moderate anaemia. Diet type is correlated with severe anaemia. Diet type is highly correlated with mild anaemia.

4.1.2. MCV and sociodemographic Data

Diet type is correlated with low MCV values.

4.1.3. MCH and Sociodemographic Data

Menstrual status is correlated with a high MCH value. Family type is correlated with a high MCH value. Diet type is correlated with low and normal MCH values.

4.1.4. MCHC and Sociodemographic Data

Menstrual status is correlated with a high MCHC value. Family type is correlated with a low MCHC value.

4.1.5. Ferritin and Sociodemographic Data

Lactating women are correlated with low ferritin values. Family type is correlated with low ferritin values.

4.1.6. BMI and Sociodemographic Data

Education is correlated with being underweight. Education is correlated with normal weight. Menstruating consistency is correlated with normal weight.

Table 1. Frequency distribution of socio-demographics and lifestyle characteristics of study subjects (N = 61)

CHARACTERISTICS	VARIABLES	FREQUENCY	PERCENTAGE
AGE GROUP	Less than 1 year	1	1.6
	1 to 5 years	7	11.5
	11 to 19 years	6	9.8
	20 to 29 years	5	8.2
	30 to 39 years	10	16.4
	40 to 49 years	12	19.7
	50 years and above	20	32.8
GENDER	Male	4	6.6
	Female	57	93.4
INCOME	Class 1 [more than 15000]	8	13.1
	Class 2 [10000-15000]	11	18.0
	Class 3 [6000-10000]	7	11.5
	Class 4 [3000-6000]	22	36.1
	Class 5 [less than 3000]	13	21.3
EDUCATION	No formal schooling	19	31.1
	Primary	11	18.0
	Middle and High	18	29.5
	Bachelors	4	6.6
	Masters	1	1.6
	Yet to start schooling	8	13.1
MARITAL STATUS	Unmarried	17	27.9
	Married	29	47.5
	Divorced	2	3.3
	Widow	13	21.3
WORK STATUS	Unemployed	16	26.2
	Homemaker	31	50.8
	Employed	14	23.0
MENSTRUAL STATUS	Not applicable	9	14.8
	Menstruating	27	44.3
	Menopaused	25	41.0
FREQUENCY OF MENSTRUATION	Not applicable	34	55.7
	Regular	15	24.6
	Irregular	12	19.7
DURATION OF MENSTRUATION	Not applicable	34	55.7
	Low [less than 3 days]	2	3.3
	Normal [3 – 7 days]	18	29.5
	High [more than 7 days]	7	11.5
MENSTRUATION CONSISTENCY	Not applicable	34	55.7
	Low normal	2	3.3
	Normal	3	4.9
	Abnormal	6	9.8
	Watery	3	4.9
	Don't know	13	21.3
LACTATING WOMEN	No	44	72.1
	Not applicable	17	27.9
NUMBER OF CHILDREN	Not applicable	17	27.9
	Normal [less than or equal to 2]	26	42.6
	Abnormal [more than 2]	18	29.5
FAMILY TYPE	Nuclear	45	73.8
	Joint family	16	26.2
DIET TYPE	Vegetarian	3	4.9
	Non – vegetarian	58	95.1

Table 2. Frequency distribution of anaemia proxies and BMI of the respondents(N = 61)

ANAEMIA PROXY	PROXIES CLASSIFICATION	FREQUENCY	PERCENTAGE
Hb	Severe [less than 7] Moderate [7 – 10] Mild [10 – 12]	45 15 1	73.8 24.6 1.6
HCT	Low [less than 36%] Normal [more than 36%]	61 0	100.0 0
RBC	Low [less than 3.8] Normal [3.8 – 5.2]	48 13	78.7 21.3
MCV	Low [less than 80 fL] Normal [80 – 94 fL]	57 4	93.4 6.6
MCH	Low [less than 27pg] Normal [27 – 31 pg] High [more than 31 pg]	57 3 1	93.4 4.9 1.6
MCHC	Low [less than 32 g/dL] Normal [32 – 36 g/dL] High [more than 36 g/dL]	52 7 2	85.2 11.5 3.3
FERRITIN LEVELS	Don't know Iron depletion (Low) [less than 15 µg/L] Moderate [15–100 µg/L] High [>100 µg/L]	60 1 0 0	98.4 1.6 0 0
BMI CATEGORY	Normal [18.5 – 24.9] Underweight [less than 18.5] Overweight [more than or equal to 25.0] Obese [more than 30.0]	22 19 17 3	36.1 31.1 27.9 4.9

Abbreviation: N-number of respondents.

Table 3. Spearman Correlation Between Sociodemographic Data and Anaemia Proxies of Respondents (n=53)

Independent Variables/ Dependent Variables	Sociodemographical characters													
	Age	Income	Education	Marital Status	Work Status	Menstrual status	Frequency Of menstruation	Menstrual Cycle status	Duration In days	Lactating women	Number Of children	Family type	Diet	Menstrual consistency
Hb														
Severe	0.088	0.016	-0.086	-0.13	0.102	-0.013	-0.121	-0.121	0.058	-0.141	0.038	0.249	-0.347*	-0.012
moderate	-0.123	-0.005	0.127	0.003	-0.115	0.094	0.082	0.082	-0.103	0.125	-0.053	-0.279*	0.129	-0.03
Mild	0.099	-0.038	-0.119	0.03	0.031	-0.145	0.133	0.133	0.133	0.063	0.045	0.071	0.700**	0.132
RBC														
Low	0.205	-0.151	-0.220	0.196	-0.035	0.128	-0.104	-0.104	-0.014	-0.125	-0.018	-0.055	-0.129	-0.116
normal	-0.205	0.151	0.220	-0.196	0.035	-0.128	0.104	0.104	0.014	0.125	0.018	0.055	0.129	0.116
MCV														
Low	-0.097	-0.017	-0.115	0.018	0.056	-0.192	-0.066	-0.066	0.097	-0.129	0.133	0.030	-0.318*	0.065
Normal	0.097	0.017	0.115	-0.018	-0.056	0.192	0.066	0.066	-0.097	0.129	-0.133	-0.030	0.318	-0.065
MCH														
Low	-0.097	-0.017	-0.115	0.018	0.056	-0.192	-0.066	-0.066	0.097	-0.129	0.133	0.030	-0.318*	0.065
Normal	0.114	0.042	0.036	0.053	-0.082	0.061	-0.003	-0.003	-0.189	0.111	-0.178	0.125	0.380*	-0.152
High	-0.005	-.0.038	0.162	-0.125	0.031	0.270*	0.133	0.133	0.133	0.063	0.045	-0.271*	-0.027	0.132
MCHC														
Low	0.041	0.044	0.029	-0.042	0.151	-0.068	-0.141	-0.141	-0.002	-0.205	0.170	0.264*	-0.174	-0.076
Normal	-0.042	-0.019	-0.163	0.085	-0.192	-0.083	0.131	0.131	0.040	0.176	-0.137	-0.213	0.215	0.110
High	-0.007	-0.054	0.231	-0.068	0.044	0.282*	0.046	0.046	-0.067	0.090	-0.092	-0.143	-0.039	-0.045
Ferritin														
Low	-0.099	0.038	0.119	-0.221	-0.031	-0.125	0.202	0.202	0.104	0.307*	-0.218	0.271*	0.027	0.195
BMI														
underweight	0.218	-0.041	-0.352*	0.231	0.124	0.179	-0.238	-0.238	-0.178	-0.206	0.104	0.072	0.067	-0.216
normal	-0.202	-0.064	0.263*	-0.097	-0.088	-0.251	0.177	0.177	0.209	0.061	0.043	0.115	-0.124	0.271*
overweight	0.066	0.179	0.043	-0.032	0.000	0.188	-0.046	-0.046	-0.138	0.095	-0.059	-0.246	0.076	-0.158
obese	-0.094	-0.030	0.178	-0.027	0.051	-0.169	0.036	0.036	0.137	0.061	-0.088	0.115	0.095	0.193

Notes: **P ≤ 0.01; *P ≤ 0.05

Abbreviations: Hb-hemoglobin; Hct-hematocrit; RBC-red blood count; MCV-mean corpuscular volume; MCH-mean corpuscular hemoglobin; MCHC-mean corpuscular hemoglobin concentration; BMI-body mass index.

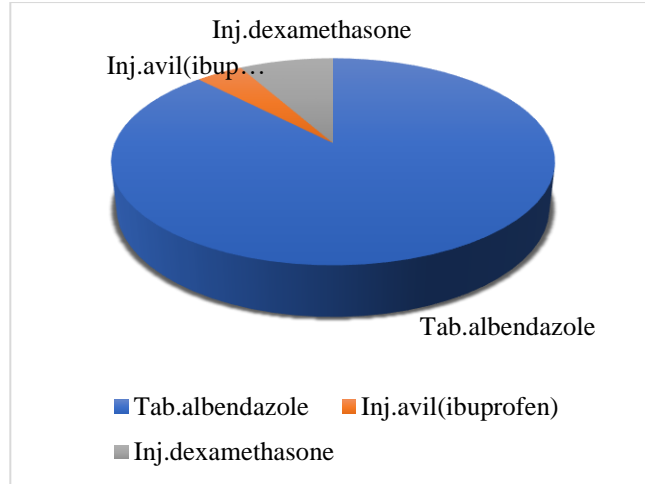**Table 4. Types of anaemia (N = 61)**

Type of Anaemia	Frequency	Percentage
1. Iron deficiency anaemia		
Diagnosis	7	11.48
Provisional diagnosis	2	3.28
2. Vitamin deficiency anaemia	0	0
3. Anaemia of inflammation(cellulitis)	1	1.64
4. A plastic anaemia	0	0
5. Anaemia associated with BMD (bone marrow disease)	0	0
6. Hemolytic anaemia		
Diagnosis	1	1.64
Provisional diagnosis	1	1.64
7. Sickle cell anaemia	0	0
8. Unclassified diagnosis		
Unclassified severe anaemia	44	72.13
Unclassified moderate anaemia	3	4.92
9. Nutritional deficiency anaemia		
Diagnosis	6	9.84
Provisional diagnosis	1	1.64
10. anaemia for evaluation	8	13.11
Mild anaemia	1	1.64

**Table 5. Type of anaemia based on a peripheral smear(N= 61)**

Type of Anaemia Based on Peripheral Smear	Frequency	Percentage
Microcytic hypochromic	30	49.18
1. normocytic hypochromic	2	6.67
2. incresed reticulocytes	2	6.67
3. eosinophilia	1	3.34
4. neutrophilia	2	6.67
5.leukopenia (vitamin deficiency)	2	6.67
6. lymphocytopenia	1	3.34
7. normocytic normochromic	1	3.34
macrocytic	0	0
No peripheral smear report	30	49.18
Severe dimorphic anaemia	1	1.64
Total	61	100

Table 6. Drugs prescribed for anaemia (N = 61)

Drugs Prescribed for Anaemia	No.of. Time Prescribed in Total Subjects(f)	Percentage
Tab.ferrous sulfate	45	73.77
Tab. folicacid	31	50.82
Tab.BCT	60	98.36
Tab. vitamin c	36	59.02
Tab.iron+folic acid	5	8.19
Tab.multivitamin	6	9.84
Inj.vitamin b12	8	13.11
Inj.thiamine(vitamin B1)	3	4.92
Inj.iron sucrose	17	27.87
Tab.zinc	8	13.11

Fig. 1 Drug prescribed for anaemia due to an infection
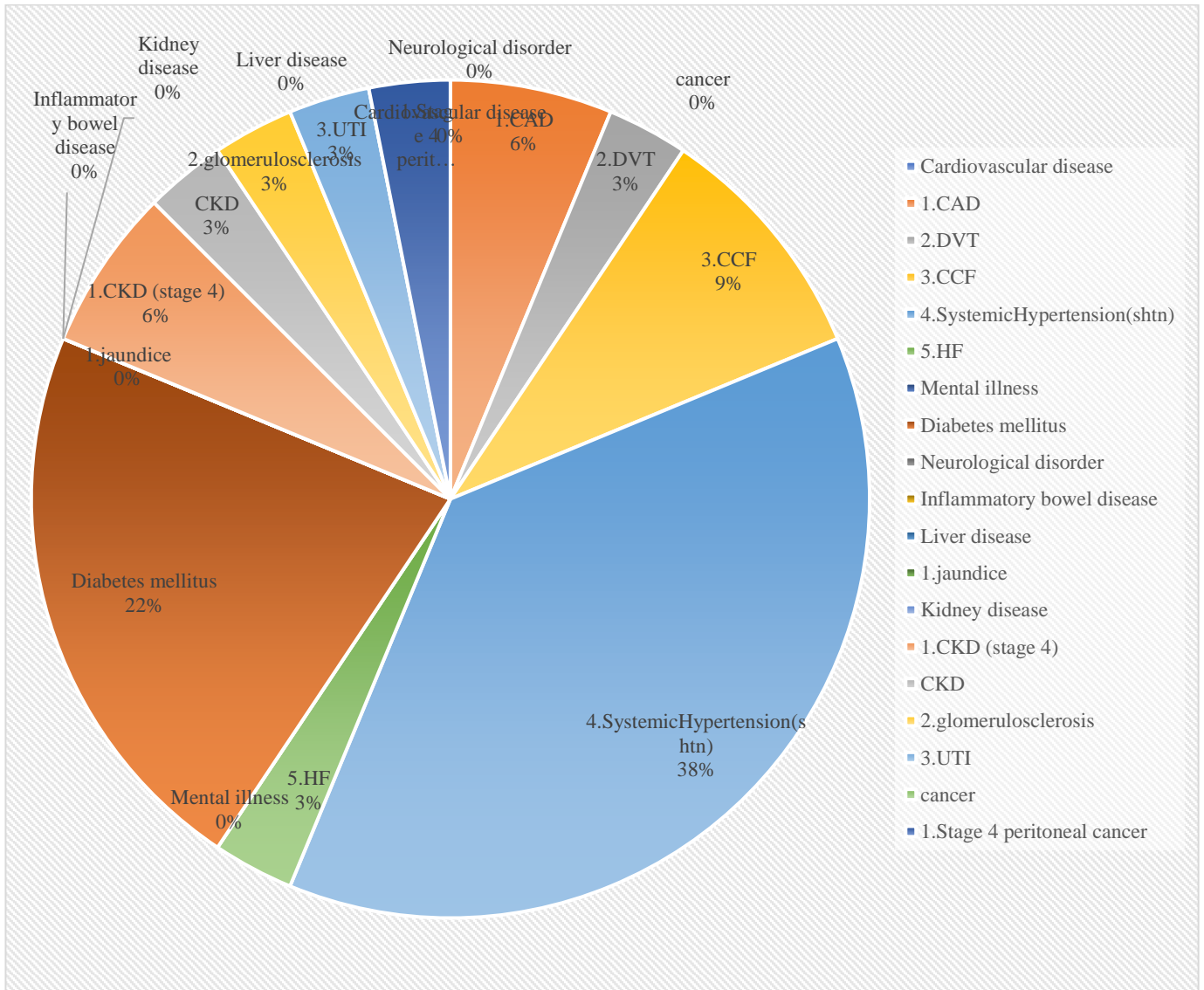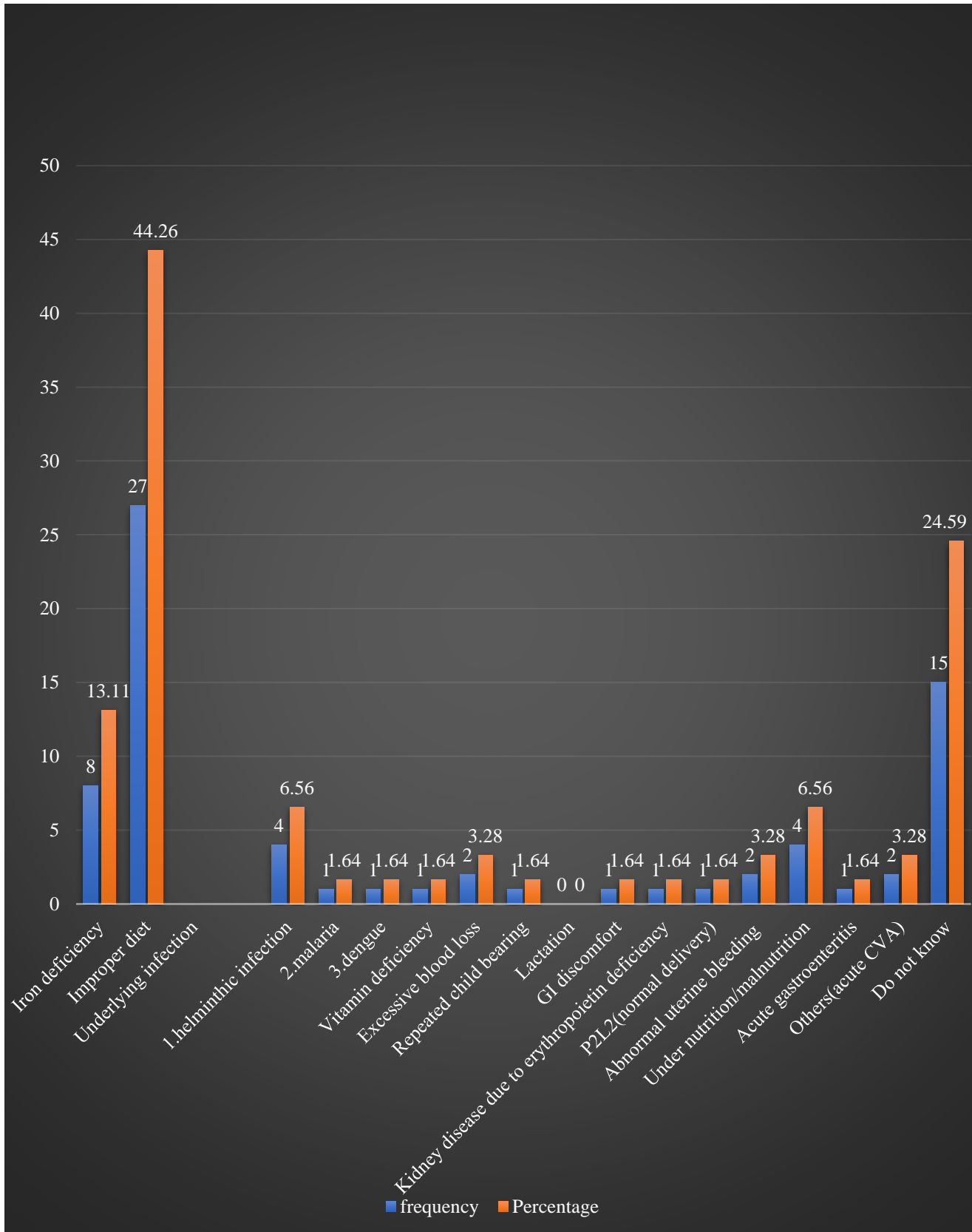

Fig. 2 Types of comorbidities

Fig. 3 Causes of anaemia

Table 7. Treatment of anaemia (N = 61)

Categories of Recommended Treatment	No.of. Times Recommended	Percentage
Oral administration		
Balanced diet	18	29.51
Vitamin B supplements	60	98.36
Iron supplements	59	96.72
Folic acid supplements	35	57.38
Vitamin c supplements	34	55.74
Zinc supplement	7	11.48
Calcium supplement	5	8.19
Iron-rich diet	8	13.11
Fluid restriction diet	1	1.64
Iv administration		
Iron supplements	21	34.43
Vitamin B supplement	11	18.03
Ivf. NS	7	11.48
Ivf. RL	5	8.19
Ivf.DNS	3	4.92
Blood transfusion	41	67.21
multivitamin	1	1.64
Others		
O2 nebulization	3	4.92

4. Discussion

Anaemia is a widespread illness that has a variety of symptoms. Though it can affect anyone, children and women are more likely to develop anaemia. Clinically significant anaemia is severe anaemia because it can cause high-output heart failure and mortality.

In our study, most hospital visitors were >50 years old [32.8%], which is not in accordance with AlFaris N et al.'s study, in which most of the hospital visitors were between the ages of 40 and 49 years old. In our study, the anaemia proxies such as Hb, Hct, RBC, MCV, MCH, MCHC, and BMI of the study respondents were found to be not according to AlFaris N et al.[17]

Most of the patients in our study belong to socio-economic class 4 [36.1], which is similar to that of Chandrakumari AS et al.[27]

In the family type of study participants, nuclear families were more prominent, similar to that of Omidvar S. et al.[25]

In general, Spearman correlation coefficients and logistic regression analysis between the respondents' sociodemographic and anaemia proxies revealed that the anaemia proxies, such as haemoglobin (Hb) level, whether severe, moderate, or mild; ferritin, whether low, moderate, or high; low Hct, low MCV, and low MCHC, were significantly ($P \le 0.05$ or $P \le 0.01$) and negatively related to family type, diet, and education level, which indicated that such anaemia proxies decrease with these factors, as indicated by Spearman correlation and strengthened by logistic regression analysis (odds ratio and 95% CI). Family type, menstruation status, diet, lactation, and education as independent variables were significantly and positively correlated with anaemia proxies. According to AlFaris et al., this outcome is variable.[17]

According to Dheeraj Sharma *et al.,* iron deficiency was the major cause of anaemia, which was not similarly observed in our study.[21]

Most of the patients in our study had microcytic hypochromic anaemia similar to that of the study by Dipshikha Maiti *et al.*[26]

Our study showed that among women with anaemia, systemic hypertension is the most prevalent comorbidity, which is similar to that of Astrid Boennelykke *et al.*[22]

In the treatment of anaemia, vitamin B supplements were prescribed more commonly in our study, which is not similar to the study by Kamala Verma et al.[20]

5. Conclusion

In our study, Women over 50 were the most often afflicted age group. Severe anaemia was the most common type of anaemia has been noticed. It was discovered that the anaemia severity was directly correlated with the frequency distribution of the anaemia proxies. It was discovered that anaemia patients are directly associated with sociodemographic parameters and lifestyle characteristics. Spearman correlation showed the connection between several sociodemographic factors and laboratory outputs. One of the parameters connected with laboratory results is family type, diet type, menstrual status, menstruation consistency, and lactation. There is a strong relationship between nutrition and mild anaemia. Poor diet was the most common reason for anaemia.

In accordance with diagnosis and information, unclassified severe anaemia is the most common form. According to a peripheral smear result, microcytic hypochromic anaemia is the most common form. The most typical condition that is comorbid with anaemia is systemic

hypertension. Patients are typically given vitamin B supplements, followed by iron supplements and blood transfusions. Most patients are given vitamin B complex as a prescription. The most frequently given additional medications for treating anaemia are individuals with infections.

Acknowledgment

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