

The impact of Hashimoto's disease on skin, hair, and nails

Wpływ choroby Hashimoto na skórę, włosy i paznokcie

ABSTRACT

The thyroid is an odd endocrine gland located in the neck. Hashimoto's thyroiditis is a diseases of the gland which often leads to changes in skin and its appendages.

The aim of this study was to investigate the relationship between hormonal disorders due to chronic autoimmune thyroiditis and skin, hair and nails conditions. This article presents the results and conclusions of a survey conducted in a group women suffering from Hashimoto's thyroiditis, diagnosed for at least a year.

The conclusions from the questionnaire showed that Hashimoto's disease adversely affects skin, hair and nails.

Keywords: skin, hair, nails, Hashimoto's disease

STRESZCZENIE

Tarczycza to nieparzysty gruczoł endokrynnny zlokalizowany w szyi. Jedną z chorób gruczołu jest zapalenie tarczycy typu Hashimoto, które często prowadzi do zmian skóry i jej przydatków.

Celem pracy było zbadanie związku między zaburzeniami hormonalnymi wynikającymi z przewlekłego autoimmunologicznego zapalenia tarczycy, a wyglądem skóry, włosów i paznokci. Zaprezentowano wyniki z badania ankietowego przeprowadzonego w grupie kobiet, chorujących na zapalenie tarczycy typu Hashimoto, mających diagnozę minimum od roku.

Wnioski wykazały, iż choroba Hashimoto wpływa w sposób negatywny na skórę, włosy i paznokcie.

Słowa kluczowe: skóra, włosy, paznokcie, choroba Hashimoto

INTRODUCTION

The thyroid gland is a vague, odd endocrine gland (glandula thyroidea). It is located in the anterior-lower part of the neck, anteriorly and laterally from the trachea and esophagus. A properly built gland consists of two flat and oval side lobes (right and left), which are connected in the middle by a ligament (isthmus). In some people, a centrally extending pyramidal lobe continues from the upper edge of the isthmus, constituting a narrow band towards the hyoid bone [1].

The weight of the thyroid gland varies between 15 and 50 g [2]. It depends on gender, age and the level of iodine supply. The thyroid gland is surrounded by a connective tissue bag that penetrates deeply and divides the organ into

lobules. The lobules contain numerous cubic follicles (epithelial cells), in the amount of 20-40 [3]. The follicular epithelial cells are thyrocytes, which are the proper units producing thyroid hormones [1]. The activity of the thyroid gland is divided into two phases: the first one concerns exocrine secretion into the lumen of the follicle, while the second phase is endocrine secretion [2]. The hormonal function of the thyroid gland is regulated by a negative feedback system between the hypothalamus, pituitary and thyroid gland under the influence of neurotransmitters of the cerebral cortex [4]. The thyroid gland hormones are derivatives of the amino acid tyrosine. They are the only hormones in

the human body that contain iodine in their structure. The biosynthesis of thyroid hormones depends on the action of enzymes and the ability of thyrocytes to absorb iodine from the blood. The most important mechanisms of action of thyroid gland hormones are the stimulation and inhibition of gene expression in the cells of target tissues [5]. Thyroid hormones affect thermogenesis, protein, carbohydrate and fat metabolism, calcium-phosphate and water-electrolyte metabolism, proper energy metabolism, as well as the muscular, sexual and cardiovascular systems [6].

THYROID DISEASES

The thyroid gland is susceptible to many diseases that affect its function as well as its structure. These diseases often affect the entire body due to the wide influence of thyroid hormones on cellular metabolism. The main categories of diseases of the thyroid gland are:

- overactive thyroid gland,
- tumours and goitre;
- hypothyroidism;
- thyroiditis.

One of the diseases of the thyroid gland is Hashimoto's thyroiditis, also known as chronic autoimmune thyroid disorder (AITD - autoimmune thyroid disorder, Hashimoto's thyroiditis) [7]. Originally, in 1912, the disease was described by Hakaru Hashimoto, and in the second half of the 1950s, it was found to be autoimmune. Typically, lymphocytic inflammation develops hypothyroidism (insufficient activity of the thyroid gland leading to a deficiency or lack of thyroid hormones). The disease may also be associated with euthyroidism (a state of normal thyroid function) [4].

Lymphocytic thyroiditis occurs in all age groups, both among adults and children, but most often it affects women between the ages of 30-50. According to the data of the National Institutes of Health Autoimmune Diseases Coordinating Committee (ADCC), about 5% of the population of Western countries develop autoimmune diseases, 80% of which affect women. Hashimoto's thyroiditis occurs in women with a frequency of 350 cases per 100,000 people per year, and in men 80 cases per 100,000 per year [8]. Hashimoto's inflammation occurs with subclinical hypothyroidism in 4-10% of the population, with overt hypothyroidism in 1-3% of the population [4]. The etiopathogenesis of Hashimoto's thyroiditis is still unclear. The autoimmune nature of the disease is indicated by the presence of specific antibodies against thyroid antigens: thyroid peroxidase (anti-TPO) and thyroglobulin (anti-Tg), as well as lymphocytic infiltrates in the thyroid gland and the coexistence of other diseases with Hashimoto's disease [4, 9]. The ultrasound image of the organ usually shows a heterogeneous, clearly hypoechoic (with reduced ability to reflect high-frequency sound waves) structure with bands of fi-

brosis. It happens that the boundaries of the thyroid gland are blurred [4, 10]. Anti-Tg and anti-TPO antibodies are destructive. The development of lymphocytic thyroiditis is influenced by genetic factors and in 20-30% of environmental factors (iodine excess in consumed meals, severe stress, viral infections, smoking, selenium deficiency, the effects of certain drugs, like lithium, amiodarone, α interferon and ionizing radiation [4]. Treatment of Hashimoto's disease is mainly based on the chronic use of L-thyroxine. In the case of coexisting hyperthyroidism, the patient takes β -blockers [4, 11]. Sometimes, thyroidectomy (removal of the thyroid gland) should be considered [10].

SKIN AND ITS APPENDAGES

Skin is the outer coating of the body that separates it from the factors of the outside world. Its thickness depends on the location: the thinnest one is on the eyelids - 0.5 mm, and the thickest on the soles of the feet - 6 mm. The area of the skin in an adult is about 2 m². The skin is divided into 3 layers: epidermis, dermis and subcutaneous tissue which also contain skin appendages such as hair, nails, and mammary, sweat and sebaceous glands.

Hair can be divided into: long hair (covering the head, armpits, genital area, on the chin and under the nose), thick hair (forming eyebrows and eyelashes), and a hair follicle that covers most of the body surface. Hair is made of keratinized cells with hard keratin and a structure enhanced by trichohalin [11]. The part of the hair that protrudes above the surface of the skin is the stem, and the part localized in the dermis and subcutaneous tissue is called the root. The hair follicle comes from the cuticle, surrounds the root, and forms the hair bulb in the final section.

Hair root between the bulb and the opening of the paranasal sebaceous gland consists of the largest number of layers:

- right hair (hair core, hair cortex and right hair coating);
- inner hair sheath (inner sheath coating, Huxley granular layer, Henle light layer);
- outer hair sheath;
- hair bags [2].

The nail is another appendage of the skin. The nail plate, which is part of the nail apparatus, is mainly made of keratin and grows in length continuously [12]. It rests on a placenta, formed by the epidermis (devoid of the granular layer) and fibrous connective tissue. Under the skin fold, at the root, there is the nail matrix (invagination of the epidermis without a granular layer), the function of which is the continuous production of the nail plate. Among the soft tissues surrounding the nail plate, the proximal nail shaft, cuticle, are distinguished, and the side parts of the nail apparatus are nail shafts that protect the nail matrix [13].

THE EFFECT OF HASHIMOTO'S DISEASE ON THE SKIN

Hashimoto's thyroiditis can be manifested by Gull's disease - myxoedema caused by the accumulation of water-binding mucopolysaccharides (by their increased breakdown) in the subcutaneous and other tissues. It causes swelling of the eyelids, face, and then the whole body [9]. The swelling takes a diffuse form without deformation after pressure [14].

The skin of people with chronic autoimmune thyroiditis is dry (xerosis cutis), rough and cool to the touch. This is a direct result of the influence of thyroid hormones on the blood supply to the skin. Additionally, the increased production of keratin and intercellular lipids affects changes in transepidermal water loss and hyperkeratosis of the skin [14]. Exfoliation and keratosis of the epidermis intensifies especially around the elbows, knees and feet. You can come across the term "dirty elbows and knees symptom" [5]. Thyroxine deficiency, which regulates the activity of the sebaceous glands, causes excessive dryness and peeling of skin [15]. Acquired keratosis of the hands and feet (acquired keratoderma, keratoderma palmoplantaris) occurs in selected diseases, including psoriasis, diabetes and hypothyroidism. Keratosis of the feet is formed in the places of greatest pressure on the feet: most often in the heels and can lead to skin cracks (cavities). It manifests itself in a dry, brittle, cracked, scaly skin structure (fig. 1) [15, 16].

The slowdown in the body's metabolism caused by disturbances in the thyroid gland increases the risk of freezing feet [15]. Hypothermia causes the reflex contraction of the skin's blood vessels in order to maintain the body temperature, which results in pale and cool skin to the touch [14].

The skin color of people with Hashimoto's thyroiditis may take a characteristic yellowish shade due to the lack of hepatic metabolism of carotene, which therefore accumulates in the stratum corneum. Then, carotene is excreted in sweat and reabsorbed through skin, depositing mainly in areas rich in sebaceous glands [14].

Herrmann et al. also mention skin marbling (cutis marmorata) as a symptom of hypothyroidism, so the appearance of blue-red streaks on skin with a reticular pattern (similar to a net or marble) as a result of a drop in ambient temperature [17].

THE EFFECT OF HASHIMOTO'S DISEASE ON HAIR

Deficiency of thyroid hormones causes swelling of the subcutaneous tissue responsible for nourishing the hair, which significantly affects the condition of the stem [18]. In Hashimoto's disease there is dryness of the hair, which is caused by the reduction of sebum secretion from the sebaceous glands, moreover, the beginning and rate of hair growth is delayed [14]. Concomitant acquired hair fragility (trichoclasia) can be caused by the side effects of hormonal medications, antibi-



Fig. 1 Keratosis of skin around the elbows and keratoderma on the feet of a patient with Hashimoto's disease

Source: Authors' own archive

otics, vitamin deficiency and hypothyroidism. As a result of this disorder, the hair becomes thin, dry, devoid of softness and becomes shorter and thinner [18].

Hashimoto's disease may cause alopecia, which is increased or sudden loss of hair without signs of skin changes. It can appear on a limited area or the entire scalp, either temporarily or permanently. An example of hormonal alopecia is thyroid alopecia caused by excessive or insufficient secretion of triiodothyronine and thyroxine. The decrease in metabolism in hypothyroidism also affects the hair cells. The hair follicles undergo miniaturization and then atrophy (the first symptoms take about 2-4 months) [18]. In the course of hypothyroidism, hair loss from the outer parts of the eyebrows is also characteristic [9]. Baldini et al. drew attention to the screening test for the functioning of the thyroid gland in a group of 298 children with alopecia areata (alopecia areata, an autoimmune disease involving hair loss from selected areas of the scalp). Abnormal thyroid test results were found in 20% of the respondents. Of these, 49% suffered from hypothyroidism, mainly caused by chronic autoimmune thyroiditis of the Hashimoto type [19].

In addition to the abnormalities mentioned above, in Hashimoto's disease, hirsutism that is excessive male hair

type occurring in women, may occur. According to the Baron scale, 3 degrees of hirsutism can be distinguished:

- I: upper lip, nipple area, diamond-shaped sexual hair;
- II: areas listed in stage I and the area of the chin, cheeks, chin, inner thighs;
- III: areas listed in grade I and II as well as the area of the back and shoulders, the dorsal surfaces of the hands, the area of the sternum and the sacro-lumbar region [17].

The causes of excessive male hair growth in women include thyroid dysfunction, including hypothyroidism. The reason for the occurrence of hirsutism in hypothyroidism is a decrease in the level of sex hormone binding globulin [20].

EFFECT OF HASHIMOTO'S DISEASE ON NAILS

Hashimoto's disease causes nail brittleness (onychoclasia), which means that the nail plate is prone to breakage. The most common type of nail brittleness is *onychoschizia lamellar* - lamellar dystrophy of the nail (splitting of the plate), in which the distal part of the nail plate splits in a horizontal plane into many, irregular layers. Another variety is onychorrhexis - brittleness in the longitudinal direction, that is the brittleness of the plate with the formation of fissures around the edge of the distal nail. Autoimmune diseases such as chronic Hashimoto's thyroiditis contribute to thinning and increasing brittleness of the nails. The result of nail plate fragility is the difficulty in performing manual activities and the necessity to shorten the nails [12].

In the case of diseases related to hypothyroidism, vertical grooving of the nail plate can be noticed along the longitudinal axis of the finger (fig. 2). This disorder appears as a single deeper furrow or as multiple fine lines. The causes of vertical lines on the nails are believed to be genetic conditions, advanced age, repeated mechanical injuries, iron deficiency, psoriasis, lichen planus and thyroid diseases [14, 21].

Another defect is the Beau's lines. There are nail changes in the form of homogeneous depressions running transversely, in a parallel manner. These changes resemble grooves with palpable prominence and are bent towards the distal part of the nail plate [21] (fig. 3). The width of the transverse groove refers to the duration of the disease that has affected the matrix. When the distal border of the furrow ends sharply, it indicates a sudden attack of the disease, and when the furrow is inclined - a more chronic course [22]. They can be symptoms of many diseases, among others autoimmune diseases of the thyroid gland [22, 23]. Taguchi described in 2018. the case of a patient with hypothyroidism resulting from Hashimoto's, with a history of dry skin, hair loss and thickened, brittle nails with transverse furrows. After 5 years of taking levothyroxine, the above symptoms disappeared [24].

Onycholysis is another defect of the nail plate in the course of Hashimoto's disease. This is a disorder in which



Fig. 2 Vertical lines on a fingernail of a patient with Hashimoto's disease
Source: Authors' own archive



Fig. 3 The Beau lines
Source: Authors' own archive



Fig. 4 Onycholysis of nails
Source: Authors' own archive

the outer part of the nail plate separates from the placenta, usually in the distal part, and may progressively worsen towards the proximal part. The clearly separated part of the plate becomes whitish due to the presence of air between the plate and the nail bed [25]. The plate that is subject to onycholysis may also take on other colors, like yellow, grey, brown, due to the accumulation of exfoliating keratin and impurities (fig. 4). The etiological factors of acquired onycholysis are, among others, thyroid disease [22, 25]. Malumani et al. pointed out that the occurrence

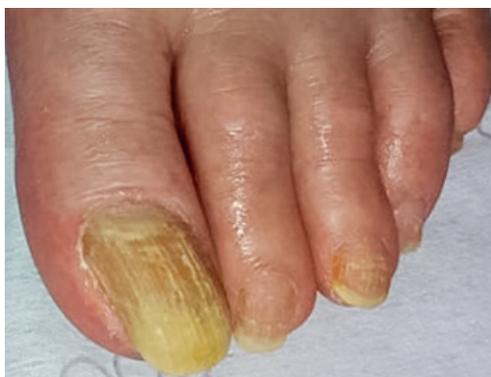


Fig. 5 Yellow nail syndrome
Source: Authors' own archive



Fig. 6 Koilonychia
Source: Authors' own archive

of onycholysis concerned patients of all races and, in the case of thyroid diseases, it occurred in both hyperthyroidism and hypothyroidism [26]. Nakatsui and Lin described 3 cases of patients with a correlation between onycholysis and hypothyroidism, confirming the presence of this disorder in the state of hypothyroidism. Two patients were diagnosed with hypothyroidism (patient 1: thyroid-stimulating hormone elevated, patient 2: elevated TSH and positive anti-TPO antibody test), excluding other conditions. The only symptom in both patients was onycholysis on one or several fingernails. After the administration of levothyroxine, an improvement of onycholysis was observed in both patients (patient 1: slightly, patient 2: high). Patient 3, already diagnosed with hypothyroidism and positive for anti-TPO antibodies, developed a new symptom in the form of onycholysis. After adjusting the dose of levothyroxine according to the latest blood test results, the patient experienced a high degree of improvement in onycholysis. Nakatsui and Lin emphasized that each case of onycholysis without a specific background should have been diagnosed for asymptomatic thyroid diseases [27].

Plummer's nails are a type of onycholysis that occurs mainly in hyperthyroidism (usually in Graves' disease). Onycholysis affects the fourth and fifth fingers of the hand. In 2018, Takasu and Seki described the case of Plummer's nails also in a patient with hypothyroidism and a positive test for the presence of anti-thyroid antibodies. Other diseases were excluded in the patient [28]. The cases de-

scribed by the researchers show the relationship between onycholysis and autoimmune diseases of the thyroid gland, in particular those related to hypothyroidism.

Yellow nail syndrome (YNS) is a rare disease that was first described in 1964. In 1966 Emmerson described the classic triad of disease symptoms (the presence of two symptoms is sufficient to establish the diagnosis) as yellow nail discoloration, lymphedema and respiratory system involvement [29]. YNS is more common in women than in men, and clinical symptoms usually appear between 40 and 60 years of age, although it can affect any age group. YNS may coexist with autoimmune diseases (including thyroiditis) [30, 31]. Characteristic manifestations of YNS concerning nails are: thickening, yellow or yellow-greenish color, free edge curvature, surface beading and atrophy of the epidermal labrum, reduction of growth rate (fig. 5). The changes usually affect some or all nails on the hands and feet and usually appear 3-5 years after the onset of the disease [16, 32].

Koilonychia, or spoon nails, is a disorder of the shape of the nail plate consisting in thinning of the plate with an incorrect concave in the center and raised side edges of the nail. The shape resembles a teaspoon that can hold a drop of water (fig. 6). The diagnosis uses the so-called the bead test, which involves placing a bead on the nail plate to check if the object stays in the plate's cavity. The etiopathogenesis of koilonychia is not fully understood yet [25]. The causes of the isolated form of spoon-shaped nails (without the coexistence of other disorders) include endocrine disorders, including hypothyroidism [33, 34].

AIM

The aim of the study was to verify the relationship between hormonal disorders resulting from Hashimoto's disease and the appearance of skin, hair and nails.

MATERIAL AND METHODS

The study was conducted using as a method an anonymous poll published on the Internet. The survey was available on Facebook groups dedicated to people suffering from chronic autoimmune thyroiditis. The questionnaire was addressed to adult women, aged 20-48, suffering from Hashimoto's, who had received the diagnosis at least one year before starting the questionnaire and were taking medications regulating the secretion of thyroid hormones (the use of long-term drug therapy by the patient means being under the control of an endocrinologist due to noticeable, troublesome symptoms). Men were excluded from the study due to the rarity of diagnosed illnesses and the different hormonal balance. Children and adolescents were also excluded due to the incomplete maturation process, which affects the state of the endocrine system. In addition, the study was limited to women up to 48 years of age, due to

the prevalence of menopause at this age, the symptoms of which may be affected by data reading. According to the report 'Polish women 50 plus. Health and its threats' Polish women go through the menopause between the ages of 48 and 50 [35]. Data was collected using a questionnaire containing 28 questions. Most of the questions were answered in 'yes' or 'no' form. Two questions in the survey were modelled on the Likert scale in order to find out the subjective opinion of the respondents. The questionnaire included one open-ended question to detail other chronic diseases and one optional open-ended question to learn about the respondents' opinions about the study and their thoughts. The remaining questions concerned age, place of residence, level of education, date of diagnosis of the disease and observed symptoms.

RESULTS

158 respondents were included in the study. 24.7% of the group were people in age between 20-25 years old, 31.6% people between 26 and 35, 35.4% respondents between 36 and 45 and about 8.2% people between 46 and 48 years. Therefore, each age range was represented in the study, but the first three groups were the vast majority. The study included both inhabitants of rural areas (25.9%), small and medium-sized towns (12.7% and 15.8%) and larger towns (17.7% and 27.8%). The vast majority of the respondents were women with higher and secondary education (96.8%). People with vocational or primary education accounted for only 3.1%.

With regard to the question related to the moment of diagnosis of the disease, the vast majority were people diagnosed before the 3-year period (44.3%), and the smallest group were those who had been ill for over 10 years (15.8%).

The specificity of the endocrine disorder, which is Hashimoto's disease, indicates the coexistence of many other disorders among diagnosed patients. Hence the interest in analyzing the health condition of the respondents from a slightly broader perspective, reliably reflecting the full picture of lymphocytic thyroiditis. With regard to this question, the respondents were given the opportunity to freely enter co-occurring disorders. The analysis of the answers obtained to this question showed that more than half of the respondents (51.9%) suffer from other chronic diseases, while 48.1% did not have any comorbidities. The most frequently mentioned diseases were: hypothyroidism, insulin resistance, allergy, asthma, cardiac diseases and polycystic ovary syndrome (listed in order of appearance). Due to the multitude of comorbidities and the symptomatological picture of Hashimoto's disease, the vast majority of respondents were under the constant care of an endocrinologist (95.6%). A few people (4.4%) did not use such care, which seems to be a very disturbing phenomenon from the point

of view of treatment and prevention related to Hashimoto's disease.

While analyzing the effects of Hashimoto's disease on hair, nails, and skin, another interesting point was a reason why the respondents started looking for help. The most frequently mentioned symptoms that prompted the respondents to seek help were: fatigue (81%); concentration and memory disorders (62%); change in body weight (60.8%); brittleness and hair loss (58.9%); depression and bad mood (51.3%); dryness and keratosis, and coolness of skin (46.8%); sleep disorders (46.2%).

The diagnosed Hashimoto's disease required the patient to start the process of collecting information, verifying and assessing them in order to find the right therapeutic path, as well as to obtain the greatest sense of comfort in the facing the symptoms. With regard to the sources from which the respondents learned about the care of skin, hair and nails in Hashimoto's disease, the majority of respondents indicated the Internet (79.1%), then the endocrinologist (41.1%) and scientific articles (39.2 %). The information received from a cosmetologist (20.9%) was only in fourth place, while information from a trichologist and a podiatrist (7.6 and 7%) was placed ahead of the dietitian and the respondents' family. This may indicate low social awareness of the existence of specialists related to skin, hair and nail diseases (this is a peculiar novelty for many people).

Next, a detailed analysis of the frequency of specific symptoms of Hashimoto's disease in skin, hair and nails were analyzed. Symptomatic lists based on the collected information from the scientific literature was created. Due to the multitude of potentially occurring symptoms in these areas, each of them was included in a separate question with the possibility of marking the answers multiple times in order to give the respondents the opportunity to create a fully adequate individual symptom picture. The distribution of answers to the above questions is presented in Fig 7-9, respectively.

On the basis of the answers provided, it can be concluded that the majority of respondents clearly noticed symptoms occurring in the above-mentioned areas. Only 7.6% of the respondents declare no symptoms in the area of skin, 8.9% in the area of hair and 20.9% in the area of nails. The rest of the respondents struggled with problems related to skin, hair and nails. Mostly these were not single symptoms, but entire symptomatic syndromes, as evidenced by multiple selected responses. The most frequently reported symptoms in skin area included: dry and rough skin, cool, cold skin, chronic swelling of the face, arms, feet, hands, and excessive keratinization and peeling of the skin on the elbows and feet. The most frequently reported symptoms in hair area included: hair loss, dryness and thinning of hair as well as 1st degree hirsutism according to Baron scale.

The most frequently reported symptoms in an area of the nails were: brittleness, vertical lines on the nails, onycholysis and yellow nail syndrome.

Although the symptoms of Hashimoto's disease related to an area of the nails were declared by 79.1% of the respondents, only 18.4% of all respondents visited a podiatrist (a specialist dealing with the diagnosis and therapeutic process of the structure and diseases of the feet and nails). People who used the help of a podiatrist usually did it on a regular basis, at least once a year (90%). Hashimoto's disease symptoms related to hair were noticed by 91.1% of respondents, but only 8.2% visited a trichologist (a specialist dealing with the diagnosis and therapeutic process of scalp and hair diseases). People who used the help of a trichologist usually did it on a regular basis, at least once a year (77%). The main reasons for the lack of contact with a specialist (both in the case of a podiatrist and a trichologist) were: no reason, no access to a specialist in the vicinity of the respondent, too high cost of the service in the respondent's opinion. According to the respondents, the significance of such visits was moderately important (in 38% in the case of a podiatrist and in 36% in the case of a trichologist).

The most interesting issue in the study was the respondents' awareness of the impact of Hashimoto's disease before completing the questionnaire. The question was asked at the end of the survey so that the respondents had the opportunity to learn about the symptoms of the disease listed in the literature. Most of the respondents declared that they had had knowledge of the effects of the disease on skin and its appendages described in the study: 91.8% for skin, 94.3% for hair and 77.2% for nails.

The survey contained a voluntary open-ended question regarding the questionnaire: "Did this survey draw your attention to anything, did it influence the perception of Hashimoto's disease?" The question was aimed to obtain the subjective opinion of the respondents and getting to know their thoughts caused by completing the questionnaire. The answers were provided by

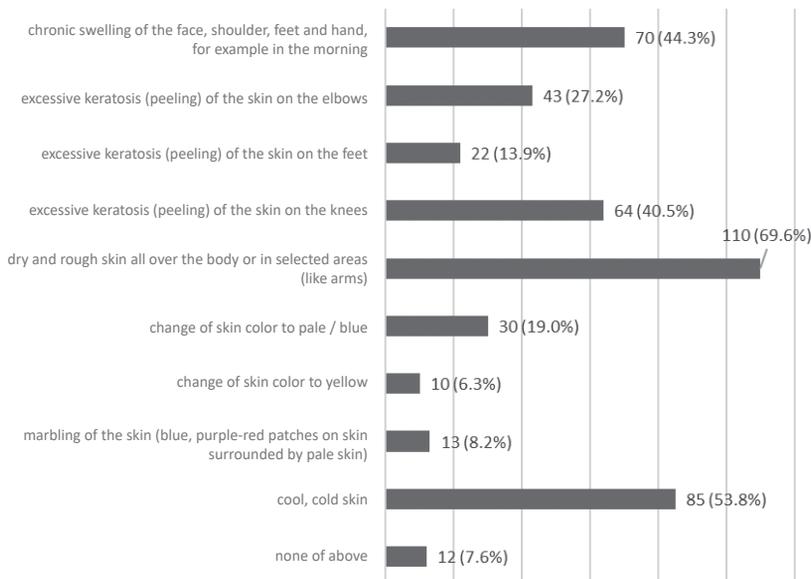


Fig. 7 Symptoms resulting from Hashimoto's disease appearing in the area of the skin noticed by the respondents
Source: Own study

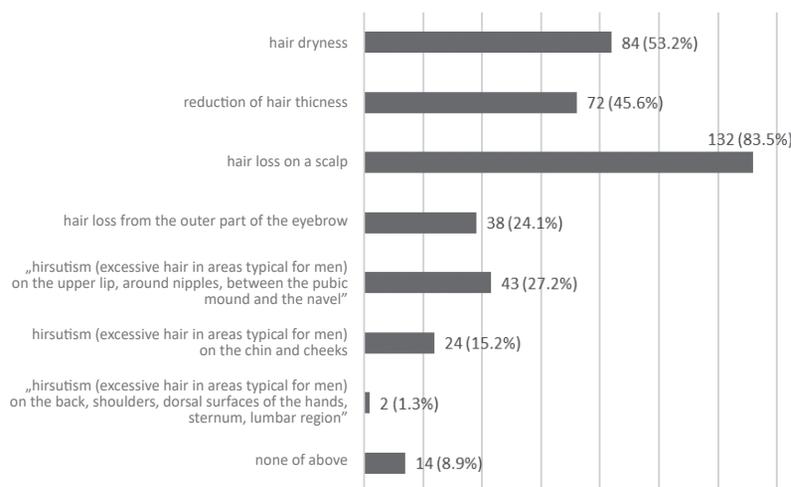


Fig. 8 Symptoms resulting from Hashimoto's disease appearing in an area of hair noticed by the respondents
Source: Own study

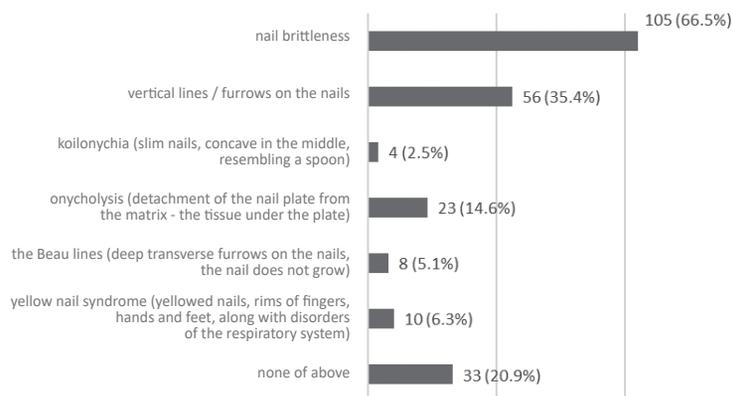


Fig. 9 Symptoms resulting from Hashimoto's disease appearing in an area of the nails noticed by the respondents
Source: Own study

48 respondents who most often pointed to the realization of how extensive the impact of Hashimoto's disease was on their body, and also how important it would be to seek the advice of a trichologist or a podiatrist.

CONCLUSIONS

1. The most frequently reported symptoms in skin area included: dry and rough skin (69.6%), cool, cold skin (53.8%), chronic swelling of the face, arms, feet, hands (44.3%) and excessive keratosis and peeling of the skin on the elbows and feet (54.4%).
2. The most frequently reported symptoms in the area of hair included: hair loss (83.5%), dryness (53.2%) and hair thinning (45.5%).
3. The most frequently reported symptoms in the area of nails included: brittleness (66.5%), vertical lines on the nails (35.4%), onycholysis (14.6%) and yellow nail syndrome (6.3%).
4. More than half of the respondents (51.9%) suffered from other chronic diseases, while 48.1% did not have comorbidities. The most frequently mentioned diseases were: hypothyroidism, insulin resistance, allergy, asthma, cardiovascular diseases and polycystic ovary syndrome.
5. Most of the respondents indicated the Internet (79.1%) as the primary source of knowledge on skin, hair and nail care, followed by an endocrinologist (41.1%) and scientific articles (39.2%). Only on fourth place was information obtained from a cosmetologist (20.9%), while information from a trichologist and podiatrist was seventh and eighth (7.6 and 7%), ahead of the dietitian and the respondents' family. This may indicate a low social awareness of the existence of specialists related to skin, hair and nail diseases.
6. Although symptoms of Hashimoto's disease related to the area of nails were declared by 79.1% of the respondents, only 18.4% of all respondents visited a podiatrist.
7. Symptoms of Hashimoto's disease related to hair were noticed by 91.1% of respondents, but only 8.2% visited a trichologist.

SUMMARY

Increasing interest in the problems previously unknown to the respondents will enable them deepen their diagnosis and select the appropriate therapy. The study also highlighted another interesting problem. Taking into account the described results, a significant proportion of respondents noticed problems with their skin, hair and nails, and at the same time did not have any reason to use the services of a podiatrist and a trichologist. This may be due to the lack of knowledge of the above-mentioned professions, which are relatively new on the Polish labour market, or the lack of knowledge about the level of education of cosmetologists

specializing in podiatry and trichology. There is a misconception that only doctors know about these conditions and how they can be alleviated. Patients with chronic autoimmune thyroiditis did not receive recommendations from endocrinologists to consult their complaints with a cosmetologist (sentence from the last point of the questionnaire). This draws attention to the need to increase public awareness of the cosmetology profession, podiatry and trichology specialization.

REFERENCES / LITERATURA

1. Pawlikowski M, ed. *Zaburzenia hormonalne*. Warszawa: Wyd. PZWL; 2003:47-48.
2. Limanowski A. *Podstawy histologii. Podręcznik dla studentów kosmetologii*. Poznań: Wyższa Szkoła Zdrowia, Urody i Edukacji w Poznaniu; 2014.
3. Jakubowicz M. *Anatomia człowieka. Tom 2*. Poznań: Wyższa Szkoła Zdrowia, Urody i Edukacji w Poznaniu; 2007:140-141.
4. Syrenicz A, ed. *Zarys endokrynologii klinicznej*. Szczecin: Wydawnictwo Pomorskiego Uniwersytetu Medycznego w Szczecinie; 2017.
5. Bednarczuk T, ed. *Podstawy endokrynologii*. Warszawa: ITEM Publishing Sp. z o.o. Sp. k.; 2017.
6. Brook CGD, Marshall NJ, Hall-Craggs MA, Ell PJ, Otto Buczkowska E, eds. *Podstawy endokrynologii*. Wrocław: Wydawnictwo Medyczne Urban & Partner; 2000.
7. O'Neill R, Murphy R, Lewiński A, eds. *Endokrynologia Crash Course*. Wrocław: Edra Urban & Partner; 2019.
8. Kucharska AM. Płeć i autoimmunizacyjne choroby tarczycy. *Endokrynol Ped*. 2014;2(47):57-64.
9. Zgliczyński S, ed. *Choroby tarczycy*. Wrocław: Wydawnictwo Medyczne Urban & Partner; 2001.
10. Królicki L, Karbownik-Lewińska M, Lewiński A, eds. *Choroby tarczycy - Kompedium*. Lublin: Wydawnictwo Czelej Sp. z o.o.; 2008.
11. Błaszczyk M. *Histologia dla kosmetologów*. Nysa: Oficyna Wydawnicza PWSZ; 2013.
12. Piraccini BM, Maleszka R., eds. *Choroby paznokci. Praktyczny poradnik - diagnostyka i leczenie*. Lublin: Wydawnictwo Czelej Sp. z o.o.; 2018.
13. Arct J, Pytkowska K. *Kosmetologia włosów*. Wrocław: Edra Urban & Partner; 2020.
14. Niepomniszcze H, Huaier Amad R. Skin disorders and thyroid diseases. *J Endocrinol Invest*. 2001;24(8):632-634. <https://doi.org/10.1007/BF03343905>
15. Klamczyńska M, Kopaczewska E, Skocka-Pietruszewska A. *Atlas podologiczny. Patologie skóry i paznokci*. Warszawa: Wyd. PZWL; 2019.
16. Klamczyńska M, Ciupińska M, eds. *Podologia*. Warszawa: Wyd. PZWL; 2020.
17. Herrmann F, Müller P, Lohmann T, et al. *Endokrynologia w praktyce klinicznej. Diagnostyka i leczenie*. Warszawa: Wyd. PZWL; 2009.
18. Siemiątkowska JM. *Zarys trychologii kosmetycznej*. Stargard: Instytut kosmetologii Fryzjerskiej Trichomed; 2015.
19. Baldini E, Odorisio T, Tuccilli C, et al. Thyroid diseases and skin autoimmunity. *Reviews in Endocrine and Metabolic Disorders*. 2018;19:311-323.
20. Rosenfeld RL. Clinical Practise. Hirsutism. *N Engl J Med*. 2005;24:2580-2581.
21. Adamski Z, Kaszuba A, eds. *Dermatologia dla kosmetologów*. Wrocław: Elsevier Urban & Partner; 2010.
22. Singal A, Arora R. Nail as a window of systemic disease. *Indian Dermatol Online J*. 2015;6(2):67-74.
23. Yorulmaz A, Yalcin B. Onychomadesis secondary to autoimmune thyroid disease mimicking thyroid acropachy. *Our Dermatol Online*. 2020;11(1):47-49.
24. Taguchi T. Brittle Nails and Hair Loss in Hypothyroidism. *N Engl J Med*. 2018;379(14):1363.
25. Jaworek AK, Jaworek M, Zalewski A, et al. Przegląd przydatnych dla lekarzy (także niedermatologów) praktycznych zagadnień związanych ze schorzeniami aparatu paznokciowego. *Pediatr Med Rodz*. 2020; 16(1):62-69.

26. Malumani M, Zhe D, Wu J, Quan Ji S. Onycholysis an early indicator of thyroid disease. *Pan Afr Med J*. 2019;32:31.
27. Nakatsui T, Lin AN. Onycholysis and thyroid disease: report of three cases. *J Cutan Med Surg*. 1998;3(1):40-42.
28. Takasu N, Seki H. Plummer's Nails (Onycholysis) in a Thyroid-Stimulation-Blocking Antibody (TSBAb)-Positive Patient with Hypothyroidism. *Intern Med Tokyo Jpn*. 2018;57(20):3055-3056.
29. Emerson PA. Yellow nails, lymphedema and pleural effusion. *Thorax*. 1966;21:247-253.
30. Malczyk Ż, Oświęcimska J, Piaszczyńska-Pindycka M, Ziara K. Zespół żółtych paznokci u piętnastoletniej dziewczynki: opis przypadku i przegląd piśmiennictwa. *Pediatr Pol*. 2014;89(4):292-296.
31. Vignes S, Baran R. Yellow nail syndrome: a review. *Orphanet J Rare Dis*. 2017;12(1):42.
32. Kaczmarek D, Brzeziński P. Zespół żółtych paznokci po karbamazepinie. Opis przypadku. *Forum Medycyny Rodzinnej*. 2011;5(6):516-520.
33. Stadler R. Nagelerkrankungen. In: Plewig G, Kaudewitz P, Sander CA, eds. *Fortschritte der praktischen Dermatologie und Venerologie. Fortschritte der praktischen Dermatologie und Venerologie, vol 19*. Berlin, Heidelberg: Springer; 2005. https://doi.org/10.1007/3-540-28691-8_50
34. Gregoriou S, Argyriou G, Larios G, Rigopoulos D. Schorzenia paznokci a choroby układowe – o czym mówi nam wygląd paznokci? Co można zobaczyć i jakie choroby należy podejrzewać w przypadku przedstawionych 11 rodzajów zmian paznokci? *The Journal of Family Practice*. 2008;57(8):509-514.
35. Ostrowska A, ed. *Raport Polki 50 plus. Zdrowie i jego zagrożenia*. Warszawa: Fundacja MSD dla Zdrowia Kobiet; Narodowy Instytut Zdrowia Publicznego; 2015:50.

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