ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

PREVALENCE OF VITAMIN-B12 DEFICIENCY IN HYPOTHYROID INDIVIDUAL ATTENDING A TERTIARY CARE HOSPITAL

Dr.Veeresh godi[1], Dr.Nandeesha H U[2] ,Dr Mohammed Ishaq [3],Koshy T Sam, DR. P Pavan Kumar[5] ,DR.Ankush N Reddy[6]

[1]Senior resident ,Department of general medicine,[2]Assistant professort,Department of general medicine[3]Senior resident,Department of general medicine[4]Junior resident,Department of general medicine,[5]Junior resident,Department of general medicine,[6]Junior resident,Department of general medicine

Vydehi Hospital - Whitefiled, Bangalore.

Corresponding authors:*Dr.Nandeesha H U*

Assistant proffesor

Abstract: The most prevalent endocrine disorder in developing countries is related to thyroid imbalance. Hypothyroidism is a common endocrine disorder with reduced production of thyroid hormones. It is a common disease with different frequency between countries. It occurs in 10% of women and 6% of men with age >65 years (Das et al,
2012)1 . However, the common occurrence of hypothyroidism was three times more in women than in men (12.4% versus 3.7%) in developing countries like Spain. Sex, geographical factors, age, ethnicity and iodine consumption are the determining factors for the occurrence of thyroid problems (Das et al, 2012)1 .

AIM : To find the prevalence of Vitamin-B12 deficiency in cases of hypothyroid patients.

Methodology:The present study was conducted on patients presenting to the Department of General Medicine OPD and IPD admitted patients with diagnosed Hypothyroidism at Pacific Medical College & Hospital, Pacific Medical University, Bhelo Ka Bedla, Pratap pura, Udaipur. Study population included 100 diagnosed hypothyroid patients. Smokers patients with hypertensiom, cardiac, hepatic and renal disorders were excluded from the study. Subjects on vitamin B12 supplements and on medication affecting thyroid also excluded from the study. Following parameter are evaluated:- Body Mass Index Following investigations were performed for the study outcome:- CBC with Peripheral Blood Smear Vitamin B12 FBS (fasting blood sugar) T3, T4, TSH Lipid profile TPO antibodies

Result: The prevalence of Vitamin B12 deficiency among hypothyroid patients was found to be 38%. The prevalence of Vitamin B12 deficiency among hypothyroid patients was highest among patients of age 20-30 years (47.7%) and was lowest among patients of age >40 (18.8%) years. The mean age of patients of with deficiency and without deficiency was 32.05±1.64 and 40.03±14.23 years respectively. The prevalence of Vitamin B12 deficiency among hypothyroid patients was higher among unemployed patients (39.2%) than employed (36.7%). However, there was no significant ($p>0.05$) association of prevalence of Vitamin B12 deficiency among hypothyroid patients with occupation.

Conclusion: It is concluded that patients with hypothyroidism have a higher prevalence (38%) of vitamin B12 deficiency. Age, BMI and Addiction habit were significantly associated with prevalence of vitamin B12 deficiency.

Keywords:vitamin B12 deficiency, hypothyroid,endocrine disorder

Introduction

The most prevalent endocrine disorder in developing countries is related to thyroid imbalance. Hypothyroidism is a common endocrine disorder with reduced production of thyroid hormones. It is a

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

common disease with different frequency between countries. It occurs in 10% of women and 6% of men with age >65 years (Das et al,
2012)1 .

However, the common occurrence of hypothyroidism was three times more in women than in men (12.4% versus 3.7%) in developing countries like Spain. Sex, geographical factors, age, ethnicity and iodine consumption are the determining factors for the occurrence of thyroid problems (Das et al, 2012)1 . Out of total patients of hypothyroidism, about 12% with primary autoimmune type disease experience pernicious anemia. In hypothyroidism vitamin B12 deficiency is observed in up to 40% of patients. However few reports showed deviation as the adult patients of hypothyroidism showed no signs of microcytic and pernicious anemia (Jabbar et al, 2008)2 . Vitamin B12 (also known as cobalamin) is found naturally in animal foods or artificially in fortified cereals. Cobalamin has a complex mechanism of absorption in the terminal ileum that depends on the intrinsic factor (a secretory product of the gastric parietal cells) and eventually releases cobalamin in the blood linked to the plasma binding protein, transcobalamin (Stabler, 2013)3 . The prevalence of B12 deficiency varies depending on the level used to define deficiency and the populations studied. In developed countries, vitamin B12 deficiency (serum B12 level <148 pmol/L) increases with age from 3% in the younger population to reach 10% in the elderly. Borderline B12 levels or subclinical cobalamin deficiency (SCCD), which is defined as a serum B12 level between 148 and 221 pmol/L, is reported in 20% of the elderly population. In developing countries, the prevalence of low and borderline B12 levels is elevated approaching 70% in adults. Furthermore, detection of B12 deficiency depends on the diagnostic strategy and the type of B12 assay used in the measurement (Rothen et al, 2021; İspir et al, 2015)4,5 .

STUDY DESIGN:

Prospective Cross-sectional study.

STUDY SETTING:

The present study was conducted on patients presenting to the Department of General Medicine OPD and IPD admitted patients with diagnosed Hypothyroidism at Pacific Medical College & Hospital, Pacific Medical University, Bhelo Ka Bedla, Pratap pura, Udaipur.

SAMPLE DESCRIPTION:

The sample size was calculated using software Raosoft ®. Sample size is calculated with α of 5%, power of the study at 80% and confidence level of 95%. The required sample size for the study came out to be 100.

TIME SCALE OF STUDY

The study duration was 12 months after clearance from the departmental committee and institutional ethical committee.

SELECTION CRITERIA

Inclusion Criteria

Patients with primary hypothyroidism, subclinical hypothyroidism, autoimmune thyroid disease and euthyroid were selected.

Exclusion Criteria

Patients on drugs known to interfere with vitamin B12 absorption such as phenytoin, dihydrofolatereductase inhibitors etc.

Subjects with history suggestive of malabsorption syndromes, previous gastrectomy will also excluded from the study.

Material and Methods

Critically ill patients.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

Those who have already received blood transfusion within last 1 month prior to presentation those already on vitamin B12 supplementations. Patients having other co-morbid conditions like cerebrovascular and neurological disease, pregnancy chronic renal impairment, ischemic heart disease and diabetes mellitus.

METHODOLOGY:

Study population included 100 diagnosed hypothyroid patients. Smokers patients with hypertensiom, cardiac, hepatic and renal disorders were excluded from the study. Subjects on vitamin B12 supplements and on medication affecting thyroid also excluded from the study. Following parameter are evaluated:- Body Mass Index Following investigations were performed for the study outcome:- CBC with Peripheral Blood Smear Vitamin B12 FBS (fasting blood sugar) T3, T4, TSH Lipid profile TPO antibodies

Result: The present study was conducted in the Department Of General Medicine Pacific Medical College and Hospital, Bhilon Ka Bedla, Udaipur, Rajasthan with the objective to assess the prevalence of Vitamin-B12 deficiency in hypothyroid patients in a Tertiary Care Centre in Southern Rajasthan. A total of 100 patients were included in the study.

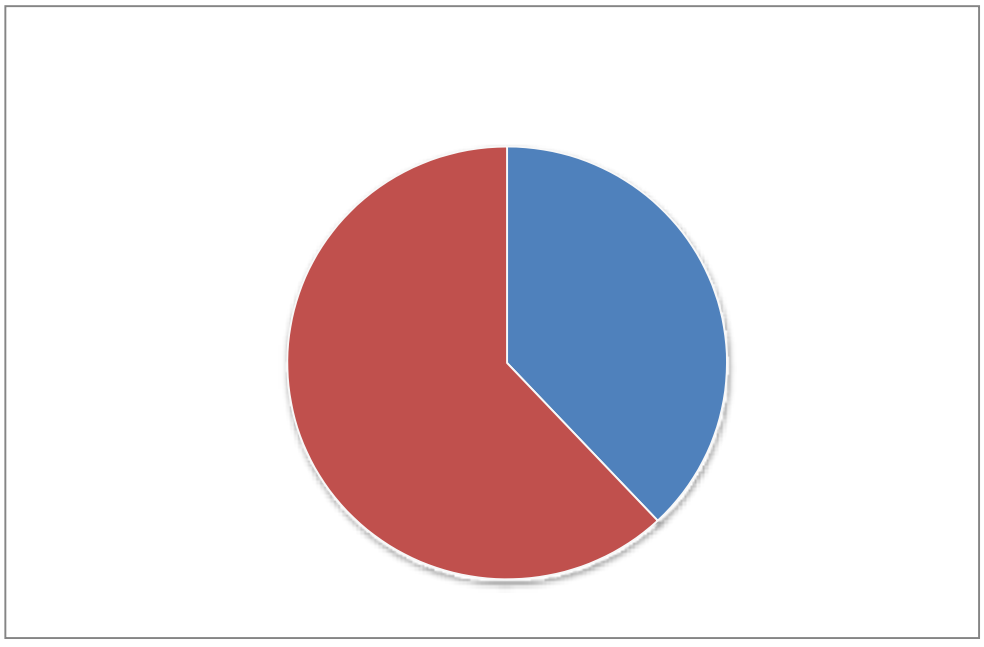
Table-1 : Distribution of prevalence of Vitamin B12 deficiency among hypothyroid patients

Vitamin B12 deficiency	No. (n=100)	%
With deficiency	38	38.0
Without deficiency	62	62.0

Table-1 & Fig.1 shows the distribution of prevalence of Vitamin B12 deficiency among hypothyroid patients. The prevalence of Vitamin B12 deficiency among hypothyroid patients was found to be 38%.

Fig. 1: Distribution of prevalence of Vitamin B12 deficiency among hypothyroid patients

Table-2: Distribution of patients according to age and its association with prevalence of Vitamin B12 deficiency among hypothyroid patients



ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

Age in years	No. (n=100)		With deficiency		Without deficiency		p-value[1]
	No.	%	No.	%	No.	%	
20-30	44	44.0	21	47.7	23	52.3	0.02*
31-40	24	24.0	11	45.8	13	54.2	
>40	32	32.0	6	18.8	26	81.2	
Mean±SD	37.00±13.35		32.05±1.64		40.03±14.23		

[1]Chi-square test, *Significant

Table-2 & Fig.2 shows the distribution of patients according to age and its association with prevalence of Vitamin B12 deficiency among hypothyroid patients. More than one third of patients were between 20-30 years of age (44%) followed by >40 (32%) and 31-40 (24%). The mean age of patients was 37.00±13.35 years.

The prevalence of Vitamin B12 deficiency among hypothyroid patients was highest among patients of age 20-30 years (47.7%) and was lowest among patients of age >40 (18.8%) years. The mean age of patients of with deficiency and without deficiency was 32.05±1.64 and 40.03±14.23 years respectively. There was significant (p=0.02) association of prevalence of Vitamin B12 deficiency among hypothyroid patients with age.

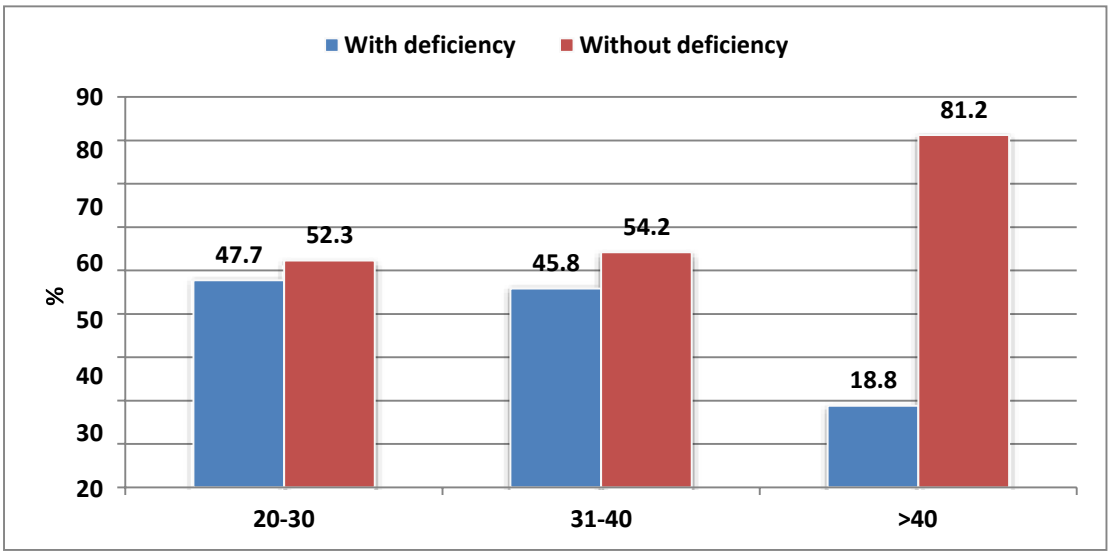


Fig. 2: Distribution of patients according to age and its association with prevalence of Vitamin B12 deficiency among hypothyroid patients

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

Table-3: Distribution of patients according to gender and its association with prevalence of Vitamin B12 deficiency among hypothyroid patients

Gender	No. (n=100)		With deficiency		Without deficiency		p-value[1]
	No.	%	No.	%	No.	%	
Male	57	57.0	25	43.9	32	56.1	0.16
Female	43	43.0	13	30.2	30	69.8	

[1]Chi-square test

Table-3 & Fig.3 shows the distribution of patients according to gender and its association with prevalence of Vitamin B12 deficiency among hypothyroid patients. More than half of patients were males (57%).

The prevalence of Vitamin B12 deficiency among hypothyroid patients was higher among male patients (43.9%) than females (30.2%). However, there was no significant (p>0.05) association of prevalence of Vitamin B12 deficiency among hypothyroid patients with gender.

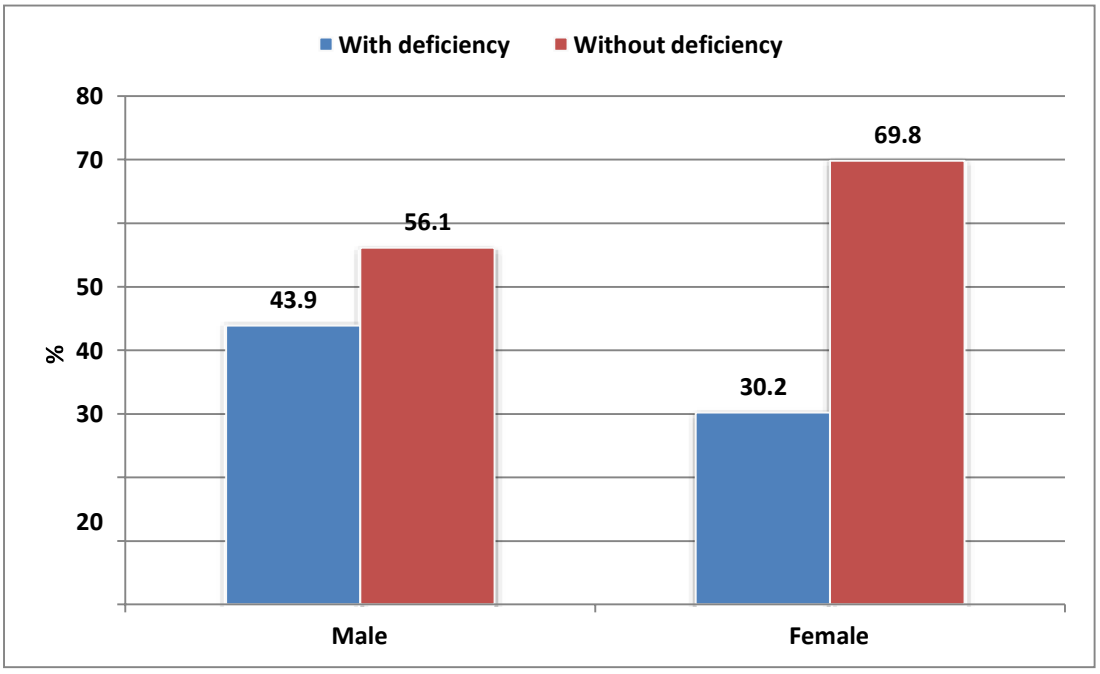


Fig. 3: Distribution of patients according to gender and its association with prevalence of Vitamin B12 deficiency among hypothyroid patients

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

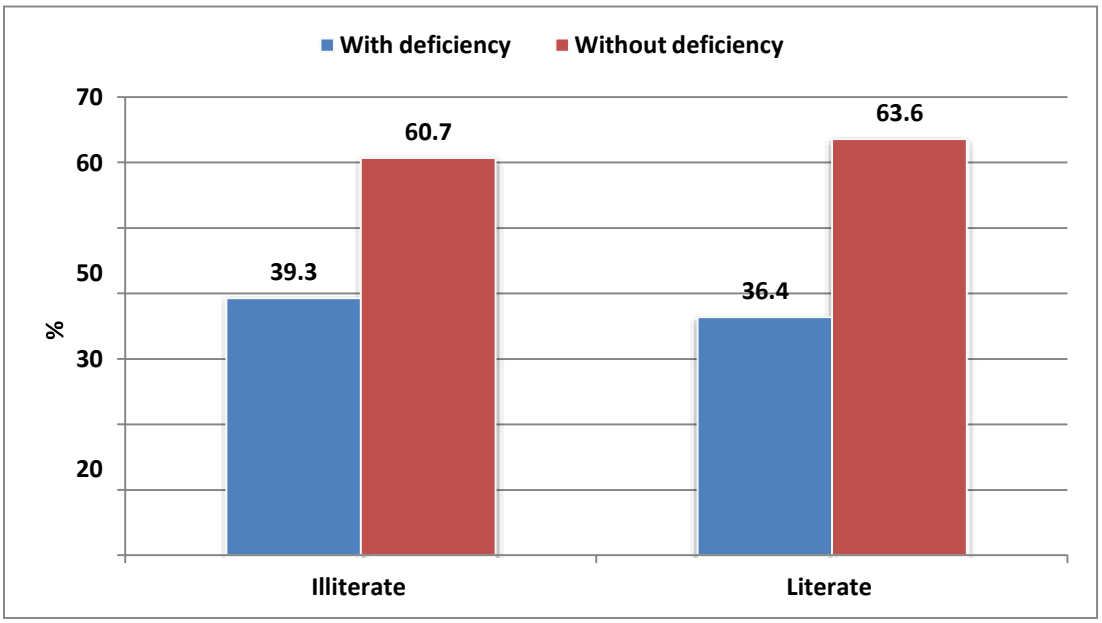
Table-4: Distribution of patients according to education and its association with prevalence of Vitamin B12 deficiency among hypothyroid patients

Education	No. (n=100)		With deficiency		Without deficiency		p-value[1]
	No.	%	No.	%	No.	%	
Illiterate	56	56.0	22	39.3	34	60.7	0.76
Literate	44	44.0	16	36.4	28	63.6	

[1]Chi-square test

Table-4 & Fig.4 shows the distribution of patients according to education and its association with prevalence of Vitamin B12 deficiency among hypothyroid patients. More than half of patients were illiterates (56%).

The prevalence of Vitamin B12 deficiency among hypothyroid patients was higher among illiterate patients (39.3%) than literates (36.4%). However, there was no significant ($p>0.05$) association of prevalence of Vitamin B12 deficiency among hypothyroid patients with education.



ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

Fig. 4: Distribution of patients according to education and its association withprevalence of Vitamin B12 deficiency among hypothyroid patients

Table-8: Distribution of patients according to presenting complaints and its association with prevalence of Vitamin B12 deficiency among hypothyroid patients

Presenting complaints#	No. (n=100)		With deficiency		Without deficiency		p-value 1
	No.	%	No.	%	No.	%	
Fever	56	56.0	26	46.4	30	53.6	0.06
Cough	46	46.0	21	45.7	25	54.3	0.14
Diabetes mellitus	42	42.0	20	47.6	22	52.4	0.09
Hypertension	53	53.0	23	43.4	30	56.6	0.23
Fatigue	63	63.0	26	41.3	37	58.7	0.37
Lethargy	37	37.0	14	37.8	23	62.2	0.98
Breathlessness	22	22.0	9	40.9	13	59.1	0.75
Generalized swelling	21	21.0	11	52.4	10	47.6	0.12
Weight gain	29	29.0	11	37.9	18	62.1	0.99
Constipation	35	35.0	16	45.7	19	54.3	0.24
Depression	35	35.0	17	48.6	18	51.4	0.11

[1]Chi-square test, #Multiple response

Table-8 & Fig.8 shows distribution of patients according to presenting complaints and its association with prevalence of Vitamin B12 deficiency among hypothyroid patients. Fatigue was the most common presenting symptom (63%) and fever was the second most common presenting symptom (56%). Generalized swelling was the least common presenting symptom (21%).

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

There was no significant ($p>0.05$) association of prevalence of Vitamin B12 deficiency among hypothyroid patients with presenting symptom.

DISCUSSION:

The most prevalent endocrine disorder in developing countries is related to thyroid imbalance. Hypothyroidism is a common endocrine disorder with reduced production of thyroid hormones. It occurs in 10% of women and 6% of men with age >65 years. However, the common occurrence of hypothyroidism was three times more in women than in men (12.4 vs 3.7%) in developing countries (Truswell, 2007)[38]. Sex, geographical factors, age, ethnicity and iodine consumption are the determining factors for the occurrence of thyroid problems (Das et al, 2012)[1].

Vitamin B12 deficiency is associated with a wide range of hematological and neurological, as well as psychiatric and cardiovascular symptoms (Institute of Medicine, 2000)[56]. The classic manifestations of deficiency include glossitis, megaloblastic anemia, and myelin deterioration (Watanabe, 2007)[57]. Neurological and psychiatric manifestations, which may include myelopathy, neuropathy, impaired memory, depression and dementia, are particularly serious, as they can occur even with subclinical deficiency and may become irreversible if left untreated.

Orzechowska-Pawilojc et al (2009)[58] observed in their study of hyperthyroid patients that there was no deficiency of vitamin B12, but the mean value of vitamin B12 was significantly lower than in the control group. But Demirbas et al (2004)[59] when studying hyperthyroid patients, did not find any differences in B12 levels between hyperthyroid and healthy subjects both before and after antithyroid therapy. Caplan et al (1975)[60] concluded that abnormalities of thyroid function per se did not alter vitamin B12 levels in patients.

RESULTS AND CONCLUSIONS

1. The prevalence of Vitamin B12 deficiency among hypothyroid patients was found to be 38%.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

2. The prevalence of Vitamin B12 deficiency among hypothyroid patients was highest among patients of age 20-30 years (47.7%) and was lowest among patients of age >40 (18.8%) years. The mean age of patients of with deficiency and without deficiency was 32.05±1.64 and 40.03±14.23 years respectively

3. The prevalence of Vitamin B12 deficiency among hypothyroid patients was higher among male patients (43.9%) than females (30.2%). However, there was no significant ($p>0.05$) association of prevalence of Vitamin B12 deficiency among hypothyroid patients with gender.

4. The prevalence of Vitamin B12 deficiency among hypothyroid patients was higher among illiterate patients (39.3%) than literates (36.4%). However, there was no significant ($p>0.05$) association of prevalence of Vitamin B12 deficiency among hypothyroid patients with education.

5. The prevalence of Vitamin B12 deficiency among hypothyroid patients was higher among unemployed patients (39.2%) than employed (36.7%). However, there was no significant ($p>0.05$) association of prevalence of Vitamin B12 deficiency among hypothyroid patients with occupation.

6. The prevalence of Vitamin B12 deficiency among hypothyroid patients was higher among who had income 10000-50,000 (43.9%) than <10000 (33.3%) and >50000 (28.6%). However, there was no significant ($p>0.05$) association of prevalence of Vitamin B12 deficiency among hypothyroid patients with income.

References :

1. Das C, Sahana PK, Sengupta N, Giri D, Roy M, Mukhopadhyay P. Etiology of anemia in primary hypothyroid subjects in a tertiary care center in Eastern India. *Indian J Endocrinol Metab* 2012;16:S361-S363.
2. Jabbar A, Yawar A, Waseem S, et al. Vitamin B12 deficiency common in primary hypothyroidism. *J Pak Med Assoc* 2008;58:258-261.
3. Stabler SP. Vitamin B12 deficiency. *N Engl J Med* 2013;368:149-160.
4. Rothen JP, Walter PN, Tsakiris DA, Infanti L, Hersberger KE, Arnet I. Identification of patients with cobalamin deficiency crucially depends on the diagnostic strategy. *Clin Lab* 2021;67:1229-1235.
5. İspir E, Serdar MA, Ozgurtas T, et al. Comparison of four automated serum vitamin B12 assays. *Clin Chem Lab Med* 2015;53:1205-1213.

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 12, 2023

6. Kulnigg-Dabsch S. Autoimmune gastritis. *Wien Med Wochenschr* 2016;166:424-430.
7. Chaker L, Bianco AC, Jonklaas J, Peeters RP. Hypothyroidism. *Lancet* 2017;390:1550-1562.
8. Almandoz JP, Gharib H. Hypothyroidism: etiology, diagnosis, and management. *Med Clin North Am* 2012;96:203-221.
9. Dahele A, Ghosh S. Vitamin B12 deficiency in untreated celiac disease. *Am J Gastroenterol* 2001;96:745-750.
10. Aktaş HŞ. Vitamin B12 and Vitamin D levels in patients with autoimmune hypothyroidism and their correlation with anti-thyroid peroxidase antibodies. *Med Princ Pract* 2020;29:364-370.
11. Mehmet E, Aybike K, Ganidagli S, Mustafa K. Characteristics of anemia in subclinical and overt hypothyroid patients. *Endocr J* 2012;59:213-220.