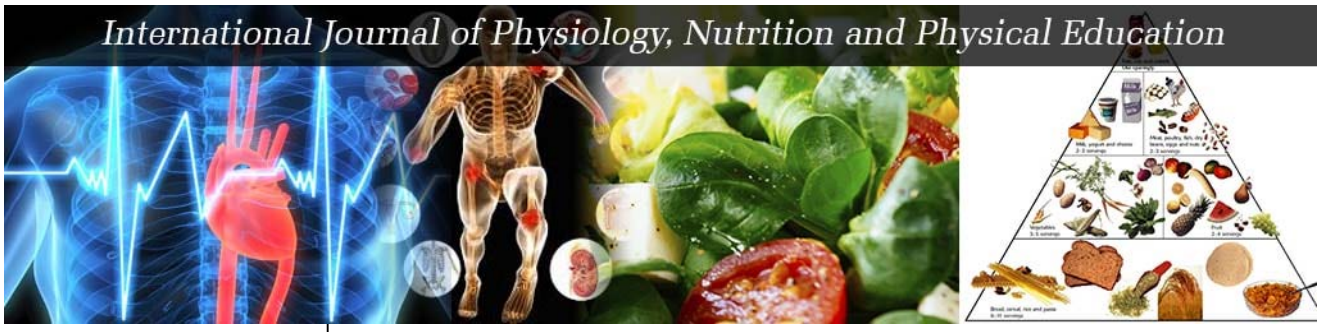

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Physiological variation of thyroid hormones (T3 & T4) in non-vegetarian and lacto-vegetarian diet individuals

Nazim Saifi, Saad Ahmed and Yusuf Jamal

Abstract
Different diets have different effects on thyroid hormone synthesis. There is increasing perception among people that vegetarian diet is balanced and healthy diet and prevents from various chronic diseases. But it is also fact that strict vegetarian (vegan) diet is deficient of many major nutrients like calcium, vitamin D3, zinc and iodine. Iodine content in food of plant origin (vegetarian diet) is lower in comparison with that of animal origin due to a low iodine concentration in soil. Iodine deficiency is prevalent in many mountainous regions and in central Africa, central South America, and northern Asia. In areas of relative iodine deficiency, there is an increased prevalence of goiter and, when deficiency is severe, hypothyroidism and cretinism. In this study, one hundred (100) young healthy volunteers on lacto-vegetarian and non vegetarian diets were randomly selected to find out the relation between thyroid hormones (FT3 and FT4) & Individuals with lacto-vegetarian and non vegetarian diets. Based on the various observations it was found that Mean of FT3 and FT4 levels in different diets were almost equal. Mean of FT3 value in non-vegetarian diet (2.06±0.38) is slightly higher than lacto-vegetarian diet (2.04±0.40). Mean of FT4 values in both lacto-vegetarian (0.82±0.31) and non-vegetarian diet (0.87±0.29) were almost same with minor difference. The study showed that there is no correlation between Lacto-vegetarian diet and FT3 & FT4, which reflects that lacto-vegetarian people of Delhi are not iodine deficient; the reason may be as they consume salt which is fortified with iodine.

Keywords: Diet & thyroid hormones, lacto-vegetarian, iodine deficiency

Introduction
Thyroid gland is present in front of trachea between the cricoids cartilage and suprasternal notch. It produces two related hormones tri-iodothyronine and thyroxine, these hormones play a very critical role in cell differentiation during development and help maintain thermogenic and metabolic homeostasis in the adult [1]. Nutrition plays a critical role in thyroid hormone synthesis. The production of thyroid hormones depends upon adequate amount of tyrosine, a non essential amino acid synthesized in the body from the essential amino acid phenylalanine, and dietary iodine [2]. Moreover, other than iodine, selenium, zinc and iron also help in thyroid hormone synthesis and in their action on target cells. T4 is the principle hormone secreted by the thyroid gland but has little biological activity. T3 the major biological active hormone is also produced by the thyroid gland, but most of this metabolite is derived from the de-iodination of T4. De-iodinase enzyme D1 is located primarily in liver and kidney and the enzymatic activity is low in hypothyroidism and high in hyperthyroidism [3]. De-iodinase enzyme D1 is a selenoprotein, which is formed by the addition of selenium to the amino acid selenocystein. Selenium deficient diets have been studied and have high incidents of goiter and reduced serum T3 concentration [4].
Iron deficiency impairs the synthesis of thyroid hormones by reducing the activity of heme-dependent thyroid peroxidase. Population studies have revealed that nonanemic children responded swiftly to iodine supplementation with regard to goiter and TSH levels than anemic children [5]. Zinc status also affects thyroid function. Zinc is required for the proper functioning of D1 de-iodinase enzyme, the enzyme required for the conversion of thyroxine into tri-iodothyronine [6]. Individual who eat no animal flesh nor any food of animal origin. They are called strict vegetarian or vegan. Individual who eat plant proteins, and also use milk are called lacto-vegetarian. Lacto-ova vegetarians are those individuals who eat both milk and eggs along with plant proteins [7].

In India vegetarian people usually do not eat egg but consume milk and milk product, so they can be termed as lacto vegetarian. There is increasing perception among people that vegetarian diet is balanced and healthy diet and prevents from various chronic diseases. But it is also fact that strict vegetarian (vegan) diet is deficient of many major nutrients like calcium, vitamin D3, zinc and iodine [7]. Iodine content in food of plant origin (vegetarian diet) is lower in comparison with that of animal origin due to a low iodine concentration in soil [8]. Iodine deficiency is prevalent in many mountainous regions and in central Africa, central South America, and northern Asia. In areas of relative iodine deficiency, there is an increased prevalence of goiter and, when deficiency is severe, hypothyroidism and cretinism [1]. Iodine deficiency is a problem in India, the importance of iodine deficiency cannot be underestimated in the Indian context [9]. Researchers from New Delhi had shown that this was linked to iodine deficiency and that this resulted in decompensated hypothyroidism in many cases.

The purpose of this study was to see the serum FT3 & FT4 range difference among non-vegetarian and lacto-vegetarian young healthy individuals.

Material & Method

One hundred (100) young healthy volunteers on lacto-vegetarian and non-vegetarian diets were randomly selected for the study. The aim of the study was to find out the relation between thyroid hormones (FT3 and FT4) and thyroid Stimulating Hormone & Individuals with lacto-vegetarian and non-vegetarian diets.

Study Type- Cross Sectional, Descriptive Study

The study was carried out in the Department of Physiology, of A & U Tibbia College, Karol Bagh, Delhi, during the period from 2014 to 2015.

Inclusion Criteria

- Healthy Individuals of 18 to 25 years of age
- Either sex

Exclusion Criteria

- Known cases of Hyperthyroidism or Hypothyroidism
- Pregnant women
- Individual with history of alcohol intake/tobacco chewing/smoking
- Any chronic disorder

Determination of Thyroid Hormone (Free T3 And Free T4)

Blood Sample Collection

Individuals were called empty stomach in the morning for blood sample collection. 3 ml blood was drawn from median cubital vein by sterile, disposable 5 ml syringes. After that blood was collected in a plain vial and allowed to clot at room temperature for an hour and then serum was obtained after centrifugation for 5 minutes at 3000rpm in centrifugal machine.

Test Kits

Serological test of thyroid hormones (fT3 & fT4) was done by URIT-660 Auto Analyzer and the testing kits of CALBIOTECH Company were used.

Observations

Total 100 volunteers were randomly selected for Mizaj identification and Thyroid function test as per inclusion criteria, out of which 6 individuals had higher TSH value above normal limit, so those volunteers were excluded from the study. Finally total 94 volunteers completed the study.

Total Registered Volunteers	Excluded	Completed
100	6	94

Out of 94 volunteers, 22 (23%) were lacto-vegetarian and 72 (77%) were non-vegetarian. Total 94 individuals were divided into two groups i.e. non-vegetarian diet group and lacto-vegetarian diet group as summarized below.

Diet Wise Distribution of Subjects

Diet	No. of Subjects	Percentage%
Lacto-Vegetarian	22	23%
Non-Vegetarian	72	77%

In both the groups mean of FT3 and FT4 were calculated. Mean of FT3 value in mix diet (2.06±0.38) is slightly higher than vegetarian diet (2.04±0.40) as summarized below.

Mean ± Sd of FT3, According To Diet

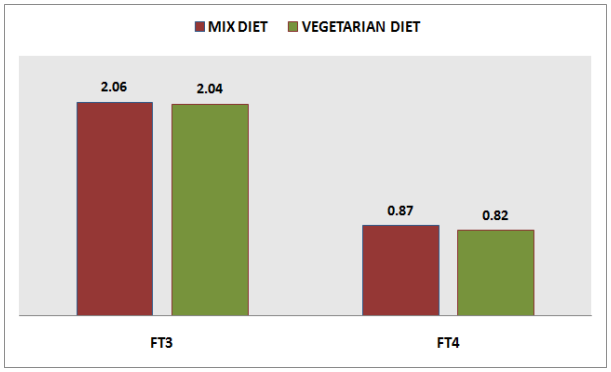
Diet	FT3
Non-Vegetarian	2.06±0.38
Lacto-vegetarian	2.04±0.40

Mean of FT4 value in both vegetarian (0.82±0.31) and mix/non-veg diet (0.87±0.29) is almost same with minor differences as summarized below.

Mean±Sd of T4, According To Diet

Diet	FT4
Non-Vegetarian	0.87±0.29
Lacto-vegetarian	0.82±0.31

Mean of FT3, FT4 According To Diet



Mean of FT3 value in non-vegetarian diet (2.06±0.38) is slightly higher than lacto-vegetarian diet (2.04±0.40). Mean of FT4 values in both lacto-vegetarian (0.82±0.31) and non-vegetarian diet (0.87±0.29) were almost same with minor difference. Lacto-vegetarian diet is comparatively iodine deficient diet and such people are considered having increased risk of hypothyroidism, therefore it may be assumed that lacto vegetarian's diet people may have TSH level relatively at higher side and FT3, FT4 at lower side, within the normal range, in comparison to non-vegetarian. This study showed lacto-vegetarian has insignificant high level of TSH in comparison to non-vegetarian diet. Mean of FT3 and FT4 levels in different diets were almost equal, which reflects that

lacto-vegetarian people of Delhi are not iodine deficient, as they consume salt which is fortified with iodine.

Results

Based on the various observations it is found that Mean of FT3 and FT4 levels in different diets were almost equal. This study shows that there is no correlation between Lacto-vegetarian diet and FT3 & FT4, which reflects that lacto-vegetarian people of Delhi are not iodine deficient; the reason may be as they consume salt which is fortified with iodine. The present study was restricted to only 100 volunteers. Thus, it may/may not be comprehensive. Therefore, future researches may be conducted on larger sample. The results of such studies may provide greater insight for the determination of prevalence of hypothyroidism and goiter in the society.

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