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A COMPARITIVE STUDY ON HYPER AND HYPOTHYROIDISM CONDITIONS IN NELLORE DISTRICT WOMEN

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ABSTRACT
A Comparative study on hyperthyroidism and hypothyroidism in female employees of south coastal area of Nellore was made. The females of the age 60 and above were prone for hyperthyroidism and hypothyroidism.500 female employees blood was collected from the south coastal area, Nellore, for the determination of hyper and hypothyroidisms by using the method micro plate enzyme immuno assays (EIA). The coastal area females' serum analysis has revealed 9% of prone for hyperthyroidism and 10% for hypothyroidism. Overall 25% of all females with a sex ratio of 5:1 most often, in between the ages 20and 60 years, were affected with hyperthyroidism**.** Estimation of serum T_3, T_4, TSH, is necessary for the diagnosis of thyroid disorders. For better results, supplementation of iodine to salt may help hypothyroidic patients to recover normally. Whereas surgery maybe necessary for hyperthyroidism.

INTRODUCTION

Hyper and hypothyroidisms are the disorders of thyroid gland. Thyroxines (T4), triodo thyronine (T3) are the two hormones produced and released by thyroid gland upon the release and stimulation of thyroid stimulating hormone (TSH) from pituitary gland. Most of T_3 is made by other tissues by metabolizing T_4 into T_3 (JL Jain). Hyperthyroidism called thyrotoxicosis is a clinical condition caused by the over production of thyroid hormones. Perhaps 25% of females shall be affected with hyperthyroidism, with a sex ratio of 5:1 among the age groups between 20 and 60 years. Hyperthyroidism causes Grave's disease (inherited), toxic multinodular goiter and solitary toxic nodule. Uncommon causes are acute thyroiditis, post - partum thyroiditis, gestational thyroiditis, and exogenous iodine, dry - amiodarone, pituitary tumors and metastatic differentiated thyroid carcinoma. Symptoms such as palpitation heat tolerance, nervousness, insomnia, and breathlessness, light or absent menstrual periods, fatigue, fast heart rate, trembling hands, muscle weakness, worm moist skin and hair loss are observed (Biondi *et al*., 1993).

Hypothyroidism is defined as a deficiency of thyroid activity caused by low production of thyroid hormones in the body. Occurrence of mild and severe forms, are observed in 2- 15% of the population (David Cooper, 2005; Davidson and Morris, 2001). In hypothyroid patients, occurrence of an ovulation and menstrual disturbances particularly hemorrhagic are observed. Women are affected more often than men and both sexes are affected more frequently with increasing age (Burts *et al.,* 1998).

Several factors influence the hypothyroidism. They may be goitorous and non-goitorous. The goitorous may be primary, secondary and peripheral resistance to thyroid hormones (Vera Skalická *et al.,* 2009)**.** Goiters are classified in to toxic and non - toxic (Davidson *et al., 1988*). The following shall describe the details.

To elucidate the effect of natural agents experiments were conducted from the collected samples and the data were analyzed to make the conclusions on the population of coastal area.

MATERIALS AND METHODS

The required reagent kits were obtained from CDR and Omega chemical companies, Chennai and Hyderabad for analysis of T_3 and T_4 by ELISA.

Blood was collected from 500 female employees in the south coastal area, Nellore district, Andhra Pradesh. Serum was separated from the blood. Quantitative determination of triodothyronine and thyroxine concentration was performed using micro plate enzyme immune assay (EIA) (Sujatha *et al.*, 2006). (Anthony Fanci, 1998) In this assay procedure the patient serum was added along with TSH antibody horse radish peroxidase conjugate to the antibody coated wells. Reaction between the two antibodies and native TSH antigen forms a sandwich complex that binds with the coated well. After attaining the equilibrium, the antibody bound fraction was separated from unbound antigen by denaturation. The activity of the enzyme was quantified by the addition of reaction with an enzyme substrate 3, 3^1, 5, 5^1 - tetra methyl benzidine and hydrogen peroxide. The peroxidase enzyme acts on H_2O_2

to evolve nascent oxygen, which oxidize the colourless substrate to a yellow coloured end product. The intensity of colour produced was measured spectrophotometrically at 450 nm. Using the above principle the following protocols were adopted to estimate T_3, T_4 and the procedure for the estimation of T_3, T_4 and TSH were performed as earlier reports (Sujatha *et al.*, 2006).

RESULTS

The normal levels of serum T_3, T_4 and TSH are 0.7-2.10 ng/dL, 4.6-11.7μg/dL and 0.3 – 0.6μlu/mL, respectively, in females. The values given in the Table 1 are mean ± standard deviation. The serum T_3 values observed in females were ranged from 1.79 - 2.99 ng/dL (Table 1). The serum T_4 levels were ranged from 12.83 to 14.18 μg/ dL. And the serum TSH levels were ranged from 0.153 to 0.21 μlu/mL in the age groups of < 30 to > 60. The values of T_3 are higher in the age group of > 60. The T_4 values are almost similar in all age groups.

From the Table 1, it is known that < 30 to > 60 years, serum T_3 and T_4 levels are increased than normal values.

But the levels of TSH are reduced to less than normal. In females the serum T_3 and T_4 values were ranged from 0.66 - 1.35 ng/ dL and 3.44 - 6.69 μg/dL (Table 2). And the serum TSH levels were ranged from 12.94 - 39.95 μlu/mL in between the age groups of <30 and>60. Thus, the values of T_3 are none in the age groups of < 30. Whereas the T_4 values observed are almost similar in all age groups except in old age *i.e.,* > 60. From the values of Table 2 it is known that <30 to> 60 years of age T_3 and T_4 levels are appeared to be normal. But the levels of TSH are increased than normal.

Table 1: The levels of hyperthyroidism showing the thyroxine and thyroid stimulating hormones in females of coastal area of Nellore district

Age group	No	Levels T_3 (ng/dL)	T_4 (μg/dL)	TSH (μlu/mL)
Normal values		0.7-2.10	4.6-11.7	0.3-6.0
Below 30 yr	10	1.79 ± 0.596	13.27 ± 2.89	0.153 ± 0.087
30-40	10	2.02 ± 0.795	13.97 ± 3.35	0.199 ± 0.082
40-50	07	2.26 ± 0.92	14.18 ± 0.85	0.18 ± 0.088
50-60	10	2.62 ± 0.49	12.83 ± 0.57	0.21 ± 0.048
Above60	09	2.99 ± 0.55	13.96 ± 1.98	0.154 ± 0.077

Table 2: The levels of hypothyroidism showing the thyroxine and thyroid stimulating hormones in females of coastal area of Nellore district

Age group	No.	Levels T_3 (ng/dL)	T_4 (μg/dL)	TSH(μlu/mL)
Normal Values		0.7-2.10	4.6-11.7	0.3-6.0
Below 30 yr	10	1.35 ± 0.32	6.69 ± 1.80	12.94 ± 7.00
30-40	10	1.03 ± 0.37	5.31 ± 1.67	17.87 ± 9.43
40-50	10	0.98 ± 0.38	5.06 ± 1.66	19.28 ± 8.72
50-60	10	1.08 ± 0.64	5.32 ± 2.68	23.46 ± 16.97
Above 60	10	0.66 ± 0.21	3.44 ± 1.02	39.95 ± 10.49

DISCUSSION

The thyroid gland utilizes iodine to make thyroid hormones. An excess of iodine intake may cause hyperthyroidism. Iodine induced hyperthyroidism is usually seen in patients, who already have an underlying abnormal thyroid gland. Certain medications, such as amiodarone (Cordarone), which is used in the treatment of heart problems, contain a large amount of iodine and may be associated with thyroid function abnormalities (Seth *et al.*, 1984). The data showed in the Table 1 provide evidence that the female employees of Nellore may be consuming more of iodinated salt.

Hyperthyroidism can be suspected in patients with tremors, excessive sweating, smooth velvety skin, fine hair, a rapid heart rate and an enlarged thyroid gland. Puffiness around the eyes is a characteristic state due to the elevation of upper eyelids. In all cases, a blood test is needed to confirm the diagnosis (Ekins, 1990). The main tool for the detection of hyperthyroidism is measurement of serum TSH levels. As mentioned earlier, TSH is secreted by pituitary gland. In the presence of excessive amounts of thyroid hormone TSH is "down-regulated" and the levels of TSH falls in an attempt to reduce the production of thyroid hormone. Thus, the measurements of TSH result in low or undetectable levels in cases of hyperthyroidism with one exception. If an excessive amount of thyroid hormone is due to a TSH- secreting pituitary tumor, then the levels of TSH will be abnormally high. This uncommon disease is known as "secondary hyperthyroidism" (Klein *et al.*, 1994). The blood test conducted on female employees revealed that they contain high amounts of T_3 and T_4. From Table 1 it is known that <30 to >60 years, T_3 and T_4 levels are increased than normal values. But the levels of TSH are reduced to less than normal values. Therefore, the females who showed hyperthyroidism did not have any problem with pituitary gland. According to our results, approximately 9% of females of Nellore district of Andhra Pradesh were prone for hyperthyroidism (Table1).

In this case study, lymphocytic thyroiditis is mostly observed in women after their delivery. Our results showed that 8% of women were prone to lymphocytic thyroiditis .Here hyperthyroid phase can last from 4 to 12 weeks and it is often followed by hypothyroid phase that can last up to 6 months (Klein *et al.*, 1994). Our results showed that, women participated in this case study are mostly childless. Normally they tend to show, regulated function, but additionally due to their employment stress, T_3 and T_4 levels are in elevated state.

Hypothyroidism is a condition, where low thyroid output observed is due to low intake of iodine. In case of hypothyroidism, measurement of basal serum TSH is necessary, for its diagnosis (Venderpump, 1995). Hypothyroidism is commonly seen in people where thyroid failure is observed accordingly to laboratory's reference population. In thyroid patients, levels of serum TSH are increased in primary hypothyroidism. Where as in secondary hypothyroidism, TSH levels are either normal or undetectable. Patients rarely having secondary hypothyroidism will secrete TSH which is immuno active but not bioactive. According to our results there is an elevation of serum TSH in hypothyroid patients. In early hypothyroidism levels of serum T_4 is abnormal and serum T_3 is normal. This shows that concentrations of serum T_3 are not reliable for the diagnosis of primary hypothyroidism. Because, compensatory hyper secretion of TSH leads to relative increase of T_3 secretion. In

hypothyroidism, TRH stimulation test assess TSH secretary mechanism. Increased response for this test is seen in hypothyroidism. Here, increased levels of creatine phosphokinase (CPK), aspartate transaminase, and lactate dehydrogenase (LDH) are observed (Sawin *et al*., 1979). Some patients who appear clinically euthyriod displayed laboratory evidence of early thyroid failure (Dermott *et al.,* 2001). In mild cases, serum TSH and its response to TRH administration are increased. while serum T_3 and T_4 levels are normal, respectively. This is due to TSH induced hyper secretion of T_3 and more efficient conversion of T_4 to T_3. Sub clinical hypothyroidism is seen in patients with Hashimoto's disease and those with Grave's disease who have been treated with surgery or ^{131}I treatment (Klein *et al*., 1994). Measurement of serum reverse T_3 concentration is useful to differentiate between "low T_3 syndromes" from intrinsic hypothyroidism. Accordingly to this in low T_3 syndrome, T_3 is increased (Ohey *et al*., 2006). Measurement of thyroid radioactive iodine uptake is little useful to differentiate between normal and hypothyroid states. The increased serum cholesterol levels are observed in hypothyroidism of thyroid origin but not pituitary (Tannis *et al***.,** 1996).

In Hashimoto's disease, high titer of anti thyroid antibodies (TPO Ab) or anti-Tg antibodies are observed. In some patients with autoimmune thyroid disease also develop circulatory antibodies against T_3 and T_4 as observed by RIA. Normal and abnormal TSH could not be distinguished.

But immunoradiometric or chemiluminiscent techniques, using monoclonal antibodies are helpful in diagnosis of hypo and hypertensions.

In conclusion, women are more affected than men and both sexes are affected frequently with increasing age. It is seen in people who predisposed to thyroid failure, included in laboratory's reference population (Wada *et al.,* 1982). Among 500 females of coastal area, 9% of them showed hyperthyroidism and 10% have definitely hypothyroidism. The data showed in Table 1 provide evidence that the female employees of Nellore may be consuming more of iodinated salt. Screening for congenital hypothyroidism is definitely worthwhile because it is relatively common (1 in 4000 births) and can cause brain damage if untreated. In these cases, TSH measurement is very specific and sensitive. Our results on coastal females revealed that the unknown causes may be influencing the elevation of hypothyroidism and suggests that supplementation of iodine to salt may help the hypothyroidic patient to get the normal work.

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