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Effect of yogic practices on the level of thyroxine (T4) in the female patients of hyperthyroidism

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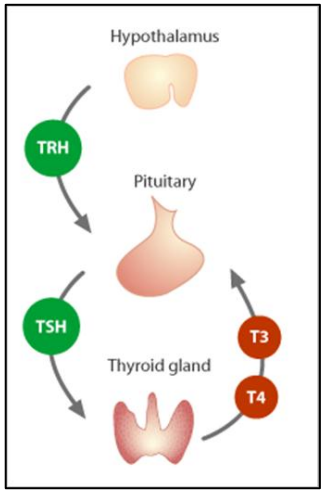
Abstract
The Hyperthyroidism is common worldwide and the overall prevalence is approximately 1.3 percent. Hyperthyroidism is more common in women than men (5:1 ratio). According to a projection from various studies on thyroid disease, it has been estimated that about 42 million people in India suffer from thyroid diseases. With the background that a number of studies being conducted to observe the effect of complementary therapies to balance the secretions of the bodily hormones, the present study aimed to find the impact of Yogic Practices on the level of Thyroxine (T4) Hormone in the female patients of Hyperthyroidism.
Forty (40) female subjects were taken in the study from Pitale clinic, Nagpur having Hyperthyroidism. They were then divided into two subgroups, experimental and control having equal 20 subjects in each group. They were voluntarily wanted to join in the study for their wellbeing. In this experimental-control research study Yogic practices including Asana, Pranayama, Mudra and Bandha were introduced to them. The volunteers practiced for 90 days including Sunday and holidays. The impact of Yogic practices showed a significant decrease in the level of Thyroxine (T4) Hormone in the female patients of Hyperthyroidism.

Keywords: Yogic Practices, Thyroxine (T4) and Hyperthyroidism

Introduction
The thyroid gland is a butterfly-shaped endocrine gland that is normally located in the lower front of the neck. The thyroid's job is to make thyroid hormones, which pour their secretion directly into the blood and then carried to every tissue in the body. The thyroid hormones are essential for growth and development, nervous system myelination, metabolism and organ functions. It influences the functioning of nearly all organ systems and that are of critical importance in normal physical and mental development and functions right from conception to old age. A typical adult limit for the hormone thyroxine (T4 serum) is 4.5 to 12.0 ng/dl. The production of thyroxine is regulated by thyroid stimulating hormone (TSH), released by the anterior pituitary. The TSH production itself is modulated by thyrotropin-releasing hormone (TRH). Five common thyroid diseases in India are: Hypothyroidism, Hyperthyroidism, Goiter and iodine deficiency disorders, Hashimoto's thyroiditis, and Thyroid cancer [3].



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Hyperthyroidism
Hyperthyroidism, often referred to as an 'overactive thyroid', is a condition in which the thyroid gland produces and secretes excessive amounts of the free thyroid hormones, triiodothyronine (T3) and/or thyroxin (T4). It presents with symptoms such as a thyroid goiter, protruding eyes (exopthalmos), palpitations, shortness of breath, excess sweating, diarrhea, weight loss, nervousness, heat intolerance, muscle weakness and unusual sensitivity to heat. The appetite is often increased [4]. The diagnosis of hyperthyroidism is confirmed by blood tests that show a decreased thyroid-stimulating hormone (TSH) level and elevated T4 and T3 levels.
In modern medical system, many patients are initially treated with anti-thyroid medication to normalize thyroid hormone levels. These drugs decrease the production of thyroid hormones. There is risk of Skin rashes, agranulocytosis (compromised immune system), and hepatitis. Beta blockers are used to decrease symptoms of hyperthyroidism such as increased heart rate, tremors, anxiety and heart palpitations. These drugs involve frequent dosing and may sometimes lose effectiveness over time. Due to the side-effects and inconvenience of such drug regimens, some patients choose to undergo radioactive iodine-131 treatment. Radioactive iodine is administered in order to destroy a portion of or the entire thyroid gland, since the radioactive iodine is selectively taken up by the gland and gradually destroys the cells of the gland. Alternatively, the gland may be partially or entirely removed surgically, though iodine treatment is usually preferred since the surgery is invasive and carries a risk of damage to the parathyroid glands or the nerves controlling the vocal cords. If the entire thyroid gland is removed, hypothyroidism results [5].
Although the system of Yoga is not developed for the purpose of treatment, it has been observed through the applied researches that the regular practice of yoga not only controls these diseases but also promotes and maintains the healthy

condition of the body and mind and prevents the disease process. Yoga is not an alternative to any conventional therapy but it definitely supports the healing process [6]. According to medical scientists, yoga therapy is successful because of the balance created in the nervous systems and organs of the body [7]. It has now been observed beyond doubt that Yogic Science not only helps to maintain normal Physical and Mental health but it is extremely useful in some diseases [8]. Yogic practices are capable to make changes in the secretions of the bodily hormones. In a study, "Effect of Yogic exercises on thyroid function in subjects resident at sea level upon exposure to high altitude", including Yogic schedule of prayer (3 minute), Hatha Yoga asanas (50 minute), pranayam (5 minute), meditation (5 minute) for one (1) month was found to cause a significant reduction in the concentration of radio-iodine in the thyroid of subjects at sea level [9]. Another study titled, "The effect of Yoga on subclinical Hypothyroidism: a case report" says that in the Hypothyroidism, the T3, T4 and TSH level may be affected through Yoga therapy. They also suggested that yoga can be an effective adjunct therapy in thyroid conditions [10]. Consequently, the researcher selected the topic entitled "Effect of Yogic practices on the level of Thyroxine (T4). In the female Patients of Hyperthyroidism" among subjects with 20-50 years age group.

Material and methods

Fifty eight (58) female subjects having medical history of hyperthyroidism were selected from the Pitale Diabetes and hormone centre, Nagpur, India. Out of which forty four (44) were eligible for the study. Each subject was assigned to one of the two groups: (i) yoga + medication, (ii) medication. After assigning the patients in yoga and non-yoga groups were (n = 22). A senior Endocrinologist referred all the patients after examining their physical health and medication status. Both the groups were kept for a stable dose of medications for six (6) months. Approximately similar medications (Methimazole (Tapazole), Propylthiouracil (PTU) etc.) were provided to both the groups. After three months of yogic intervention yoga (n = 20) and non-yoga (n = 20) groups completed the study protocol. Subjects who did not participate in yogic intervention classes (>80% yogic practice classes) were excluded from the study. Patients, who dropped the study, also did not differ significantly in terms of age and sex. Having cervical spondylitis and age <20yrs. and >50yrs. was the exclusion criteria for the study. Before study all the subjects were asked to maintain their routine activities and not initiate any new physical activities for this duration. Those patients with clinical history of Hyperthyroidism and age limit 20-50 years were included in the study and patients with other co-morbid conditions like hypertension, diabetes mellitus, Chronic obstructive pulmonary disease (COPD), asthma and various heart diseases were excluded from the study. Patients were registered from November 2013 to April 2014, who fulfilled the inclusion criteria and willing for compliance were invited to participate in the yogic interventional prospective study. After informed consent by the subjects, bio-chemical measurement was taken.

Laboratory evaluation of Thyroxine (T4) Hormone

Diagnostic lab test performed on a blood sample include:- Thyroxine (T4) hormone.

Sample collection

Five millilitres of venous blood was collected, following informed consent, from all individuals who participated in this study before yogic intervention and again blood was collected after three months of yogic intervention in yoga group and without intervention in non-yoga group. Serum was separated by centrifuge machine (3500-4000 rotations/min) at room temperature.

Biochemical measurements

The Thyroxine (T4) Hormone level in the blood was evaluated in the Biochemistry Laboratory of Pitale Diabetes and Hormone centre, Nagpur, India.

Yogic intervention

Under the guidance and supervision of yoga expert, subjects performed yogic practices. The Yogic practices were

Asasna	- Sarvangasana, Supta-Pawan-muktasana, Yoga Mudrasana, Kandharasana (2 min. each) total 8 min.
Pranayama	- Nadi-shodhana, Ujjayi, Sheetli, Bhramari (4 min. each) total 16 min.
Mudra	- Vipreetkarni mudra (3 min.).
Bandha	- Jalandhar Bandha (3 min.).

The schedule for Yogic practices

Time duration for yogic practice- 90 days.
The exposure time for yogic practice- 30 min.

Statistical analysis

IBM SPSS software was used in the statistical analysis. All statistical tests were 2-tailed and a p value of <0.05 was considered significant. The main objective was to compare the Thyroxine (T4) Hormone level in the two groups (yoga and non-yoga) after the follow-up period of three months.

Results

Out of 73 patients 40 have finished the program and completed study protocol. Table 1 summarizes pre and post-intervention changes in the variables. Compared to the non-yoga group, the yoga group revealed a pattern of improvement in Thyroxine (T4) level (p < 0.01).

Table 1: Experimental

Test	N	Mean	Std. Deviation	SE_D	t	df	R	significance level
Pre	20	12.04	1.393	0.463	3.493	19	0.226	0.01
Post	20	10.42	1.881					

Table 2: Controlled

Test	N	Mean	Std. Deviation	SE_D	t	df	R	significance level
Pre	20	11.73	1.112	0.336	1.396	19	0.039	not significant
Post	20	11.26	0.973					

Table 1 and 2 summarizes the pre and post intervention changes in the experimental and control groups. Mean value of pre test is 12.04 and post test is 10.42 in experimental group. While mean value of pre test is 11.73 and post test is 11.26 in controlled group. T-value of experimental group is 3.493 and that of controlled group is 1.396. Compared to the non yoga group, the yoga group revealed a pattern of improvement in T4 level ($p<0.01$).

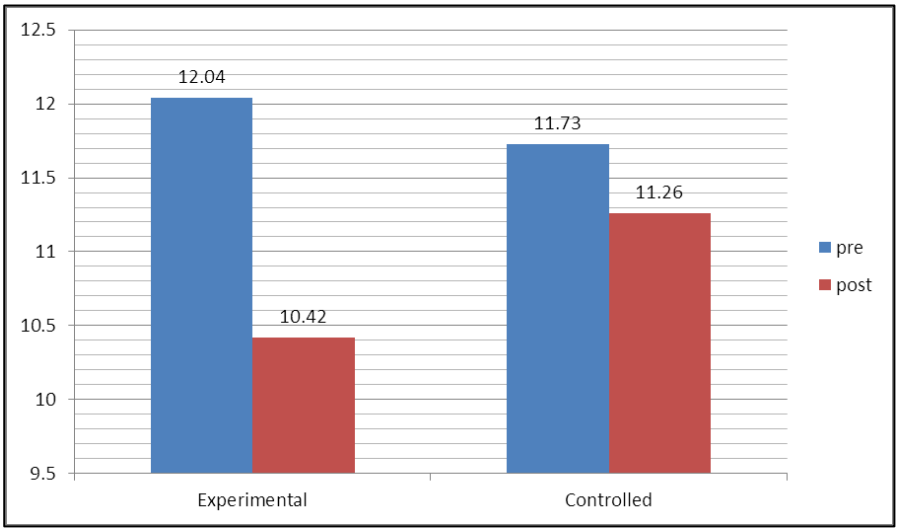

Fig 1: Graphical representation of Mean Value

Discussion

In the present study the effect of yogic practices was seen on the level of Thyroxine (T4) Hormone in the female patients of Hyperthyroidism. Significant improvement in level of T4 was observed. Other researchers also corroborate with these findings. In a study conducted on twenty (20) hyperthyroid patients, the effect of Hatha Yogic practices (Asana, Pranayama, Mudra, Bandha) was observed on the level of Triiodothyronine (T3) hormone. Patients practiced the package for three (3) months. After three months of yogic practices, the level of T3 hormone decreased significantly in the Yoga group [11]. In another study the effect of yogic practices was observed on thyroid patients. They found significant effect of Yogic practices on Thyroid Stimulating Hormone [12]. In a research conducted in India, a twelve week program of yogic practices was undertaken to observe the Triiodothyronine (T3) level in hypothyroid patients, significant increase in T3 level was observed in the patients with yoga [13]. It was found that yogic practices are useful in preventing and managing disorders related to the body systems. In the present study T4 level significantly decreased after the applying Yogic practices in yoga group. This study assessed the feasibility of implementing a yoga program among female patients of Hyperthyroidism.

Practice of Yoga improves the endocrine activity and corrects body metabolism and physiological functions. In a research conducted by Singh *et al*. (2011) in their study, "The impact of yoga upon female patients suffering from hypothyroidism", studied the effect of yoga on the quality of life of 20 female hypothyroid patients with the help of WHO Quality of Life Scale (22). Subjects attended one hour yoga sessions daily for a period of one month. A pretest-post-test research design was used for data analysis and they concluded that yoga is valuable in helping the hypothyroid patients to manage their disease-related symptoms. Yoga may be considered as supportive or complementary therapy in conjunction with medical therapy for the treatment of hypothyroid disorder [14].

In the present study the level of Thyroxine (T4) hormone significantly decreased after yogic practices. Table (1) and (2) shows that the practice of yogic practices decreases the level of Thyroxine (T4) hormone in the female patients suffering with Hyperthyroidism significantly. Decrease in the level of T4 hormone in the condition of Hyperthyroidism is beneficial. So, it can be said that, there is positive effect of Yogic practices on the level of Thyroxine (T4) in the female patients suffering with Hyperthyroidism. At the end it can be concluded that Yogic practices significantly decreases the level of Thyroxine (T4) Hormone of the female patients suffering with Hyperthyroidism.

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