

# Prevalence of Hypothyroidism And Its Association With Vegetarian And Non Vegetarian Diets

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**Abstract:** Hypothyroidism a pathological condition that affect whole metabolic processes of our body primarily under the influence of less supply of stimulating hormone and raw materials required for biosynthesis of T<sub>3</sub> ( Triiodothyronine ) and T<sub>4</sub> ( Tetraiodothyronine ). Thyroid hormones regulate the conversion of oxygen and food into energy for proper physiological activities. We thought to explore the cause of pervasive occurrence of hypothyroidism even in sub urban inhabitants in relation to food habit. The vegetarian population 181n (60.33%) were found to be affected and having high level of TSH ( mean value- 23.8  $\mu$ IU/ml ) On the contrary the subjects 119n (39.66%) who were taking non vegan diets and not consuming cruciferous vegetable were reported of having less TSH (mean value- 11.7  $\mu$ IU/ml ) . The upshot of this study indicated that the occurrence of hypothyroidism were predominantly more in vegetarian population as vegan diets lack vitamin D, zinc, iodine and other nutrients.

**Keywords:** Triiodothyronine, Tetraiodothyronine, TSH, Iodine and selenium.

**Introduction:** The overall metabolic rate of body is mainly governed by thyroid hormones ( T<sub>3</sub>, T<sub>4</sub> ). Any disturbance in level of hormone synthesis greatly affect the metabolism and on the whole health of individuals. Lower hormone level –hypothyroidism plays a detrimental role by slowing down the rate of metabolism leading to various complications like- obesity , cardiovascular problem , mental health issue, peripheral neuropathy, infertility, birth defects etc. However over production of thyroid hormones also have ill effect on various organs so optimum level must be maintained by endocrine regulation mainly from hypothalamus pituitary axis. Being a main controlling centre hypothalamus produces THRH that stimulates pituitary to secrete TSH that play a vital role in determining the biosynthesis of T<sub>3</sub>, T<sub>4</sub> hormones. Thyroid hormones are essential for cell differentiation during developmental stages and maintain the thermogenic parameters and homeostasis. The hormones of thyroid gland increase the oxygen consumption thus increases the utilization of carbohydrate, fats and proteins in body. The production of heat and energy inside the body exclusively depends on thyroid secretions. Nutrients have great impact on synthesis of hormones and overall health. Non essential amino acid- tyrosine is base material which is synthesized from essential amino acid phenylalanine in the body. Iodine, selenium, iron, zinc help in synthesis of thyroid hormones. So finding the relation between types of food habit and hypothyroidism has become imperative to reduce the occurrence of this menace and protect the society. Wellness is essential factor in reducing the burden of morbidity and mortality , thus exploring the cause of high rate of occurrence of hypothyroidism may reduce the morbidity as hypothyroidism never come as single ailment but its associated complications are numerous leading to high number of associated diseases.

Despite the growing concern that vegan diets lack vitamin D, zinc, iodine and other nutrients which are found in non veg diets. A study with very large numbers of subjects approximately 97000 conducted by **Serena Tonstad** et.al drawn a conclusion that vegetarian diets do not have major impact and not associated with high rate of hypothyroidism except lacto-ovo vegan group. According to **Paloma Team** (Online consultant group solely dedicated to hypothyroidism treatment) vegan diets have innumerable benefits in hypothyroidism and Hashimoto's disease. **Dr. J. E. Williams** in his article "Thyroid and Diet connection" elaborated that various cruciferous vegetables containing goitrogenic substances interfere with elements essential for the synthesis of thyroid hormones. **Stoewsand GS** in his article "Bioactive organosulfur phytochemicals in *Brassica oleracea* vegetables---a review " elaborated sulfur containing phytochemical- glucosinolates and its components isothiocyanates, hydrolytic products inhibit iodine intake by thyroid. **August McLaughlin** in his paper indicated that fruits and vegetables might interfere with function of thyroid gland. **Nimmy N J** in his paper emphasized that food habit is the main factor of hypothyroidism. **David L, Watts, D.C** indicated that various minerals and vitamins suppress thyroid function.

After having insight of above mentioned outcome of studies it became decisive to further explore the possibility of relationship between thyroid gland and its abnormalities with food habits. We decided to conduct a study in Nalanda district of Bihar to ascertain the actual cause of high rate of occurrence of hypothyroidism.

## Material and Method:

A questionnaire was designed to take the feed back of patients suffering hypothyroidism from prominent medical consultants ( Dr. Shyam Narain Prasad, Dr. Sujit Kumar, Dr. Tanvir Ahmad and Dr. Awadhesh Prasad ) of Nalanda district . One to one

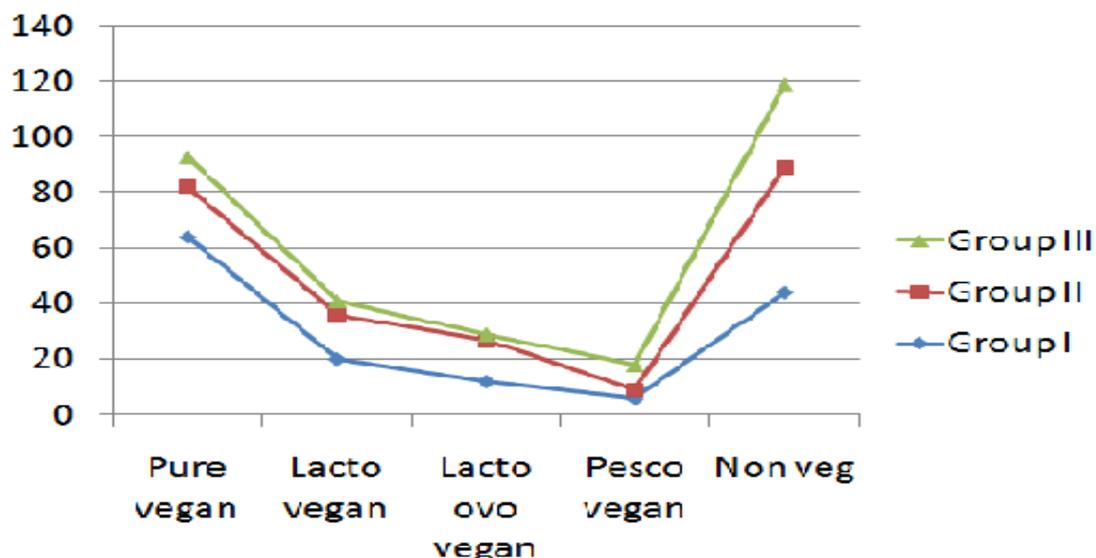
interview were conducted to procure the necessary data. Altogether 325 patients could be contacted but out of which 25 patients were excluded due to non co-operation and not fulfilling the criteria. The questionnaire having all the valuable parameters with additional information were very helpful in compilation of data for the study. The age group of participants was considered between 20 to 50 years. They had been divided into 3 age groups i.e- 20-30, 30-40 and 40-50 years to find out the dominance of hypothyroidism in particular age group. The participants were also divided into pure vegan, lacto vegan, lacto-ovo vegan, pesco vegan and non veg taking groups. Data were also collected to evaluate the habit of taking cruciferous vegetable which happens to be cultivated in large area of Nalanda district. Out of 300 patients 256 (85.33%) were female and only 44 (14.66%) were male, a huge disparity in gender were noticed which need to be investigated.

### Result:

The aim of the study was to find out the correlation between food habit and hypothyroidism. Out of total number of patients the vegetarians were predominantly higher in comparison to non vegetarians. Data collected from different clinics of medical practitioners of hypothyroidism patients show that 181n (60.33%) patients were vegetarians whereas only 119n (39.66%) were non vegetarians. Out of total number of vegetarian i.e-181n 106n (58.56%) were taking cruciferous vegetables like cauliflower, cabbage, radish etc These findings are covertly indicating that vegetarians population are more prone to hypothyroidism as compared to non vegetarian population. Although the vegetarian were not true vegan but they were mostly lacto vegan and few pesco vegan ( Lacto vegan include diary product derived from animal sources, lacto-ovo vegan consumes egg apart from veg diet whereas Pesco vegan include fish and other sea food in their diets apart from veg diet).The three age groups were having 146n i.e.- 48.66% subjects in group I ( Age- 20-30 yrs), 97n i.e.- 32.33 % were in group II ( Age- 30-40 yrs ) and in group III ( Age- 40-50 yrs ) only 57n i.e.- 19% were found. The data concerned with age of subjects suggested that the younger generation were more exposed to endocrine disruptors elements. The outcome of the study may signify that non veg diet show some protective mechanism against hypothyroidism due to rich source of amino acids, zinc, iodine and other essential elements to support thyroid hormone synthesis. On the other hand vegetarian diets are deficient in iodine the base material for synthesis of thyroid hormones and also exposed to goitrogenic substances which interfere with iodine uptake by the thyroid follicles.

Food Habit	Group I	Group II	Group III	Total
Pure vegan	64 ( 43.83% )	18 ( 19.35% )	11 ( 11.82% )	93 ( 51.38% )
Lacto vegan	20 ( 13.69% )	16 ( 16.49% )	05 ( 8.77% )	41 ( 22.65% )
Lacto-ovo vegan	12 ( 8.21% )	15 ( 15.46% )	02 ( 3.50% )	29 ( 16% )
Pesco vegan	06 ( 4.10% )	03 ( 3.09% )	09 ( 15.79% )	18 ( 9.94% )
Non vegan	44 ( 30.13% )	45 ( 46.39% )	30 ( 52.63% )	119 ( 39.66% )
Total	146 ( 48.66% )	97 ( 32.33% )	57 ( 19% )	300 ( 100% )

Table 1 : Showing number subjects suffering from Hypothyroidism and their food habit



Graph : showing data of diverse food habit of patients suffering from hypothyroidism

Food Habit	No. of females	No. of Males	Mean value of TSH
Vegetarian	159	22	23.8 $\mu$ IU/ml
Non Vegetarian	97	22	11.7 $\mu$ IU/ml
Total	256	44	17.7 $\mu$ IU/ml

Table 2: showing mean value of TSH among vegetarian and non vegetarian subjects

**Discussion:** Hypothyroidism is a condition of underactive thyroid gland and thus influencing almost every physiological reactions which are the indispensable to keep body in healthy condition. The prevalence of hypothyroidism has increased many fold since last two decades, the credit for more diagnosis goes to pharmaceutical industry for advocating the need of thyroid test to screen the patients. Thyroid hormones control basic metabolic rate and maintain homeostasis. Hypofunction of thyroid gland severely impact bodily functions. In our study male and female disparity is significantly representing the dominance of hypothyroidism in female. The higher occurrence in female suggests that female hormones mainly estrogen may play a negative role in functioning of thyroid hormone and thus disproportionately affect women.

The data collected is indicative of high prevalence of hypothyroidism in Vegetarian population with high level of TSH as compared with non vegetarian group. Out of 181n vegetarian 109n ( 60.22% ) were pure vegan, 56n ( 30.9% ) lacto vegan, 10 n ( 5.52% ) lacto ovo vegan and 6n ( 3.31% ) were pescos. The distribution of different types of vegetarian in outcome of the study is pointing towards the influence of veg diet and their constituents might be involved in endocrine disruption. The cruciferous vegetables contain sulfur rich compounds glucosinolates, chewing raw cruciferous vegetables result in hydrolysis of bioactive glucosinolate into isothiocyanate and indole-3-carbinol. These metabolites impart detrimental effects on endocrine functions. especially sulfur rich compounds release sulfur that binds with iodine receptor in thyroid gland and inhibit the formation of  $T_3$  and  $T_4$ . Thus causing less production of thyroid hormones and leading to hypothyroidism. To have a clear picture about prevalence of hypothyroidism further studies are required with larger number of participants.

**Conclusion:** Hypothyroidism and its relation to diets have been explored to ascertain the effects of veg or non veg foods on thyroid function. One of the reason behind higher incidence of hypo function of thyroid may be due to less intake of iodine as veg diets have very poor source of iodine as well as Cruciferous vegetables adversely affect the production of  $T_3$  and  $T_4$ . The dominance of hypothyroidism in society has been increasing at an alarming rate so finding out the cause has become imperative and the measures must be taken to minimize the occurrence. Further studies are required with more no of subjects to ascertain cause of widespread occurrence.

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