

A STATISTICAL INVESTIGATION OF THE CORRELATION BETWEEN HASHIMOTO'S THYROIDITIS AND EXCESSIVE DIETARY INTAKE OF OMEGA-6 FATTY ACIDS

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Abstract

Hashimoto's thyroiditis is an autoimmune disease where the body itself forms antibodies directed against the thyroid gland, leading to chronic inflammation. This is one of the most common conditions that lead to hypothyroidism. The purpose of this study is to statistically determine the correlation between Hashimoto's thyroiditis and excessive intake of omega-6 fatty acids, as well as to make a detailed analysis of the dietary habits of the subjects who were included in this study.

The research was conducted from February 1, 2023. until 14.02.2023 through an online survey and included 497 respondents aged 15 to 80 (474 women and 23 men). Student's t-test and relative numbers were used for data processing. The data are presented tabularly and graphically. The obtained result for $t = 3.33$ is greater than the tabular value $t = 2.59$ for $n = 495$ and $p < 0.01$, which leads to the conclusion that the difference between the proportions is significant (significant), and arises due to differences in intake of foods rich in omega-6 fatty acids. In this case, the working, i.e. alternative hypothesis is accepted that the excessive intake of food rich in omega-6 fatty acids is one of the causes of Hashimoto's thyroiditis.

Keywords: omega-3, omega-6, food, thyroiditis, eicosanoids

1. Introduction

Hashimoto's thyroiditis is an autoimmune disease where the body itself forms antibodies directed against the thyroid gland, leading to chronic inflammation. This is one of the most common conditions that lead to hypothyroidism.

Certain people have a predisposition to create antibodies against their own glands. There are two types of these antibodies: some that destroy or block (as in Hashimoto's) and antibodies that stimulate as in thyrotoxicosis.

Statistical data show that Hashimoto's thyroiditis is the most common cause of reduced function of the thyroid gland (hypothyroidism). Over time, this results in an impaired ability of the thyroid gland to produce thyroid hormones, which leads to a gradual weakening of function and eventually to a complete cessation of thyroid function. In terms of gender, it occurs 4 times more often in women than in men. The age at which it most often occurs is between 30-50 years. Hashimoto's thyroiditis occurs most often in middle-aged women, but it can occur at any age.

The main symptoms are the result and correspond to the reduced function of the thyroid gland – hypothyroidism.

Patients with elevated TPO antibodies and normal thyroid function tests (TSH and free thyroxine) do not require treatment. As long as there is no decrease in thyroid hormones, there is no need to treat the disease. For those patients with obvious hypothyroidism (elevated TSH and low levels of thyroid hormones), the treatment consists of supplementing the thyroid hormones, i.e. taking levothyroxine orally in the prescribed doses. [1]

2. Goals

The purpose of this research is to determine the correlation between Hashimoto's thyroiditis and a diet dominated by omega-6 fatty acids, as well as to gain insight into the dietary habits of people suffering from Hashimoto's thyroiditis.

In that case, the main objectives of the research will be:

- to statistically determine the correlation between Hashimoto's thyroiditis and excessive intake of omega-6 fatty acids in the representative sample that was included in this study;
- to make a detailed statistical analysis of the dietary habits of subjects suffering from Hashimoto's thyroiditis who were included in this study.

3. Material and Methods

3.1. Research material: Considering that Hashimoto's thyroiditis is one of the most common thyroid diseases, we decided to do research on the correlation between excessive intake of omega-6 fatty acids through the diet and the occurrence of Hashimoto's thyroiditis, as well as on the eating habits of people suffering from Hashimoto's thyroiditis. The research was conducted by the Faculty of Food Technology and Nutrition at the University of Tetovo. The research was conducted in the period from February 1, 2023. until 14.02.2023 through an online survey. The research we conducted is of a prospective type. Also, below is the survey questionnaire that we used to conduct this research.

QUESTIONNAIRE

1. Gender:

- A. Male
- B. Female

2. Age:

- A. 15-25 years.
- B. 26-36 years.
- C. 37-47 years.
- D. 48-58 years.
- E. 59-69 years.
- F. 70-80 years.

3. Are you using drug therapy prescribed by your doctor for Hashimoto's thyroiditis?

- A. Yes
- B. No

4. Which of the following food groups dominates your diet?

- A. Foods rich in omega-3 fatty acids: green vegetables, flaxseeds, beet (canola) oil, meats, dairy products, and eggs that contain omega-3s (from grass-fed animals)
- B. Foods rich in omega-6 fatty acids: vegetable oils (corn, soybean, sunflower, etc.), hydrogenated trans fats (margarine, cakes, crackers, pastries, pizzas, chips, etc.), standard meat and dairy products, non-organic eggs

5. What oil or fat do you use to prepare your meals?

- A. Sunflower oil

- B. Olive oil
- C. Butter
- D. Other oils or fats

6. How many times a week do you eat meat?

- A. 1-2 times a week
- B. 3-4 times a week
- C. 5-6 times a week
- D. Every day
- E. I do not consume meat

7. How many times a week do you consume standard dairy products that can be bought from any store?

- A. 1-2 times a week
- B. 3-4 times a week
- C. 5-6 times a week
- D. Every day
- E. I do not consume milk and milk products

8. How many eggs do you eat during a week prepared in any way (boiled, fried, etc.)?

- A. 1-2 eggs
- B. 3-4 eggs
- C. 5-6 eggs
- D. More than 6
- E. I do not consume eggs

9. Do you consume or use margarine to prepare some dishes?

- A. Yes
- B. No

10. How often do you eat processed foods: cookies, crackers, baked goods, pizza, chips, etc.?

- A. 1-2 times a week
- B. 3-4 times a week
- C. 5-6 times a week
- D. Every day
- E. I do not consume processed food

The research was conducted on a representative sample of 497 respondents. The study included male and female respondents aged 15 to 80 years. In order to be able to use the obtained data in our study, we obtained online consent from the respondents who were included in the research.

3.2. *Research methodology:* The study was conducted with a quota sample: the number of female respondents is 474, and the number of male respondents is 23 respondents. The selection of the sample was systematic, ie. it was necessary to meet certain criteria:

- the study should include both sexes;
- respondents should be between the ages of 15 and 80;
- the subjects suffer from Hashimoto's thyroiditis, which has been diagnosed by a doctor.

3.3. *Statistical method of data processing:* As statistical methods of work, Student's t-test is used to test the significance of the difference between two proportions in order to determine whether there is an association between excessive intake of omega-6 fatty acids through the diet and the occurrence of Hashimoto's thyroiditis, as well as relative numbers for analysis of the respondents' eating habits. The data are presented tabularly and graphically.

4. Results

Table 1 shows information on the number of respondents who were included in this study, distributed by gender.

| Age | Number of respondents |
|-----------|-----------------------|
| 15-25 age | 13 |
| 26-36 age | 108 |
| 37-47 age | 217 |
| 48-58 age | 111 |
| 59-69 age | 40 |
| 70-80 age | 8 |
| In total | 497 |

Table 1. Distribution of patients with Hashimoto's thyroiditis by gender

From table 1, it can be concluded that Hashimoto's thyroiditis occurs much more often in the female population, i.e. 95.4% of respondents suffering from Hashimoto's thyroiditis are women.

Chart 1 shows information on the number of respondents who were included in the study, distributed by age group.

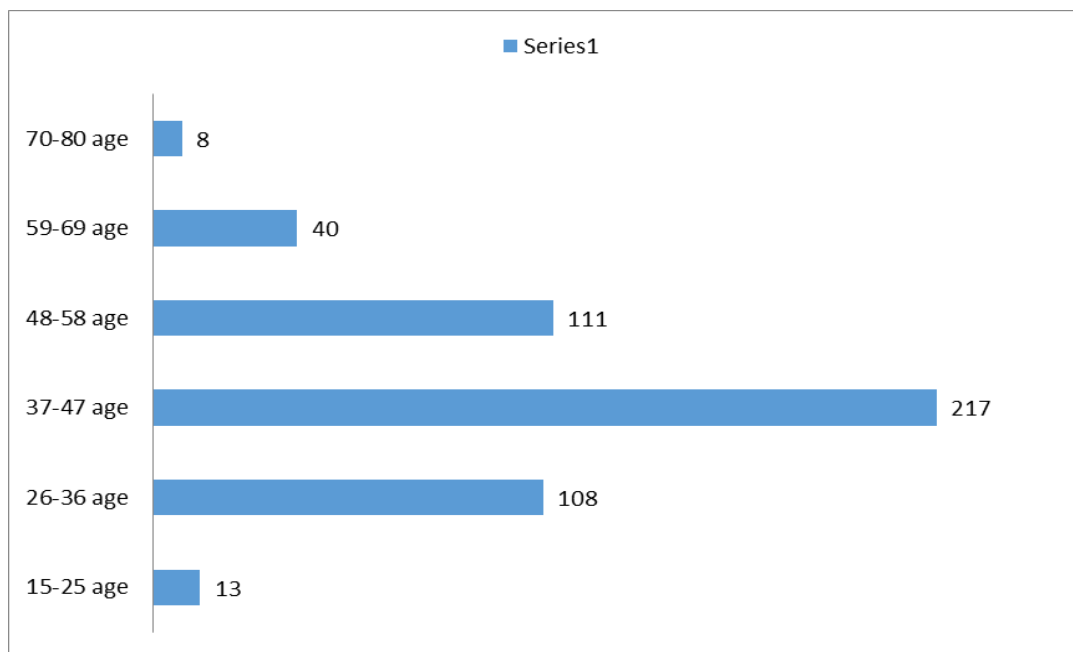


Chart 1. Distribution of patients with Hashimoto's thyroiditis by age groups

From graph 1, it can be observed that 43.7% of respondents suffering from Hashimoto's thyroiditis are aged between 37 and 47 years.

Graph 2 shows data on the percentage distribution of the number of respondents who receive and do not receive drug therapy prescribed by a doctor.

| Age | Number of respondents |
|-----------|-----------------------|
| 15-25 age | 13 |
| 26-36 age | 108 |
| 37-47 age | 217 |
| 48-58 age | 111 |
| 59-69 age | 40 |
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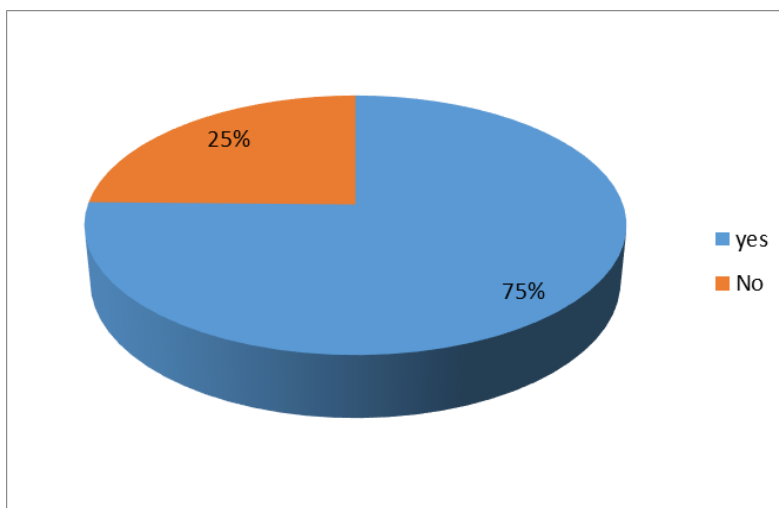


Chart 2. Distribution of patients with Hashimoto's thyroiditis according to whether or not they receive medical therapy prescribed by a doctor

From graph 2, it can be concluded that 75% of the respondents stated that they receive drug therapy prescribed by a doctor.

Table 2 shows information on whether the diet of subjects suffering from Hashimoto's thyroiditis is dominated by foods rich in omega-3 or omega-6 fatty acids.

| Commonly used oils and fats for meal preparation | % of respondents |
|--|------------------|
| Sunflower oil | 66.70% |
| Olive oil | 28.10% |
| Butter | 2.70% |
| Other oils or fats | 2.50% |
| | |
| In total | 100.00% |

Table 2. Distribution of patients with Hashimoto's thyroiditis according to the type of food that dominates their diet

| Food dominated by... | Number of respondents | % |
|----------------------|-----------------------|-------|
| Omega-3 fatty acids | 211 | 42,5% |
| Omega-6 fatty acids | 286 | 57,5% |
| In total | 497 | 100% |

From table 2, it can be seen that 57.5% of subjects suffering from Hashimoto's thyroiditis are dominated by foods that are rich in omega-6 fatty acids, and 42.5% of subjects suffering from Hashimoto's thyroiditis are dominated by foods that are rich in omega-3 fatty acids.

In order to see if there is significance in the difference between the two proportions, we will use a student's t-test. Testing is performed according to the formula:

$$t = \frac{p_1 - p_2}{np_1 - p_2}$$

In the shown formula, p1 represents the proportion of a certain attribute in the first sample, and p2 the proportion in the second sample. np1-p2 represents the standard error between the two proportions. The standard error of the difference between the two proportions is determined by the formula:

$$p_1 - p_2 = \sqrt{\frac{p_1q_1}{n_1} + \frac{p_2q_2}{n_2}}$$

The value of q is determined in the following way q1 = 1 - p1; q2 = 1 - p2. n1 represents the size of the first sample and n2 is the size of the second sample. [2]

If the values are replaced in the previous formulas, we get:

$$np_1 - p_2 = \sqrt{\frac{0,425 \times 0,575}{211} + \frac{0,575 \times 0,425}{286}} = 0,045$$

$$t = \frac{0,575 - 0,425}{0,045} = 3,33$$

The obtained result for t = 3.33 is compared with a table value for t - test, for a certain degree of freedom n (n1+n2 - 2) and p = 0.01. Since the obtained value for t = 3.33 is greater than the tabular value t = 2.59 for n = 495 and p < 0.01, it is concluded that the difference between the proportions in the two groups is significant, and arises due to differences in food intake. foods rich in omega-6 versus foods rich in omega-3 fatty acids. In this case, the working, i.e. alternative hypothesis is accepted that the excessive intake of food rich in omega-6 fatty acids is one of the causes of Hashimoto's thyroiditis.

Chart 3 shows information on the most commonly used oils and fats used by respondents suffering from Hashimoto's thyroiditis to prepare their food.

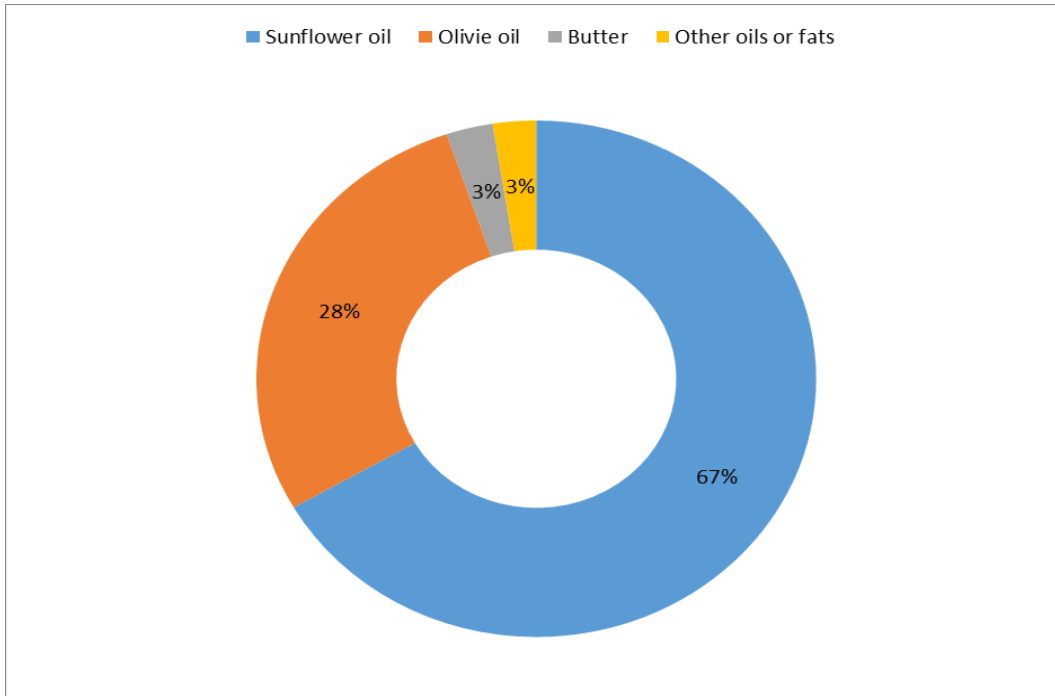


Chart 3. Commonly Used Food Preparation Oils and Fats Used by Hashimoto's Thyroiditis Patients

It can be seen from graph 3 that the most frequently used oil is sunflower oil. As many as 67% of respondents suffering from Hashimoto's thyroiditis declared that they use sunflower oil to prepare their meals.

Chart 4 shows data on how often the respondents who were included in the study consume meat.

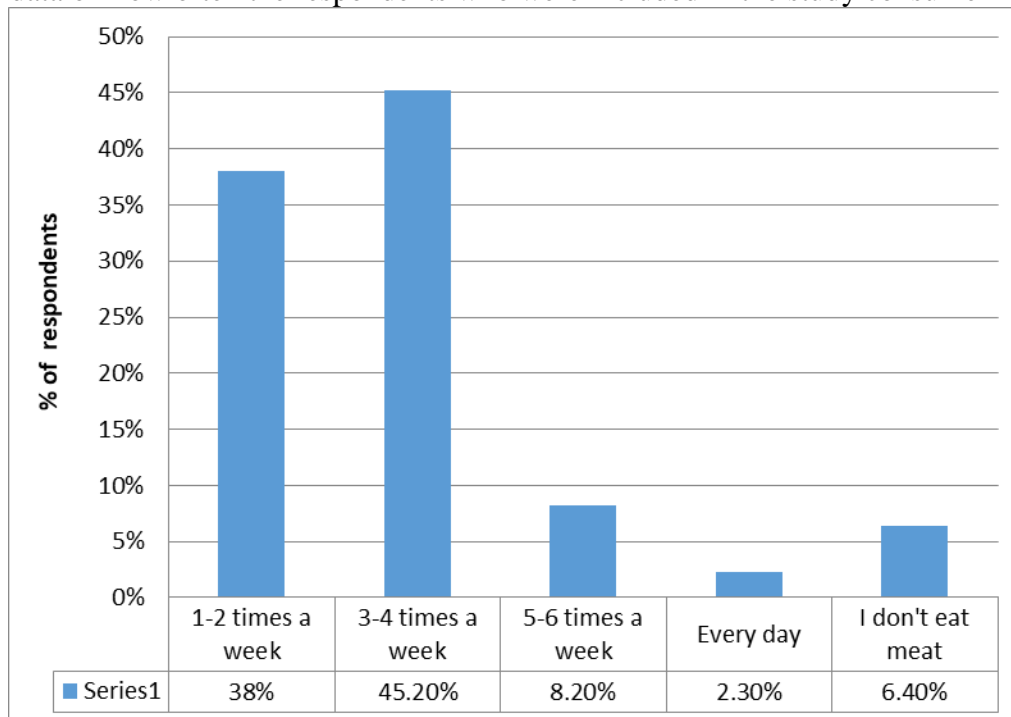


Chart 4. Percentage distribution of respondents who answered the question: "How many times a week do you eat meat?"

From graph 4, it can be seen that 45.2% of respondents consume meat 3-4 times a week.

Table 3 shows the percentage distribution of respondents who answered the question: "How many times a week do you consume dairy products that can be bought from any store?".

Table 3. Percentage distribution of respondents who answered the question: "How many times a week do you consume dairy products that can be purchased from any store?"

| How many times a week do you eat meat? | % of respondents |
|--|------------------|
| 1-2 times a week | 38% |
| 3-4 times a week | 45.20% |
| 5-6 times a week | 8.20% |
| Every day | 2.30% |
| I don't eat meat | 6.40% |
| In total | 100% |

According to table 3, the largest % of respondents (35.7%) answered that they consume dairy products 3-4 times a week.

Table 4 shows the percentage distribution of respondents who answered the question: "How many eggs do you eat during a week prepared in any way (boiled, fried, etc.)?".

Table 4. Percentage distribution of respondents who answered the question: "How many eggs do you eat during a week prepared in any way (boiled, fried, etc.)?"

| Number of eggs consumed by respondents during a week | % of respondents |
|--|------------------|
| 1-2 eggs | 44,9% |
| 3-4 eggs | 33,2% |
| 5-6 eggs | 10,2% |
| Повеќе од 6 јајца | 3,7% |
| I don't consume eggs | 8% |
| In total | 100% |

From table 4 it can be concluded that most of the respondents (44.9%) consume 1-2 eggs per week.

Graph 5 presents the percentage distribution of respondents who answered the question: "Do you consume or use margarine to prepare some dishes?".

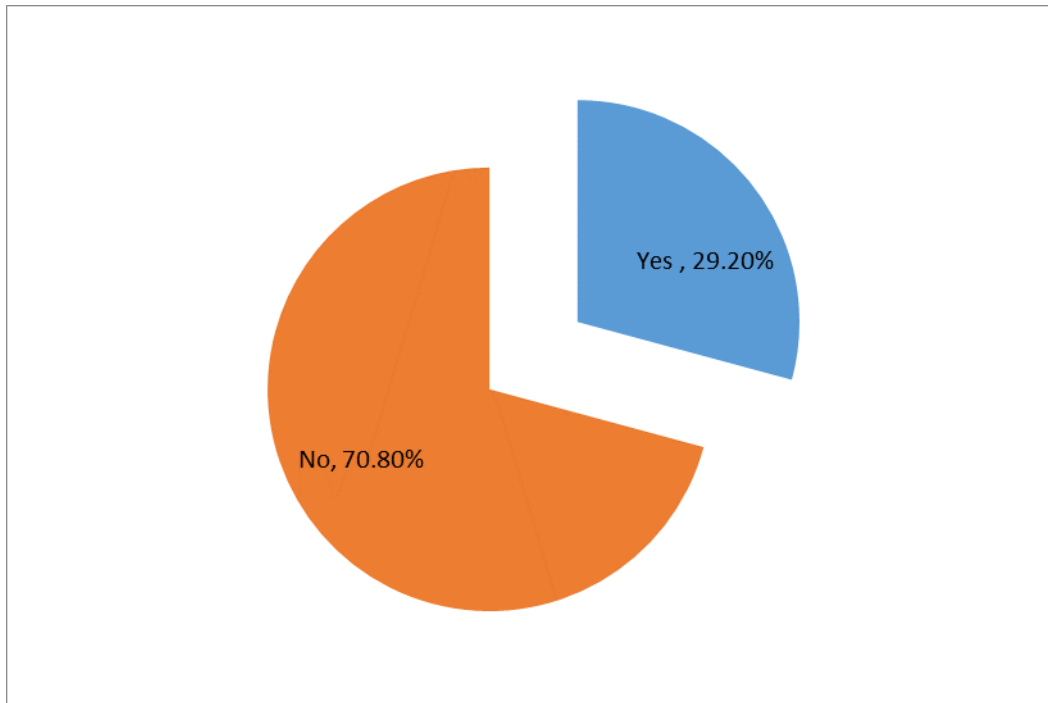


Chart 5. Percentage distribution of respondents who answered the question: "Do you consume or use margarine to prepare some dishes?"

The data from graph 5 is encouraging because 70.8% of respondents suffering from Hashimoto's thyroiditis indicated that they do not consume margarine and do not use it for the preparation of certain dishes.

Table 5 shows the percentage distribution of respondents who answered the question: "How often do you eat processed food: cookies, crackers, pastries, pizzas, chips, etc.?"

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| How many times a week do you eat meat? | % of respondents |
|--|------------------|
| 1-2 times a week | 38% |
| 3-4 times a week | 45.20% |
| 5-6 times a week | 8.20% |
| Every day | 2.30% |
| I don't eat meat | 6.40% |
| In total | 100% |

According to the results of table 5, it can be concluded that most of the subjects suffering from Hashimoto's thyroiditis (46.5%) consume 1-2 times a week processed food: cookies, crackers, baked goods, pizzas, chips, etc.

5. Discussion

According to statistical research, Hashimoto's thyroiditis occurs 4 times more often in women than in men. In our study, the number of women suffering from Hashimoto's thyroiditis is almost 20 times higher than the number of men suffering from the same disease (474 women versus 23 men). The age at which it most often occurs is between 30-50 years. In our study, the majority of subjects suffering from Hashimoto's thyroiditis (43.7%) were aged between 37 and 47 years.

75% of subjects suffering from Hashimoto's thyroiditis who were included in this study were receiving levothyroxine in the exact doses prescribed by their doctor because they have hypothyroidism that occurred as a result of Hashimoto's thyroiditis.

According to the study, 57.5% of respondents (286 respondents) who suffer from Hashimoto's thyroiditis have an increased intake of foods that are rich in omega-6 fatty acids. While 42.5% of respondents (211 respondents) suffering from Hashimoto's thyroiditis have a low intake of foods that are rich in omega-6 fatty acids. In order to determine whether the difference in proportion between the two groups was the result of random factors, or the result of differences in omega-6 fatty acid intake, we performed a Student's t-test to test the significance of the difference between two proportions. Since the obtained value for $t = 3.33$ is greater than the table value $t = 2.59$ for $n = 495$ and $p < 0.01$, we came to the conclusion that the difference between the proportions in the two groups is significant (significant), and arises due to differences in food intake. rich in omega-6 fatty acids. In this case, the working, i.e. alternative hypothesis is accepted that the excessive intake of food rich in omega-6 fatty acids is one of the causes of Hashimoto's thyroiditis. Omega-3 and omega-6 are polyunsaturated fats, some of which are essential for us. This means that we need them for certain functions in the body and that the human body cannot produce them, so we have to get them through food. Omega-3 and omega-6 represent two families of fats in which there are several subtypes that differ in the length of the fatty acid molecule chains.

These fatty acids play a crucial role in health because they manage the eicosanoid hormone system. This hormonal system manages the entire metabolism because it supervises, directly or indirectly, insulin and other endocrine hormones (glucagon, cortisol, adrenaline and others), and through their mediation it supervises all body systems, i.e. the biochemical processes in those systems.

Eicosanoids are divided into two groups, the so-called good and bad, but even the bad are useful and necessary if they act in mutual balance with the good. They have the opposite effect, so good eicosanoids act anti-inflammatory and in general maintain good health and strong immunity, while bad eicosanoids cause inflammation to protect against injuries and are needed during great physical and mental efforts in short intense periods.

EPA (eicosapentaenoic acid), a fatty acid from the omega-3 family, manages the group of good eicosanoids, thus acting anti-inflammatory, protecting the heart and blood vessels and general good health, but only while AA (arachidonic acid) from the omega-6 family, which manages bad eicosanoids and causes inflammation, is present to a lesser extent.

Both groups are necessary, but the problem occurs when the bad eicosanoids predominate over the good ones, ie. when we consume more omega-6 than omega-3 fats through our diet. Because omega-3 and omega-6 compete for the same metabolic pathways, ie. they use the same delta-6-dehydrogenase enzyme, excessive intake of omega-6 leads to a deficiency of omega-3 and good eicosanoids, so the normal inflammatory processes managed by bad eicosanoids turn into chronic inflammatory processes and lead to cardiovascular diseases and other modern diseases from which today is suffering.

AA, which manages the bad eicosanoids, is made from LA (linoleic acid), which is prevalent in vegetable oils, margarine, grains, nuts, and seeds. EPA, which manages the good eicosanoids, is also needed for the production of DHA (docosapentanoic acid), which builds the cell membranes of the brain and nervous system. But EPA and DHA are only found in foods of animal origin, namely bluefish, meat from herbivores,

and free-range eggs. EPA can theoretically be obtained from its plant precursor ALA (alpha-linolenic acid), which is rich in, for example, flax seeds, but in this form a person can only produce a small percentage of EPA. [3] Only approximately 1-10% of ALA is converted to EPA and 0.5-5% to DHA. [4]

In the past, as long as people ate real food, they got enough EPA and DHA from fish, meat from herbivores and eggs from free-range chickens, and the ratio of omega-6 to omega-3 was 1:1, i.e. they received an equal amount from one and the other. In the second half of the 20th century, the consumption of vegetable oils, margarines and cereals increased significantly, so that ratio today is 20:1, i.e. twenty times more omega-6 than omega-3 is ingested with food. It was during this period that cardiovascular diseases, diabetes and cancer spread rapidly. [3] According to modern nutritional views, it is best if their ratio is 5:1. [5]

The role of omega-6 and omega-3 is very complex due to their action on the eicosanoid hormonal system, but the correct balance between them is extremely important. Omega-6 and omega-3, through bad and good eicosanoids, have opposite roles. Omega-6 through bad eicosanoids encourages inflammatory processes and blood clotting. These are normal bodily processes, but they become harmful when they become chronic. Omega-3, through the good eicosanoids, stops inflammatory processes and dissolves blood clots. The lack of omega-3 in conventional products and the excessive intake of omega-6 from cereals and vegetable oils lead to the predominance of bad eicosanoids and to the creation of chronic inflammatory processes, which are the cause of inflammatory diseases. [3] This mechanism can also explain our hypothesis that the excessive intake of food rich in omega-6 fatty acids is one of the causes of Hashimoto's thyroiditis. According to our study, 67% of respondents use sunflower oil to prepare their meals. By using sunflower oil, they ingest too many omega-6 fatty acids, which have a pro-inflammatory effect and contribute to the appearance of Hashimoto's thyroiditis. Also, we would like to emphasize here that sunflower oil is not suitable for thermal processing of food because it creates lipid peroxides that cause atherosclerosis. [6] Also, chronic inflammation of the arteries leads to clogging of the blood vessels and the appearance of cardiovascular diseases. The correct balance between omega-3 and omega-6 is not only important for a healthy heart and blood vessels, but also for general physical and mental health and immunity. It is even important for achieving and maintaining a normal body weight, because it reduces the signals that create fat reserves in the body, thus reducing the risk of diabetes.

The hormones insulin and glucagon are closely related to the action of eicosanoids. Insulin stimulates the bad eicosanoids by helping LA to make AA, while glucagon stimulates the good eicosanoids and stimulates the production of EPA from its precursor ALA. But glucagon can only act in the absence of insulin, because they are two hormones with opposite effects. This means that glucagon cannot work if there is too much sugar and starch in the diet, which stimulate the secretion of insulin. [3] Here we will return to our study. 89.1% of respondents suffering from Hashimoto's thyroiditis indicated that they consume processed food such as: cookies, crackers, baked goods, pizzas, chips, etc. This food is rich in sugar and starch, which stimulate the secretion of insulin from the pancreas. High levels of insulin help convert LA to AA and create bad eicosanoids, which cause a chronic inflammatory process in the thyroid gland and contribute to Hashimoto's thyroiditis.

Processed foods (cookies, crackers, baked goods, pizza, chips, etc.) are full of "hydrogenated" or "partially hydrogenated" vegetable oils (trans fat). These are omega-6 oils (especially from soy, sometimes from palm or beet) that have been modified so that they are solid at room temperature (they are usually liquid, even in the refrigerator). Because of the change, they are harder to digest and even more pro-inflammatory than natural omega-6s. [7] "Hydrogenated" or "partially hydrogenated" fats are an inexpensive way to obtain crispness in biscuits, juiciness in cakes and creaminess in fillings, while also ensuring a longer shelf life of processed products. However, they increase the level of LDL cholesterol ("bad" cholesterol) in the blood while simultaneously lowering the level of HDL ("good" cholesterol) in the blood, which in turn increases the risk of heart disease and at the same time increases the risk of diabetes. [5] The sugar and starch found in processed foods also play a role in creating inflammatory processes. Excess sugar molecules bind to various

proteins that damage the walls of blood vessels. Due to the excess of omega-6, the inflammation becomes chronic and the blood begins to clot, thus creating a clot that leads to clogging of the blood vessels.

According to the study, 45.2% of subjects suffering from Hashimoto's thyroiditis eat meat 3-4 times a week, and 35.7% of subjects suffering from Hashimoto's thyroiditis indicated that they consume dairy products 3-4 times a week. From the results it can be concluded that subjects suffering from Hashimoto's thyroiditis consume too much meat. During one week, it is recommended to consume meat at most 2 times. [8] When it comes to dairy products, it is recommended to consume 2-4 servings of dairy products. One portion means 200 ml. milk, 40 gr. cheese, 150 ml. yogurt etc. [5] But in reality, people do not measure the amount of food they eat (including dairy products) and consume far higher amounts of dairy products than the intended portions. Standard store-bought meat and dairy products are much higher in omega-6 fatty acids.

In the natural cycle, cows calve in the spring, when the grass is at its most lush, and produce milk for several months, until late summer. Summer grass is a particularly rich source of omega-3 fatty acids; from there, those fatty acids are concentrated in the milk of cows raised on pastures and from that milk in the products – butter, cream, yogurt, cheese. Omega-3 fatty acids are also found in the meat of grass-fed animals and in the eggs of free-range chickens that are fed their natural diet (not grains).

Starting in the fifties of the last century, the needs for dairy products and for beef increased and farmers had to look for a faster way in the natural cycle of milk production and reduce the area of pasture needed to feed a 750 kg cow. Thus, pastures were abandoned and replaced by industrial farming. Corn, soy and wheat, which have become the basis of animal feed, contain practically no omega-3 fatty acids. Conversely, these sources are rich in omega-6 fatty acids. Omega-3 and omega-6 are called "essential" acids because the human body cannot produce them. So, the amount of omega-3 and omega-6 acids in our body depends directly on the food we eat. What's more, the amounts of omega-3 and omega-6 fatty acids in our food also depend on what the cows and chickens we eat have taken in their diets. If they eat grass, then their meat, milk and eggs are also perfectly balanced in terms of omega-3 and omega-6 (a ratio close to 1:1). If they eat corn and soy, the resulting imbalance in our body reaches a ratio of 1:5 or even 1:40. Cows are not the only farmed animals affected by this change. The diet of the chicks has also been radically changed. Eggs – the epitome of natural nutrition – no longer contain the essential fatty acids they did fifty years ago. Dr. Artemis Simopoulos is a prominent American nutritionist who headed the Division of Nutrition Research at the National Institutes of Health. In an unusual study, published in the *New England Journal of Medicine*, it shows that eggs from hens raised on corn (an almost common practice today) contain twenty times more omega-6 fatty acids than omega-3 fatty acids. Eggs taken from the Greek property she grew up on still have a nearly 1:1 balance. [7] Most of the respondents (44.9%) who were included in this study declared that they consume 1-2 eggs per week prepared in any way (boiled, fried, etc.). According to the latest nutritional knowledge, it is recommended to consume 2-3 boiled eggs per week. [8] According to this data, it can be concluded that the subjects suffering from Hashimoto's thyroiditis and who were included in this study do not overdo their egg intake. But considering the facts we presented above, the eggs consumed by the subjects also have more omega-6 fatty acids than omega-3 because they are non-organic eggs that are obtained from corn-fed chickens raised on poultry farms. Unfortunately, due to the industrial farming of livestock and poultry, meat, dairy products and eggs containing omega-3 (from grass-fed animals) are difficult to come by.

The disproportion between omega-6 and omega-3 (excessive intake of omega-6 and lack of omega-3), together with the excessive intake of sugar and starch, is one of the biggest problems of the modern diet. [3]

6. Conclusion

For good health, it is important to consider the balance of omega-6 and omega-3 fatty acids in the diet. The right balance is important, not only for healthy cell membranes, but also because omega-6 fatty acids are precursors to pro-inflammatory molecules, molecules that boost and maintain inflammatory responses. For a healthy balance of omega-6 and omega-3 fatty acids, it is important to reduce the amount of omega-6 fatty acids and increase the intake of omega-3 fatty acids, for example EPA, DHA and ALA. [9] To achieve this, sufficient omega-3 fats from fish, cod liver oil, and natural meat and eggs should be consumed, as well as margarine, vegetable oils, and flour foods should be avoided. This way of eating is useful for everyone who wants to preserve health. [3]

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