



## Original Research Article

# PREVALENCE AND ETIOLOGY OF ANEMIA AMONG HYPOTHYROID PATIENTS - A CROSS SECTIONAL STUDY

Katreddi Mounika<sup>1</sup>, Sonia Baldwa<sup>1</sup>, Chitturi Ashok Kumar<sup>2</sup>, Gadi Vamsi Krishna<sup>3</sup>, Sreeram Krishna Nikhitha<sup>4</sup>

<sup>1</sup>Assistant Professor, Department of General Medicine, Konaseema Institute of Medical Sciences & Research Foundation, Amalapuram, Andhra Pradesh, India

<sup>2</sup>Associate Professor, Department of General Medicine, Konaseema Institute of Medical Sciences & Research Foundation, Amalapuram, Andhra Pradesh, India

<sup>3</sup>Senior Resident, Department of General Medicine, JR Medical College and Hospital, Avanampattu, Tamil Nadu, India

<sup>4</sup>Final year Post Graduate, Department of General Medicine, Konaseema Institute of Medical Sciences & Research Foundation, Amalapuram, Andhra Pradesh, India

Received : 17/01/2026  
Received in revised form : 08/03/2026  
Accepted : 24/03/2026

### Corresponding Author:

**Dr. Katreddi Mounika,**  
Assistant Professor, Department of  
General Medicine, Konaseema Institute  
of Medical Sciences & Research  
Foundation, Amalapuram, Andhra  
Pradesh, India.  
Email: mounikatreddi@gmail.com

DOI: 10.70034/ijmedph.2026.2.280

Source of Support: Nil,  
Conflict of Interest: None declared

Int J Med Pub Health  
2026; 16 (2); 1683-1688

### ABSTRACT

**Background:** Hypothyroidism is a common endocrine disorder characterized by deficiency of thyroid hormones, which play an essential role in metabolism and hematopoiesis. Thyroid hormones influence erythropoiesis by stimulating proliferation of erythrocyte precursors and enhancing erythropoietin production. In hypothyroidism, reduced bone marrow stimulation and associated nutritional deficiencies may lead to different types of anemia. Evaluating the prevalence and etiology of anemia in hypothyroid patients is important for appropriate diagnosis and management. The aim is to determine the prevalence and types of anemia among patients with hypothyroidism and to identify the underlying etiological factors.

**Materials and Methods:** This hospital-based cross-sectional observational study was conducted in the Department of General Medicine at KIMS & RF, Amalapuram, from May 2025 to February 2026. A total of 100 patients aged  $\geq 18$  years with overt or subclinical hypothyroidism were included in the study. Patients with hemoglobinopathies, chronic kidney disease, pregnancy, overt bleeding, alcoholism and those on antiplatelet therapy were excluded. Detailed clinical evaluation and laboratory investigations including TSH, FT3, FT4, complete blood picture, peripheral smear, iron profile, vitamin B12, folate levels, LDH and reticulocyte count were performed. Statistical analysis was done using the chi-square test.

**Results:** Among the 100 hypothyroid patients, 70% had overt hypothyroidism and 30% had subclinical hypothyroidism. The overall prevalence of anemia was 60%. Females constituted the majority of anemic patients (76.67%), while males accounted for 23.33%. Severe anemia (48.33%) and moderate anemia (41.67%) were more common than mild anemia. Based on MCV and MCH, the most common morphological type was microcytic hypochromic anemia (50%), followed by normocytic normochromic anemia (26.67%) and macrocytic anemia (23.33%). Iron deficiency anemia was the most common etiology (65%), followed by anemia of chronic disease (48.33%), vitamin B12 deficiency (20%) and folate deficiency (6.67%).

**Conclusion:** Anemia is a common finding in patients with hypothyroidism, with iron deficiency anemia being the most prevalent type in this study. Routine screening for anemia in hypothyroid patients is recommended to ensure early detection and appropriate management, thereby improving patient outcomes and quality of life.

**Keywords:** Hypothyroidism, Anemia, Iron deficiency anemia, Microcytic hypochromic anemia, Vitamin B12 deficiency, Folate deficiency, Cross-sectional study.

## INTRODUCTION

Thyroid hormones play a crucial role in the functioning and maintenance of human metabolism.<sup>[1]</sup> Hypothyroidism is a syndrome characterized by clinical manifestations associated with thyroid hormone deficiency.<sup>[2]</sup> Overt hypothyroidism is defined as elevated TSH and low levels of free T4 and/or free T3 levels while subclinical hypothyroidism is defined as elevated serum TSH with normal free T4 and free T3 levels.<sup>[3]</sup> Anemia represents a significant health concern worldwide, affecting individuals of all ages and demographics. According to WHO, Anemia was classified as: Mild – Hb 11 to 11.9 (males: 11 to 12.9) gm%, Moderate – Hb 8 to 10.9 gm%, Severe – Hb <8 gm%. There is an overall slowing of all physiological processes in hypothyroidism including the hematopoietic system.<sup>[2]</sup> Thyroid plays a crucial role in erythropoiesis by stimulating proliferation of erythrocyte precursors, erythropoietin gene expression, and erythropoietin production in kidneys.<sup>[3,4]</sup> In hypothyroidism, there is low bone marrow stimulation, low erythropoietin production and deficiency of nutrients leading to anemia.<sup>[5]</sup> Understanding the frequency and type of anemia in patients with hypothyroidism is thus essential for appropriate diagnostic evaluation and targeted management strategies to optimize patient outcomes.

### Aims and objectives

- To study the prevalence of anemia and the type of anemia among hypothyroid patients.
- To understand the etiology of anemia of various morphology.

## MATERIALS AND METHODS

This hospital-based observational cross-sectional study was conducted in the Department of General Medicine at KIMS & RF, Amalapuram. The study was carried out over a period of ten months, from May 2025 to February 2026. A total of 100 participants were included in the study to evaluate the study objectives.

### Inclusion Criteria

Patients with overt / subclinical hypothyroidism – newly diagnosed or already on treatment aged  $\geq 18$  years.

### Exclusion Criteria

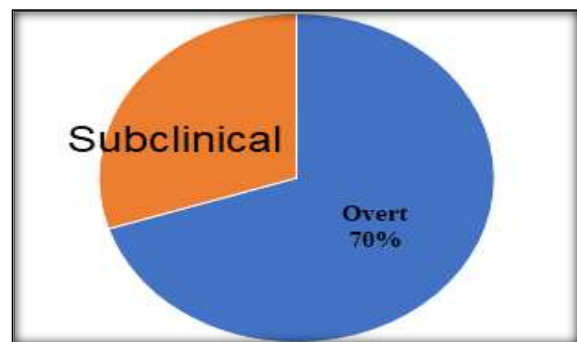
- 1) Patients on antiplatelet therapy.
- 2) Age less than 18 years.

- 3) Any overt bleeding such as melena, hemoptysis, hematochezia, hematemesis.
- 4) Haemoglobinopathies.
- 5) Chronic kidney disease.
- 6) Alcoholics.
- 7) Pregnant women.

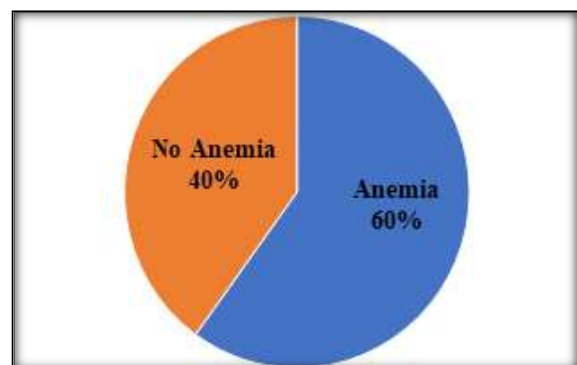
**Methodology:** The present study was undertaken after obtaining approval from Institutional Ethics Committee [IEC]. Prior informed consent was taken from all subjects enrolled in the study. 100 patients who fulfilled inclusion criteria were chosen for the study. Complete history was taken and detailed physical examination was done. Investigations including TSH, FT3, FT4, CBP, peripheral smear, iron profile, fasting B12, folate levels, LDH, reticulocyte count were done. The causes and frequency among the study group were finalized and the reports were followed. Then statistical analysis was carried out using chi square test. Results were expressed with respect to 'p' values and were being interpreted.

## RESULTS

Prevalence of Subclinical and Overt Hypothyroidism



Prevalence of Anemia among Hypothyroid patients



**Table 1**

Type of Hypothyroidism	No. of Patients	Percentage
Overt	70	70
Subclinical	30	30
Total	100	100

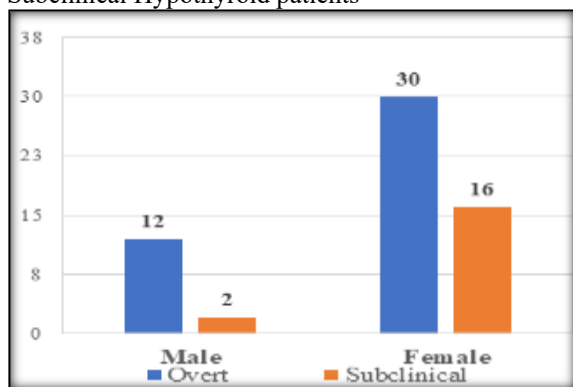
**Table 2: Gender distribution of Anemia among Overt and Subclinical Hypothyroid patients**

		Overt	Subclinical	Total	p-value
Male	No.	12	2	14	0.1326
	%	28.58	11.11	23.33	
Female	No.	30	16	46	
	%	71.42	88.89	76.67	
Total		42	18	60	

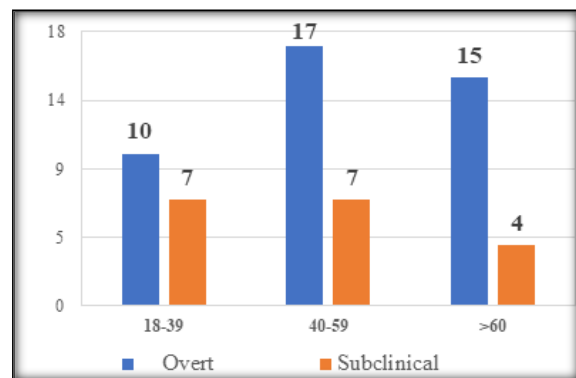
**Table 3: Age distribution of Anemia among Overt and Subclinical Hypothyroid patients**

Age (in years)		Overt	Subclinical	Total	p-value
18-39	No.	10	7	17	0.4
	%	23.81	38.89	28.33	
40-59	No.	17	7	24	
	%	40.48	38.89	40	
>60	No.	15	4	19	
	%	35.71	22.22	31.67	
Total		42	18	60	

Gender distribution of Anemia among Overt and Subclinical Hypothyroid patients



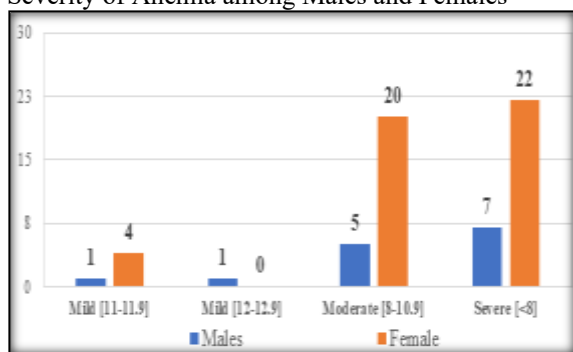
Severity of Anemia among Males and Females



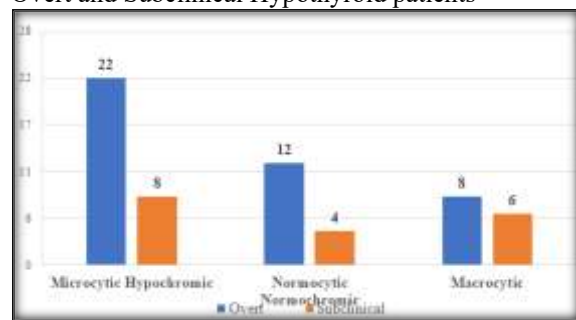
**Table 4**

Sex		Mild (11-11.9)	Mild (12-12.9)	Moderate (8-10.9)	Severe (<8)	Total
Male	No.	1	1	5	7	14
	% with Anemia	22.22	100	19.51	24.49	
Female	No.	4	0	20	22	46
	% with Anemia	77.78	0	80.49	75.51	
Total		5	1	25	29	60

Severity of Anemia among Males and Females



Type of Anemia based on Peripheral smear among Overt and Subclinical Hypothyroid patients



**Table 5: Types of Anemia among Overt and Subclinical Hypothyroid patients based on MCV&MCH**

Anemia based on MCV & MCH		Type of Hypothyroidism		Total	P-value
		Overt	Subclinical		
Microcytic Hypochromic	No.	22	8	30	0.2654
	%	52.38	44.44	50	
Normocytic Normochromic	No.	12	4	16	
	%	28.57	22.22	26.66	
Macrocytic	No.	8	6	14	
	%	19.04	33.33	23.33	
Total	No.	42	18	60	

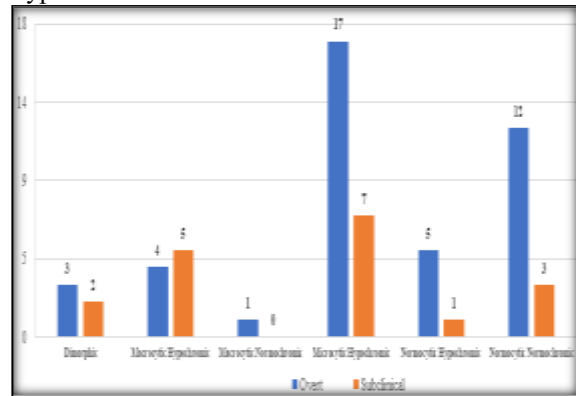
**Table 6**

Anemia based on peripheral smear		Overt	Subclinical	Total	p-value
Dimorphic	No.	3	2	5	0.0918
	%	7.14	13.33	8.33	
Macrocytic hypochromic	No.	4	5	9	
	%	10	30	15	
Macrocytic normochromic	No.	1	0	1	
	%	1.43	0	1.67	
Microcytic hypochromic	No.	17	7	24	
	%	41.43	36.67	40	
Normocytic hypochromic	No.	5	1	6	
	%	11.43	3.33	10	
Normocytic normochromic	No.	12	3	15	
	%	28.57	16.67	25	
Total		42	18	60	

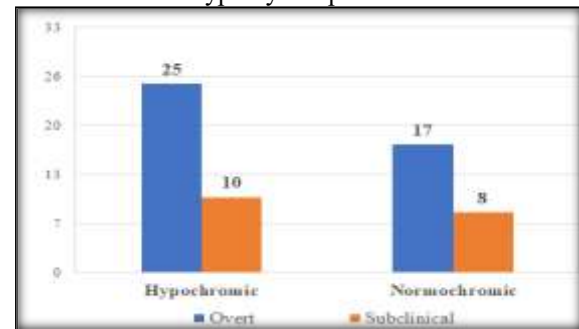
**Table 7**

Anemia based on MCHC		Overt	Subclinical	Total	P-value
Hypochromic	No.	25	10	35	0.5359
	%	60	53.33	58	
Normochromic	No.	17	8	25	
	%	40	46.67	42	
Total		42	18	60	

Types of Anemia based on MCHC



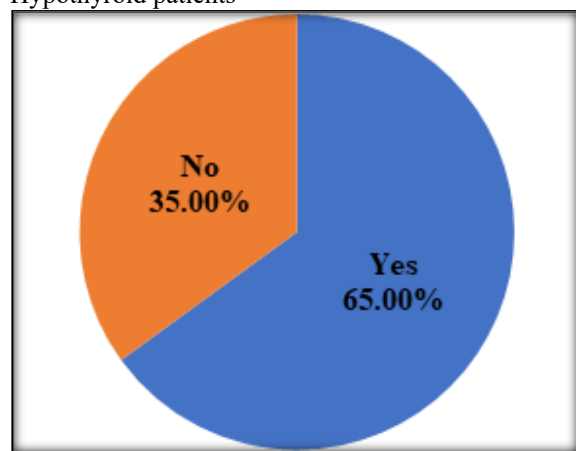
Types of Anemia based on MCHC  
Prevalence of Iron deficiency Anemia among Overt and Subclinical Hypothyroid patients



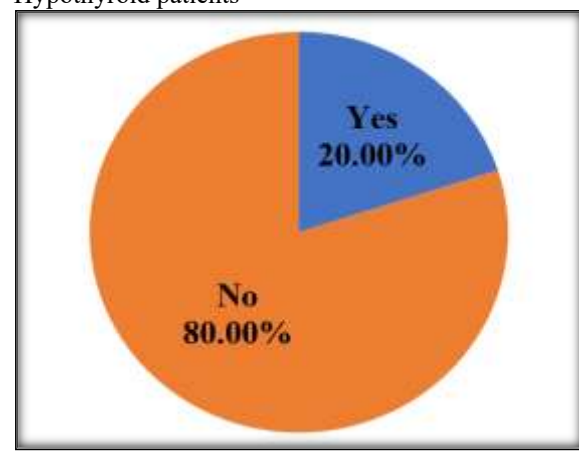
**Table 8**

Iron deficiency anemia	Overt	Subclinical	Total
No.	29	10	39
%	75	25	100

Prevalence of Iron deficiency Anemia among Hypothyroid patients



Prevalence of Vitamin B12 deficiency among Hypothyroid patients



**Table 9: Prevalence of Vitamin B12 deficiency among Overt and Subclinical Hypothyroid patients**

Vitamin B12 Deficiency	Overt	Subclinical	Total
No.	6	6	12
%	50	50	100

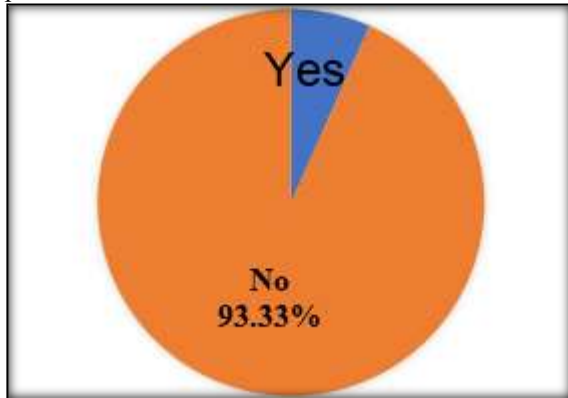
**Table 10: Prevalence of Folate deficiency among Overt and Subclinical Hypothyroid patients**

Folate deficiency	Overt	Subclinical	Total
No.	1	3	4
%	25	75	100

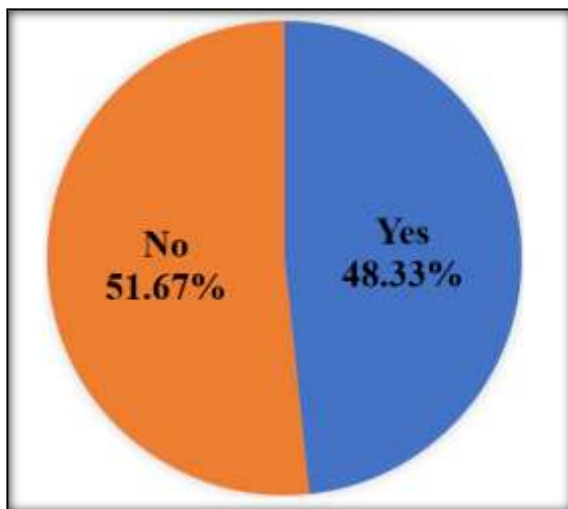
**Table 11: Prevalence of Anemia of chronic disease among Overt and Subclinical Hypothyroid patients**

Anemia of chronic disease	Overt	Subclinical	Total
No.	17	12	29
%	59.18	40.82	100

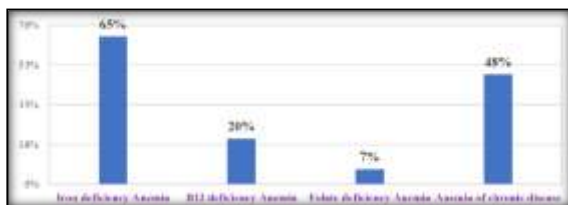
Prevalence of Folate deficiency among Hypothyroid patients



Prevalence of Anemia of chronic disease among Hypothyroid patients



Prevalence of Etiologies of Anemia among Hypothyroid Patients



A total of 100 patients with hypothyroidism were included in the study. Among them, 70% had overt hypothyroidism and 30% had subclinical hypothyroidism. The overall prevalence of anemia among hypothyroid patients was 60%. Among the anemic patients, females constituted the majority

with 46 (76.67%) cases, while males accounted for 14 (23.33%). In overt hypothyroidism, anemia was observed in 30 females (71.42%) and 12 males (28.58%), whereas in subclinical hypothyroidism it was seen in 16 females (88.89%) and 2 males (11.11%); however, this difference was not statistically significant ( $p = 0.1326$ ). With respect to age distribution, the highest proportion of anemia was observed in the 40–59 years age group (40%), followed by patients above 60 years (31.67%) and those aged 18–39 years (28.33%), with no significant association between age group and type of hypothyroidism ( $p = 0.4$ ). Regarding severity, severe anemia was the most common form (48.33%), followed by moderate anemia (41.67%) and mild anemia (10%). Based on red cell indices (MCV and MCH), microcytic hypochromic anemia was the most common morphological type (50%), followed by normocytic normochromic anemia (26.66%) and macrocytic anemia (23.33%), with no statistically significant difference between overt and subclinical hypothyroidism ( $p = 0.2654$ ). Peripheral smear examination showed microcytic hypochromic anemia in 40% of cases, normocytic normochromic in 25%, macrocytic hypochromic in 15%, normocytic hypochromic in 10%, dimorphic anemia in 8.33%, and macrocytic normochromic in 1.67% ( $p = 0.0918$ ). Based on MCHC values, 58% of patients had hypochromic anemia while 42% had normochromic anemia, with no significant association between anemia type and hypothyroidism category ( $p = 0.5359$ ). Among the etiological factors, iron deficiency anemia was the most common cause (65%), followed by anemia of chronic disease (48.33%), vitamin B12 deficiency (20%), and folate deficiency (6.67%). These findings indicate that anemia, particularly iron deficiency anemia, is highly prevalent among patients with hypothyroidism.

## DISCUSSION

Hypothyroidism predominantly affects the hematopoietic system with anemia being the most typical feature of thyroid hormone insufficiency. The prevalence of anemia in hypothyroid patients reported in our study was 60%, which was similar to Ali et al,<sup>[6]</sup> study (67%). Among anemia patients in our study, 10% patients had mild anemia, 41.67% had moderate anemia, while 48.33% had severe anemia. In Sumanth Reddy et al,<sup>[7]</sup> study on anemia patients, it was found that 51.6% of the hypothyroid patients had mild anemia, 25% had moderate while 20% had

severe anemia. In our study, the most common type of anemia was microcytic hypochromic (50%) followed by normocytic normochromic (26.67%) followed by macrocytic (23.33%). These findings were consistent with Yogananda Chidambaram et al,<sup>[2]</sup> study. In our study, the most common etiology was found to be iron deficiency anemia (65%) followed by anemia of chronic disease (48.33%), B12 deficiency (20%) and folate deficiency (6.67%). These findings were found to be similar to Firdous et al study.<sup>[8]</sup> Overall, in different countries, according to literature, the most common type of anemia is normocytic normochromic anemia, but present study shows microcytic hypochromic anemia (due to iron deficiency) as the most common cause. Menorrhagia due to hormonal instability and malabsorption seen in hypothyroidism played an important role making iron deficiency anemia (microcytic hypochromic anemia) as the most common cause in the present study.

## CONCLUSION

According to our study, anemia is a prevalent finding of hypothyroidism. Routine screening for anemia should be considered in all individuals with hypothyroidism. Identifying the cause of anemia in hypothyroid patients aids in its proper management. Anemia, in addition to hypothyroidism, will affect the individual's quality of life and productivity. Therefore, both should be addressed simultaneously.

### Limitations

The present study was a single-centre study. Because of small sample size, findings cannot be generalized to entire population. The increasing link of anemia with hypothyroidism needs to be supported by larger population research.

## REFERENCES

1. Bashir H, Bhat MH, Farooq R, Majid S, Shoib S, Hamid R, Mattoo AA, Rashid T, Bhat AA, Wani HA, Masood A. Comparison of hematological parameters in untreated and treated subclinical hypothyroidism and primary hypothyroidism patients. *Med J Islam Repub Iran.* 2012 Nov;26(4):172-8. PMID: 23482519; PMCID: PMC3562538.
2. Sasidharan P, Chidambaram Y, Kumar B, Velammal P, Kumar S. Anemia types in hypothyroid patients in a Combatore tertiary care hospital: A prospective observational study. *Endocr Regul.* 2023 Jun7;57(1):114-120. doi: 10.2478/enr-2023-0014. PMID:37285462.
3. Erdogan M, Kösenli A, Ganidagli S, Kulaksizoglu M. Characteristics of anemia in subclinical and overt hypothyroid patients. *Endocr J.* 2012;59(3):213-20. doi: 10.1507/endocrj.ej11-0096. Epub 2011 Dec 27. Erratum in: *Endocr J.* 2013;60(4):541. Mehmet, Erdogan [corrected to Erdogan, Mehmet]; Aybike, Kosenli [corrected to Kösenli, Aybike]; Mustafa, Kulaksizoglu [corrected to Kulaksizoglu, Mustafa]. PMID: 22200582.
4. Szczepanek-Parulska E, Hernik A, Ruchala M. Anemia in thyroid diseases. *Pol Arch Intern Med.* 2017 May 31;127(5):352-360. doi: 10.20452/pamw.3985. Epub 2017 Mar 28. PMID: 28400547.
5. Gul SJ, Mirza ZH, Ahmed W, Gul SF, Gul K, Basri R. Comparison of Frequency and Types of Anemia in SubclinicalHypothyroidism and Euthyroidism. *Pak Armed Forces Med J* 2023; 73(Suppl-1): S65-68
6. Ali S, Khan MN, Zafar F, Adnan STA, Yusuf A, Hussnain M, Anwar A, Hashmi AA. Frequency and Types of Anemia in Primary Hypothyroidism Patients: A Prospective Observational Study. *Cureus.* 2024 Apr 30;16(4):e59350. doi: 10.7759/cureus.59350. PMID: 38817512; PMCID: PMC11138123.
7. Sumanth Reddy M, Archana Reddy D. Prevalence of anaemia in hypothyroid patients in a tertiary care hospital. *J. Evid. Based Med. Healthc.* 2020; 7(5), 241-245. DOI: 10.18410/jebmh/2020/51.
8. Ashraf ul Abeddin Md and Firdous F. Prevalence of various types of anemia in patients of hypothyroidism in a tertiary care center in Telangana, India. *World Journal of Pharmaceutical and Medical Research.* 2017,3(8), 332-334.