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A COMPARATIVE STUDY OF SERUM IRON LEVELIN HYPOTHYROID AND HEALTHY POSTMENOPAUSAL FEMALES

Medical Biochemistry

Om Prakash* Senior Demonstrator and Ph.D. Students in Department of Biochemistry, Dr. S. N. Medical College, Jodhpur. *Corresponding Author

Dr. Ranjana Mathur Senior Professor in Department of Biochemistry, Dr. S. N. Medical College, Jodhpur.

ABSTRACT

Being a third world country, iron deficiency is very common in general population and prevalence of hypothyroidism has also increased tremendously over the past few years. Therefore, this study was planned to estimate the level of serum iron in postmenopausal females with and without hypothyroidism. In this study, 150 postmenopausal females without hypothyroidism and 150 cases of hypothyroidism were evaluated. They were compared for serum iron. The mean age was not statistically different between two groups (p=0.587). Hypothyroid postmenopausal females showed a highly significant (p<0.0001) relationship in serum iron levels when results were compared with normal postmenopausal females without hypothyroidism.

KEYWORDS

Iron, Post-menopause, Hypothyroidism

INTRODUCTION

Menopause is the time in most women lives when menstrual periods stop permanently and they are no longer able to bear children.[1] Menopause typically occurs between 49 and 52 years of age.[2]

Thyroid diseases predominantly affect women; their incidence is 5-20 times higher in women than in men. Additionally, the prevalence of most thyroid gland autoimmunity, hypothyroidism, nodular goiter and cancer occur most often in postmenopausal and elderly women.[3]

Hypothyroidism means deficiency of thyroid activity resulting from reduced secretion of total thyroxine (T_4) and triiodothyronin (T_3). Biochemical decrease in T_4 and T_3 lead to hyper secretion of pituitary thyroid stimulating hormone (TSH) and an amplified increase in serum TSH levels.[4]

The adequate functioning of thyroid hormone, there is a requirement of various minerals and trace elements and iron consider to be one of the important element in the metabolism of thyroid hormone.[5] Iron is considered as a co-factor in catalysis of various important biological enzymes including thyroid peroxidase (TPO).[6] This unique enzyme involve in catalyze the first two reaction of thyroid hormone biosynthesis.[7] Low levels of body iron status are going to decrease the efficiency of TPO and thereby affect the overall thyroid hormone metabolism.

Outcomes of the study may implicate role of iron in management of postmenopausal hypothyroid female's treatment. Thus it will change the management of treatment for postmenopausal hypothyroid females.

MATERIALS AND METHOD

The study was conducted on 150 postmenopausal females with hypothyroidism of 45-60 years of age groups and results were compared with 150 postmenopausal females without hypothyroidism attending Out Patient Department in the Department of Gynaecology and Obstetrics, Umaid Hospital for Women and Children and MDM Hospital, Jodhpur.

An informed consent was taken from all the healthy control groups and study groups who participated in the study for physical examination and biochemical procedures after apprising them the nature and objective of the study.

Test for serum iron was estimated by ferrozine method in the clinical laboratory of the Department of Biochemistry at Dr. S. N. Medical College, Jodhpur.

RESULTS

The present study had been conducted on 300 postmenopausal females of same age group (45-60 years), comprising of 150 clinically established postmenopausal females and equal number of postmenopausal females with hypothyroidism.

The mean Body Mass Index (BMI) of the postmenopausal females with hypothyroidism was 30.98 ± 2.42; which varies from 26.31 to 36.84 kg/m^2. It was 30.44 ± 0.85 in postmenopausal females without hypothyroidism which varies from 27.77 to 31.66 kg/m^2.

A statistically significant difference (p=0.01) was observed in BMI of postmenopausal females with hypothyroidism (t = 2.578) when results were compared with the postmenopausal females without hypothyroidisms.

The mean serum iron of the hypothyroid postmenopausal females was 41.88±12.19 µg/dl; which varies from 16.16 to 87.24 µg/dl. It was 65.55±5.64 µg/dl in postmenopausal females without hypothyroidism which varies from 50.12 to 77.66 µg/dl. (Table 1)

A statistically highly significant difference (p<0.0001) was observed in serum iron of hypothyroid postmenopausal females (t= 21.581) when results were compared with the postmenopausal females without hypothyroidisms. (Table 2)

Table 1: Mean Serum Iron level (µg/dl) of the subjects studied

Group Studied	Serum Iron (Mean±SD) [Range]
Hypothyroid Postmenopausal Female	41.88±12.19 [16.16-87.24]
Normal Postmenopausal Female	65.55±5.64 [50.12-77.66]

Table 2: Statistical analysis of serum iron among the groups studied

Group Compared	t – value	p – value
Hypothyroid Postmenopausal Female Vs Normal Postmenopausal Female	21.581	p<0.0001 (HS)

DISCUSSIONS AND CONCLUSIONS

Hypothyroidism is common especially in older women.[8] There is increasing evidence that subclinical hypothyroidism may have serious consequences in postmenopausal women. According to Mark P, the prevalence of spontaneous hypothyroidism is between 1 and 2% and is more common in older women and 10 times more common in women than in men. A significant proportion of subjects have asymptomatic chronic autoimmune thyroiditis and 8% of women (10% of women over 55 years of age) and 3% of men have subclinical hypothyroidism.[9]

In this study, serum iron level showed a highly significant relationship between both the groups studied.

Similar to our study, Debnath J et al (2017)[10] observed that the mean serum iron levels was lower (42.75±35.47 µg/dl) in hypothyroid postmenopausal female subjects as compared to control groups (89.13±32.95 µg/dl) and it showed a highly significant difference (p<0.001) when both of the groups were compared.

Our study is in accordance with the study of Prasad VD et al (2021)[11] as they observed, Mean serum iron levels in hypothyroid postmenopausal females (48.00 ± 11.34 µg/dl) show a highly significant relationship ($p<0.001$) when compared to the control subjects (72.18±14.23 µg/dl).

Kawa MP et al (2010)[12] study observed, the levels of serum total iron, ferritin and hemoglobin were recorded to low in postmenopausal females with hypothyroidism as compared to healthy controls. These results were agreed with other studies conducted by Smith et al (1993)[13] & Santin et al (2011)[14] which revealed that iron deficiency may be associated with low levels of thyroid hormones in postmenopausal females.

It was observed in a study by Erdogan M et al (2012)[15] & Khatiwada S et al (2016)[16] that the postmenopausal females with hypothyroid there are decreased in the number and proliferative activity of erythroid cells in the marrow by reduce in plasma erythropoietin levels and then the decrease oxygen supplement of the tissues leading to slowly metabolic rate in hypothyroidism due to reduce the diffusion of oxygen to tissues in deficiency of thyroid hormones lead anemia.

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