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IMPORTANCE OF INCLUSION OF THYROID STIMULATING HORMONE (TSH) TEST IN MASTER HEALTH CHECKUPS –A SURVEY

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ABSTRACT

Introduction:*Thyroid dysfuction both hyper and hypo thyroidism may lead to many metabollic disorders and hence screening should be a essential part of master health check up.* ***Aim &Objective:****To include TSH test in Master Health Check up package to rule out thyroid abnormalities in population of central bangalore.****Materials &methods:****The subjects who visit the tertiary care multispeciality Vikram hospital for Master health Check up were included for the survey. TSH test is included in the package .The TSH levels are measured using Mini Vidas immuno assay analyser with principle of Enzyme Linked Fluorescence Assay(ELFA) .Adults aged between 25 to 75 yrs without any history of thyroid problems were included for the study.* ***Results &Discussions:****TSH test has been conducted for all the subjects(male and female with age group 25 to 75 years) who visit the tertiary care multispeciality Vikram hospital for Master health Check ups.We found 17% of this population to have hypothyroidism and 2.6% hyperthyroidism .The mean TSH for all age group including males and females is found to be 3.886 µIU/ml.* ***Conclusions:****Post inclusion of TSH in the master Health checkup package along with a panel of organ specific tests, we can capture missed out hypothyroid and hyperthyroid cases and treat accordingly to prevent further risk of thyroid related metabolic health problems.*

KEYWORDS

TSH- thyroid Stimulating Hormone, MHC -Master Health Check up. ELFA -Enzyme Linked Fluorescence Assay.

INTRODUCTION

Even today most of the hospital and diagnostic centers have not included thyroid function test in the health heck up package. The Master Health Check-up (MHC) is a programme that attempts to reduce health care costs by prevention and early diagnosis. A variety of chronic diseases affect us, most of which take their toll after the fifth decade of life. Diabetes, hypertension, heart attacks, stroke and cancer are some of the more common examples. Almost all of these problems first go through a long phase where they produce no symptoms (this period can be as long as 10 - 20 years). It makes sense, therefore, that a programme that attempts to detect and correct these problems during this silent phase will decrease the ultimate morbidity from these diseases. In the early days of preventive health check-ups every conceivable test and technology was ordered in the hope that some would be abnormal and that this would provide an avenue of approach. The philosophy was one of "the more the better." Experience has shown that this approach is neither effective nor safe. A handful of items, mostly simple, appear to provide the greatest value. Today the MHC is a carefully designed program it offers a series of tests that

are proven to be valuable. This panel of tests though valuable need not be limiting and basis my experience the Thyroid stimulating Hormone test need to be added as an important part in the panel of tests conducted in MHC. Laboratory diagnosis along with glinical findings are important before one concludes on Hypo or Hyperthyroidism.Many studies on statistics of hypo and hyperthyroid patients in Indian scenario.In this study we tried to find out whether TSH test can be included in MHC package as a screening test for thyroid. The thyroid is one of the largest endocrine glands found in the neck, below the thyroid cartilage[1]. The thyroid gland is a butterfly-shaped organ and is composed of two cone-like lobes or wings, connected via the isthmus. . The thyroid gland controls the usage of energy by the body (metabolism rate), makes proteins, and controls the sensitivity of the body to other hormones. It participates in these processes by producing thyroid hormones, the principal ones being triiodothyronine (T3) and thyroxine (T4). These hormones hence regulate the rate of metabolism and affect the growth and rate of function of many other systems in the body[2]. Hormonal output from the thyroid is regulated by thyroid-stimulating hormone (TSH) produced by the anterior pituitary, which itself is regulated by thyrotropin- releasing hormone (TRH) produced by the hypothalamus. TSH is reliable index of the biological activity of thyroid gland[7].*T*he production of thyroxine and triiodothyronine is regulated by thyroid-stimulating hormone (TSH) . Iodide is actively absorbed from the bloodstream by a process called Iodide trapping. In this process,sodium is cotransported with iodide from the basolateral side of the membrane into the cell and then concentrated in the thyroid follicles to about thirty times its concentration in the blood. Via a reaction with the enzyme thyroperoxidase iodine is bound to tyrosine residues in the thyroglobulin molecules, forming Monoiodotyrosine (MIT) and Doiodotyrosine (DIT). Linking two moieties of DIT produces thyroxine. Combining one particle of MIT and one particle of DIT produces triiodothyronine. Proteases digest iodinated thyroglobulin, releasing the hormones T4 and T3, the biologically active agents central to metabolic regulation. Both T3 and T4 are used to treat thyroid hormone deficiency hypothyroidism. They are both absorbed well by the gut, so can be given orally[3,4,5].

Disorders: Thyroid disorders include hyperthyroidism and Hypothyroidism . All these disorders may give rise to goiter, that is, an enlarged thyroid.

Hypothyroidism: Hypothyroidism is a condition in which the thyroid gland does not make enough thyroid hormone. Iodine deficiency is the most common cause but it can be caused by other causes such as several conditions of the thyroid gland or, less commonly, the pituitary gland or hypothalamus. Severe hypothyroidism in infants can result in cretinism[5,6,1].

Primary :The most common forms include Hashimoto's thyroiditis (an autoimmune disease) and radio iodine therapy for hyperthyroidism origin from thyroid.

Secondary:Occurs if the pituitary gland does not create enough thyroid-stimulating hormone (TSH) to induce the thyroid gland and produce enough thyroxin and triiodothyronine. Although not every case of secondary hypothyroidism has a clear-cut cause, it is usually caused by damage to the pituitary gland, as by a tumor, radiation, or surgery. Secondary hypothyroidism accounts for less than 5% or 10%of hypothyroidism cases.

Tertiary:Results when the hypothalamus fails to produce sufficient thyroidal-releasing hormone (TRH). TRH prompts the pituitary gland to produce thyroid stimulating hormone (TSH). Hence may also be termed hypothalami-

pituitary-axis hypothyroidism. It accounts for less than 5% of hypothyroidism cases.[7,8,9].

Signs and symptoms:Early hypothyroidism is often asymptomatic and can have very mild symptoms. Subclinical hypothyroidism is a state of normal thyroid hormone levels, thyroxine (T4) and triiodothyronine (T3), with mild elevation of thyrotropin, thyroid-stimulating hormone (TSH). With higher TSH levels and low free T4 levels, symptoms become more readily apparent in clinical (or overt) hypothyroidism.[10,11,12]

Hypothyroidism can be associated with the following symptoms: Poor muscle tone (muscle hypotonia), Fatigue, Hyperprolactinemia and galactorrhea, Elevated serum cholesterol, Cold intolerance, increased sensitivity to cold, Constipation, Rapid thoughts, Depression, Muscle cramps and joint pain, Thin and brittle fingernails, Coarse hair, Paleness, Decreased sweating, Dry, itchy skin,Weight gain and water retention,Bradycardia (low heart rate – fewer than sixty beats per minute), Goiter, Slow speech and hoarse, breaking voice –Dry puffy skin,Thinning of the outer third of the eyebrows, Abnormal menstrual cycles ,Low basal body temperature.

Subclinical hypothyroidism: Sub-clinical hypothyroidism occurs when thyrotropin (TSH) levels are elevated but thyroxin (T4) and triiodothyronine (T3) levels are normal. In primary hypothyroidism, TSH levels are high and T4 and T3 levels are low. Usually TSH increases when T4 and T3 levels drop. TSH prompts the thyroid gland to make more hormones. In sub-clinical hypothyroidism, TSH is elevated but below the limit representing overt hypothyroidism. The levels of the active hormones will be within the laboratory reference ranges.

Causes:Iodine deficiency is the most common cause .Congenital hypothyroidism is very rare accounting for approximately 0.2‰ and which can have several causes such as thyroid aplasia or defects in the hormone metabolism. Hypothyroidism can result from postpartum thyroiditis, a condition that affects about 5% of all women within a year of giving birth. The first phase is typically hyperthyroidism; the thyroid then either returns to normal, or a woman develops hypothyroidism. Hypothyroidism can also result from sporadic inheritance, sometimes autosomal recessive.

Diagnosis:The only validated test to diagnose primary hypothyroidism, is to measure thyroid-stimulating hormone (TSH) and then free thyroxin (T4).

Treatment:Hypothyroidism is treated with the levorotatory forms of thyroxine (levothyroxine) (L-T4) and triiodothyronine (liothyronine) (L-T3).

Hyperthyroidism: The overproduction of the thyroid hormones T3 and T4, and is most commonly caused by the development of Graves' disease, an autoimmune disease in which antibodies are produced which stimulate the thyroid to secrete excessive quantities of thyroid hormones. This disease can result in the formation of a toxic goiter as a result of thyroid growth in response to a lack of negative feedback mechanisms. It presents with symptoms like thyroid goiter, protruding eyes (exopthalmos), palpitations, excess sweating, diarrhea, weight loss, muscle weakness and unusual sensitivity to heat. The appetite is often increased.

Symptoms:Hyperthyroidism usually begins slowly. In the beginning, the symptoms may be mistaken for simple nervousness due to stress.

The diagnosis of hyperthyroidism is confirmed by blood tests that show a decreased thyroid-stimulating hormone (TSH) level and elevated T4 and T3 levels.

Treatment:The large and generally accepted modalities for treatment of hyperthyroidism in humans involve initial temporary use of suppressive thyrostatics medication (anti

thyroid drugs), and possibly later use of permanent surgical or radioisotope therapy.

Review of literature: Indian studies[13] have shown that the profile of thyroid disorders encountered especially in paediatric and adolescent age groups in India is similar to that seen in most parts of the world except for the prevalence of iodine deficiency disorders in certain endemic regions of this country. World-over[14] approximately 1.1% population suffers from Hyperthyroidism. However in India according to the industry estimates only 4 Lac patients get treated. Generally speaking incidence of hyperthyroidism is more common in females then males in the ratio of 4:1 (Female: Male).

Hypothyroidism is a condition, affecting more women than men. The negative consequences of hypothyroidism, which are frequent, dictate its timely diagnosis. The measurement of thyroid hormones in women after the age of 50, in pregnancy and after delivery, in women and men with hypercholesterolemia, in patients having had neck radiotherapy, in patients having been given drugs, such as amiodarone and lithium, appears appropriate[15].

Takamatsu et al [16] in 437 patients, found both types of autoantibodies positive in 316, only one in 85 and none in 36. Amongst patients positive for autoantibodies 50-75% are euthyroid, 25-50% have subclinical hypothyroidism, and 5-10% clinical hypothyroidism.

Need for study: By the inclusion of one test TSH in the MHC package we can screen thyroid by picking up Hypo and Hyperthyroid cases ,we should hence include TSH so that further complications associated with that can be taken care.

METHODS AND MATERIALS:

TSH test has been conducted along with many other organ specific tests for all the subjects (male and female) with age group 25 to 75 years who visit the tertiary care multi speciality Vikram hospital for Master health Check ups. The TSH levels are measured using Mini Vidas immunoassay assay analyzer with principle of Enzyme Linked Fluorescence Assay(ELFA) Serum is used for the assay. Females and Males aged between 25 to 75yrs without any history of thyroid problems which is been collected at the time of blood collection.

Inclusion criteria: Subjects (males and females) without Thyroid history and age between 25 to 75 years .

Exclusion criteria: Males and females <25 and >75yrs of age with a history of thyroid disorders.

Statistical analysis of data:

The total number of subjects included in the study is 235(n=235) with age ranging between 25 yrs to 75 yrs.17% of this population is found to have hypothyroidism and 2.6% hyperthyroidism .The mean TSH for all age group including males and females found to be 3.886 µIU /ml. **Table (1)**

Chi-square tests: In the age group <43 yrs 20.3% is found to be hypothyroid and 3.8% hyperthyroid. Age group 44 to 54 yrs 2.3% hyperthyroid and 12.5% hypothyroid. Above 55 yrs of age 1.5% hyper and 19.1% hypothyroid. **Table (2)**

Out of the total population taken 15% of the females and 19.4% of the males are found to be hypothyroid. **Table (3)**

Table(1) Statistics

	TSH
N	235
Mean	3.886
Median	2.580
Mode	0.1[a]
Std.Deviation	6.3306
Minimum	0.1
Maximum	60.0

a. Multiple Modes exist. The smallest value is shown.

Table(2)

AGE.NEW * TSH.CAT Crosstabulation

			TSH.CAT			
			< .25	.25-5	5+	Total
AGE.NEW	< 43 yrs	Count	3	60	16	79
		row %	3.8%	75.9%	20.3%	100.0%
	44- 54 yrs	Count	2	75	11	88
		row %	2.3%	85.2%	12.5%	100.0%
	55 + yrs	Count	1	54	13	68
		row %	1.5%	79.4%	19.1%	100.0%
Total		Count	6	189	40	235
		row %	2.6%	80.4%	17.0%	100.0%

Table(3)

SEX * TSH.CAT Crosstabulation

			TSH.CAT			
			< .25	.25-5	5+	Total
SEX	F	Count	6	102	19	127
		row %	4.7%	80.3%	15.0%	100%
	M	Count		87	21	108
		row %		80.6%	19.4%	100%
Total		Count	6	189	40	235
		row %	2.6%	80.4%	17.0%	100%

CONCLUSION

An attempt has been made to create public awareness on thyroid screening and possibly MHCs to be designed in such a way that which should include Thyroid Stimulating Hormone (TSH) test for the purpose of preliminary diagnosis of any Thyroid disorders .

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