ASSESSMENT OF ANTHROPOMETRIC CHANGES IN DIFFERENT THYROID GLAND DISEASES

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Abstract. *In this article, the authors conducted a retrospective analysis of the worldwide studies of changes in anthropometric indicators and changes in thyroid hormone levels in thyroid disease.*

Keywords: *weight, body mass index, anti-thyroid peroxidase (anti-TPO), vascular endothelial growth factor-1.*

Significance: Recently, several authors have pointed out that the number of endocrine gland diseases is increasing as a result of the deterioration of the environment in the world. Also, due to the increasing number of secondary diseases related to the thyroid gland in the population of regions with a deficiency of iodine, this topic remains open.

Purpose: To study the impact of thyroid disease on changes in anthropometric indicators in the world.

Materials and methods: In this topic, the results of articles, abstracts, dissertations were taken from pubmed, web of science and google scholar databases, and a retrospective analysis was conducted on these scientific researches.

The results of the study: Behrang Motamed and his colleagues conducted scientific observations in four stages. This observation began in 1999 and ended in 2011. 971 women and 784 men participated in the observations. In the 9.7-year follow-up, it was observed that the free T4 level decreased with the patient's weight and waist-to-hip ratio. In addition, it was found that the amount of thyroid-stimulating hormone has an effect on the waist circumference, and with the change of the free T4 hormone level over time. found that there is a negative correlation between body weight.[5]

In a study of women living in the southern region of Surya, Dareen A.A and co-authors studied the relationship between anthropometry of obese women and the size of the thyroid gland. This study was carried out between 2017 and 2018 and included a total of 140 women over the age of 35 years old or recently. Obese women who had no complaints related to the thyroid gland participated. During the study, women were divided into 3 groups according to the degree of obesity, body surface area, waist and hip circumference, waist-to-hip ratio were determined, and the morphology of the thyroid gland was determined It was determined by ultrasound examination. In the research, it was found that the size of the thyroid gland was determined in women of the third degree of obesity.[10]

In China, from March to October 2010, Weimin Hu and co-authors studied the correlation of thyroid nodules with anthropometric indicators. A total of 6793 adults and 2410 children in Hangzhou, Zhejiang Province, China, were conducted based on ultrasound examination of the thyroid gland. Socio-demographic thyroid gland characteristics and potential risk factors were collected in a questionnaire. Height and weight were measured using standard protocols. This

study found that weight, height, BMI, and BSA were positively associated with thyroid nodules in women and girls. Taller, obese individuals show an increased susceptibility to thyroid nodules.[11]

Silvia Turcios and co-authors conducted a study among a total of 100 healthy people aged 18-50, including 21 men and 79 women, living in Cuban conditions without iodine deficiency. Authors were measured and correlated with several anthropometric data and various factors leading to thyroid cancer. In multivariate analysis, thyroid volume was associated with all anthropometric measurements, but in multivariate analysis, body surface area was found to be the only significant anthropometric parameter. Research has shown that body surface area measurements of thyroid size can be used to clinically estimate thyroid size and that thyroid size is inconsistent among tobacco users.[12]

This study was conducted by Nidhi Budhalakoti and Kalpana Kulshrestha on 150 randomly selected female subjects aged 21 to 50 years in Pantnagar area of Udham Singh Nagar district, Uttarakhand. Basic anthropometric measurements such as weight, height, waist and hip circumference measurements of all participants were taken, blood samples were taken from those suspected of hypothyroidism, and thyroid hormones were analyzed. People with high weight, waist and hip circumference, increased need for sleep, constipation, weak muscle tone (muscular hypotonia), impaired cognitive function (brain fog) and restlessness, depression, etc. In conclusion blood content analysis should include biochemical testing for thyroid function.[13]

M. Dvořáková and other authors studied the relationship between hypothalamus-thyroid hormones and anthropometric indicators in the Czech population. The participants included patients with thyroid diseases and obesity. Among them, 1012 includes male and 1625 female patients. The amount of thyroid stimulating hormone, free T3 and free T4 was determined in the blood of the patients. Also, anthropometric indicators such as age, body weight, body size, body mass index,hip circumference, neck circumference, wrist circumference and several other measurements were taken. As a result, it was found that thyroid stimulating hormone, free T3, free T4, T3 and T4 ratio in men were negatively related to age, in women only The ratio of T3 to T4 was found to be negatively correlated with age.[14]

In Wuhan, China, Ranran Hu and researchers aimed to assess how thyroid function is linked to underweight, overweight, or obesity, and metabolic risk markers in adults. : A total of 16,975 subjects, aged 18–80 years, who attended the Health Management Center of Tongji Hospital, Wuhan, China were enrolled in this study. Anthropometric and laboratory data were collected and analyzed. Serum free triiodothyronine (fT3) and fT3/free thyroxine (fT4) ratio (fT3/fT4) were positively associated with body mass index (BMI) ($P < 0.001$), while there was a negative relationship between fT4 and BMI ($P < 0.001$) according to multivariable regression analysis adjusted for age and sex. Associations between thyroid hormone concentrations and markers of blood pressure, and lipid and glucose metabolism were identified after adjustment for age, sex, and BMI, with TSH being negatively associated with fasting blood glucose (FBG). fT3 was positively associated with systolic blood pressure and low-density lipoprotein-cholesterol, while fT4 was positively associated with diastolic blood pressure, FBG, and high-density lipoprotein-cholesterol (HDL-C), and negatively associated with hemoglobin A1c (HbA1c) and triglyceride. Finally, fT3/fT4 was positively associated with HbA1c and triglyceride, and negatively associated with HDL-C. In conclusions overweight or obese participants had a high serum concentration of fT3, high fT3/fT4 ratio, and a low concentration of fT4. Underweight participants had high concentrations of fT4 and low concentrations of fT3. Thus, relationships

between thyroid hormones and metabolic risk markers were identified which suggest that thyroid function might be one factor that influences body weight and the co-morbidities of obesity.[1]

In this study Mahdieh Abbasalizad Farhangi and other authors are The aimed of the current study was to evaluate the effects of Nigella sativa on thyroid function, serum Vascular Endothelial Growth Factor (VEGF) – 1, Nesfatin-1 and anthropometric features in patients with Hashimoto's thyroiditis. Forty patients with Hashimoto's thyroiditis, aged between 22 and 50 years old, participated in the trial and were randomly allocated into two groups of intervention and control receiving powdered Nigella sativa or placebo daily for 8 weeks. Changes in anthropometric variables, dietary intakes, thyroid status, serum VEGF and Nesfatin-1 concentrations after 8 weeks were measured. Treatment with Nigella sativa significantly reduced body weight and body mass index (BMI). Serum concentrations of thyroid stimulating hormone (TSH) and anti-thyroid peroxidase (anti-TPO) antibodies decreased while serum T3 concentrations increased in Nigella sativa-treated group after 8 weeks. There was a significant reduction in serum VEGF concentrations in intervention group. None of these changes had been observed in placebo treated group. In stepwise multiple regression model, changes in waist to hip ratio (WHR) and thyroid hormones were significant predictors of changes in serum VEGF and Nesgfatin-1 values in Nigella sativa treated group ($P < 0.05$).In conclusions dates showed a potent beneficial effect of powdered Nigella sativa in improving thyroid status and anthropometric variables in patients with Hashimoto's thyroiditis. Moreover, Nigella sativa significantly reduced serum VEGF concentrations in these patients. Considering observed health- promoting effect of this medicinal plant

in ameliorating the disease severity, it can be regarded as a useful therapeutic approach in management of

Hashimoto's thyroiditis.[1]

Parathyroid glands play an important role in controlling calcium levels, which influence muscular contraction and neurotransmission. The number of variants, localization and ectopic positions make these glands tricky during surgical exploration. Detailed anatomical knowledge of these glands is fundamental to avoid postsurgical hypoparathyroidism, such as failures during thyroidectomy and parathyroid procedures In 2011, Flavio Hojaij and other authors were to study and report practical knowledge for surgeons in order to localize the glands. Dissections were performed on 56 cadavers. Gland identity was confirmed by histological study. Also, mediastinal tissue and the carotid sheath were treated with Carnoy's solution to identify ectopic glands. The thyroid gland was divided and sliced to identify parathyroid glands in the parenchymal and subcapsular space. Four or more parathyroid glands were found in 89.3% of the studied specimens. Mean gland weight was 33.1 mg, and its mean measurements were 6.7 9 3.9 9 2.0 mm. In more than 90% of the cases there was a correlation with the inferior laryngeal nerve and the parathyroid glands: the upper glands were located in medial positions, and the lower ones were found to be located laterally. In 42.8% of cases at least one ectopic gland was observed. The main ectopic regions were the mediastinum and thymus (19.6%), thyroid subcapsular space (12.5%) and thyroid parenchyma (5.4%). Quantity, gland characteristics and location were not influenced by anthropometric and demographic parameters. Here we show the high incidence of parathyroid glands positioned at ‘‘abnormal’’ locations, and as a controversial topic in endocrine surgery, this matter must be continuously studied and reported in the literature.[2]

Lucas Schwingshackl other authors aimed to perform a systematic review and meta-analysis of prospective cohort studies on fruit and vegetable consumption in relation to changes in anthropometric measures. Seventeen cohort studies (from 20 reports) including 563,277 participants met our inclusion criteria. Higher intake of fruits was inversely associated with weight change (decrease) (beta-coefficient per 100-g increment, -13.68 g/year; 95% CI, -22.97 to -4.40). No significant changes could be observed for combined fruit and vegetable consumption or vegetable consumption. Increased intake of fruits was inversely associated with changes (decrease) in waist circumference (beta: -0.04 cm/year; 95% CI, -0.05 to -0.02). Comparing the highest combined fruit & vegetable, fruit, and vegetable intake categories were associated with a 9%, 17%, and 17% reduced risk of adiposity (odds ratio [OR]: 0.91, 95% CI, 0.84 to 0.99), (OR: 0.83, 95% CI, 0.71 to 0.99), and (OR: 0.83, 95% CI, 0.70 to 0.99), respectively. This meta-analysis showed several inverse associations between fruit and vegetable intake and prospective improvements in anthropometric parameters, and risk of adiposity. The present meta-analysis seems to be limited by low study quality. Nevertheless, when combined with evolutionary nutrition and epidemiological modeling studies, these findings have public health relevance and support all initiatives to increase fruit and vegetable intake.[3]

Fabiane Aparecida Canaan Rezende and co-authors compared indicators and indices anthropometrics of the elderly by gender and age group. Cross-sectional study was undertaken using a representative probability sample, involving 621 elderly. We evaluated the weight, height, circumferences (waist, hip, calf and arm); body mass index, body adiposity index, waist-hip ratio and waist-stature ratio. In result, women were found to have a higher mean body mass index, waist-stature ratio, body adiposity index and arm circumference (p0.05). Weight, and calf and arm circumferences were observed to be lower in the older age groups (p0.05). In conclusion the total and peripheral body mass, for the men, in particular, was lower among the older subjects. Central adiposity did not differ among the age groups in both the genders.[4]

By Behrang Motamed and other authors uncertainties exist regarding the causal relationship between thyroid function tests (TFT) within the euthyroid range and anthropometric measures. This longitudinal cohort is aimed to examine the relationship between the two conditions. Euthyroid participants of Tehran Thyroid Study (TTS) attending phase I (1999–2001) were included in this study and were followed up to phase IV (2008–2011). TSH and free T4 (fT4) levels as well as weight (Wt), waist circumference (WC), hip circumference (HC) and waist-to-hip ratio (WHR) were measured at both phases. Results: 971 women and 784 men were included in the analysis. During 9.7 years of follow-up, increases in TSH levels, Wt and WHR as well as a decrease in fT4 level were observed. Multivariable regression analysis showed a significant relationship between TSH changes and alterations in WC in women ($\beta = 0.69$, $P = 0.021$) and men ($\beta = 0.61$, $P = 0.038$). Moreover, a significant negative association of ΔfT4 with changes in weight was documented ($\beta = -0.49$, $P = 0.001$ in women and $\beta = -0.56$, $P < 0.001$ in men). Additionally, we found a negative relationship between ΔfT4 and ΔHC in men ($\beta = -0.36$, $P = 0.001$). Conclusion: In both genders, there was a positive relationship between changes in TSH and waist circumference and conversely a negative association of changes of fT4 levels with weight over time.[5]

Getachew Wassihun Dessalew, Dawit Habte Woldeyes and Belta Asnakew Abegaz aimed at documenting the anthropometric parameters of 10,000 meter runners and to find out the association between such parameters and performances. Methods: A descriptive field study was

conducted. 32 elite 10,000 meter runners participated. The data were collected while the athletics team was preparing for the world athletics championship. The experience of male and female athletes showed a negative association with finishing time. However, there was no statistically significant correlation between the age and running time in both sexes. A significant positive association of body weight to running time was observed in both sexes. Body height correlates positively to running time in males but not in females. The length of the arm, the forearm, the leg in both sexes and length of the thigh in women had no significant association with finishing time. A smaller arm and calf circumferences have a positive effect on the performance of both sexes. Smaller thigh circumference showed a positive association with the performance of men. In conclusion the age of the runners did not correlate with their performance. The anthropometric variables displayed significantly higher values in men than in women. Experienced athletes performed better in both sexes. Anthropometric parameters may be useful for selection, prediction, improving running performance besides for preventing injuries and health risk assessment.[6]

Saeed Ilbeigi; and other authers were to investigate the relationship between some of anthropometric variables and basic motor abilities in primary school boys aged 9 -11 years of Birjand. The population was 650 boys' students in fourth and fifth grade in birjand city, those 129 students (9-11 years old) randomly were selected as sample group. Anthropometric measurements such as: height, weight, sitting height, shoulder width, knee height, Q angle, hand length, thigh length, foot length, heel width, the width of the front foot, thigh circumference, arms circumference, legs circumference , arms circumference were measured. Moreover, the basic motor abilities tests, including balance test, jumping test, agility test and flexibility was done. The statistical analysis was done, using the Pearson correlation coefficients between anthropometric indices and basic motor skills.The results showed significant relationship between jumping and thigh and shank girths ($p \leq 0.05$). Moreover, the same results were found between balance test and shank girth, weight and heel width. The results also indicated the significant negative correlation between agility and height, weight, knee height, thigh height, and foot height.Generally the results suggested that the some parameters can be considered as important factor for talent selection between children and adolescent.[7]

In Taiwanese , N-F Chu, EB Rimm, D-J Wang , H-S Liou and S-M Shieh were evaluated the association between anthropometric parameters and lipid levels among Taiwanese school children.They were used a probability-proportional-to size sampling and multi-stages sampling procedure, we sampled 1500 school children from 10 schools in Taipei city. Anthropometric parameters including body weight, body height, waist circumference, hip circumference and skinfolds were measured. Serum total cholesterol (CHOL), triglycerides (TG), high density lipoprotein-cholesterol (HDL-C), apolipoprotein A1 and B (ApoA1 and ApoB) were measured by standard methods, low density lipoprotein-cholesterol (LDL-C) and CHOL=HDL-C ratio were calculated by formula. In analyses 1366 children (681 boys and 685 girls) are participated. The boys had higher body height ($P < 0.001$) and larger body weight ($P < 0.05$), waist circumference ($P < 0.01$) and waist=hip ratio (WHR, $P < 0.001$) than the girls. However, the girls had larger skinfolds than the boys. After adjusting for age, girls had higher total CHOL, TG, HDL-C, LDL-C, ApoA1 and ApoB concentrations than boys. In general, TG was positively associated with most anthropometric parameters (except body height); a similar negative association between HDL-C and anthropometric variables was noted. After controlling, for age, cigarette smoking, alcohol drinking and puberty development, shorter body height was the strongest predictor of total CHOL,

LDL-C and ApoB concentrations among boys. From this large study of school-age children from Taiwan, we found anthropometric parameters, such as body height, BMI or WHR, are adequate predictors of blood lipid levels; however, skinfold measurements are generally more strongly associated with lipid levels in both genders.[8]

Two hundred and fifty healthy schoolchildren over 6 years of age, 12 years old (male: 9.3 ± 2; female: 9.4 ± 1.9) participated in this study. Their lung function, such as forced expiratory volume in 1 second (FEV1), forced vital capacity (FVC), and peak expiratory flow rate (PEF), was assessed using a micro-computerized spirometer. In addition, anthropometric variables including height, weight, chest circumference, waist circumference, and hip circumference were measured. Anthropometric variables are strong determinants of lung function in children. In addition, higher BMI had a positive effect on FEV1 and FVC values.[9]

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