

Case Report

# Case Reports and Experts Opinions about Current Use of Leech Therapy in Dermatology and Cosmetology

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**Abstract:** This article aimed to determine the experts' opinion on the use of hirudotherapy in cosmetology, to supplement knowledge, and to identify factors that, in the opinion of experts, affect the effectiveness and frequency of use of this method in eliminating skin problems. The study was conducted using the expert interview method. The research tool was a categorized expert interview questionnaire using the CAWI (Computer Assisted Web Interview) technique. Hirudotherapy is one of the oldest healing methods. The mechanism of action is based on the therapeutic properties of bioactive substances isolated from leech saliva. It has been shown to have a wide range of applications in the treatment of numerous diseases in various fields of medicine, including dermatology and cosmetology. Despite its therapeutic properties and effectiveness, hirudotherapy is a rarely used tool in cosmetology. It has been found effective in the treatment of many dermatoses. The most spectacular effects have been observed in the treatment of rosacea, local inflammations, lipomas, skin scars, hard to heal wounds and contusions.

**Keywords:** hirudotherapy; leech; *Hirudo medicinalis*; complementary therapies; hirudin; side effects



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## 1. Introduction

Currently, leech therapy raises a lot of controversy. Therefore, there is a need to emphasize the scientific nature of this form of therapy and to popularize knowledge about the effectiveness of hirudotherapy and the healing properties of medicinal leeches. The use of hirudotherapy in modern cosmetology, dermatology and aesthetic medicine may currently be of great importance, contrary to appearances [1].

Leeches belong to the group of parasites as leeches suck blood; however, in return, leeches introduce many bioactive substances, including enzymes, into the bloodstream [2]. Numerous substances with healing properties are produced in the salivary glands of the leech and these enzymes provide a wide range of therapeutic possibilities, as well as supporting health and beauty.

Treatments with the use of leeches have been known since antiquity. The practice of these therapies was widespread all over the world [3–7]. At the end of the 19th century, as a result of the development of modern medicine and experimental methods, use of leeches was considered a therapy that was even harmful. Hirudotherapy has again gained recognition in the world of medicine thanks to its beneficial influence in transplantology [8].

### 1.1. Leech

Among the numerous species of leeches in hirudotherapy, the following are mainly used: medicinal leech (*Hirudo medicinalis officinalis*); medicinal leech (*Hirudo medicinalis medicinalis*); and oriental medicinal leech (*Hirudo medicinalis orientalis*). The treatments can also be performed with the use of, inter alia, *Hirudo verbana*, *Hirudo sawdust*, or the Asian medicinal leech (*Hirudinaria manillensis*) [9]. In order to ensure full safety, only leeches

grown in laboratories specially for this purpose, where there is an isolated environment with fully controlled conditions, should be used in the therapy [10].

The process of sucking blood takes approx. 10–30 min; during this time, the leech ingests 2–20 mL of blood, and when the animal is full, it spontaneously falls off the host [11]. From the site after the bite, blood may ooze for up to 48 h [11]. A bite by a leech leaves a mark (Figure 1).



**Figure 1.** Photographs taken during the hirudotherapy treatment and photos of wounds in the healing process on day 3 and day 6 after applying the leeches (own documentation with the consent of the patient).

While sucking blood, the leech secretes numerous substances, which are injected into the host's blood [5]. These substances are intended to prevent blood from clotting during the long period of its storage in the intestines. Leeches also secrete compounds that dilate blood vessels and anesthetize, which is why leeches' bites are painless [12,13].

### 1.2. Hirudotherapy—Definition and Basic Concepts

Medical Leech Therapy (MLT) is an unconventional, natural method of treatment, and is also classified as a complementary and integrative medicine method [14]. Hirudotherapy is included in the International Classification of Medical Procedures, in the third volume on medical procedures, in the category of other treatments (ICD-9-CM; No. 99.991) [15]. The leeches themselves have been approved as a medical product by the US Food and Drug Administration (FDA). More than 20 techniques are used in modern hirudotherapy [16].

The disturbance of microcirculation or its absence are one of the main pathomechanisms of many diseases; hence, the leech therapy makes it possible to treat or support the treatment (Table 1). The medical contraindications to the use of this form of therapy are shown in Table 2. Before performing the procedure, a detailed interview should be conducted, mainly concerning the pharmacotherapy used and the medical history [17].

**Table 1.** Selected indications for the use of hirudotherapy [1,18–20].

Chronic skin diseases: scabies, psoriasis, chronic ulcers Varicose veins, hemorrhoids, phlebitis and thrombotic conditions In plastic surgery, reimplantation and tissues reconstruction Pain and inflammation reduction Boils, abscesses, <i>Staphylococcus aureus</i> infection Contusions, hematomas Allergies, eczema Hard-to-heal wounds Rejuvenating treatments Scars, alopecia
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**Table 2.** Selected contraindications to the use of hirudotherapy [1,17–20].

Absolute	Relative
Haemophilia, coagulation factor deficiency diseases, anemia; Refusal of blood transfusions or therapy; Pregnancy or breastfeeding; Tumors; Sepsis; Arterial failure, hypotension; Unstable health condition, exhaustion of the body; Taking anticoagulants, NSAIDs, acetylsalicylic acid; Large blood loss.	Age below 10 years of age; Late old age; Menstruation; High temperature; General weakness; Scarring; Tuberculosis; HIV infection; Mental disorders.

### 1.3. Active Substances and Mechanism of Action

The effectiveness of therapy with leeches is based on numerous compounds showing therapeutic effects. Only 150 bioactive substances have been identified, with the leech secreting from 160 to 300. Unfortunately, most of them have still not been fully described, and are not known in terms of their chemical structure and mechanisms of action. The most important of them are [14,19,21,22]: hirudin, destabilase, bdellin A and B, eglin B and C, fibrinases, LDTI (leech-derived tryptase inhibitor), hyaluronidase, anti-elastase, analgetic factors responsible for the secretion of endorphins and kininase, and also cholesterol esterase.

Therapeutic properties are also exhibited by many other compounds. In addition, the symbiotic bacterium—*Aeromonas hydrophila*—releases a spectrum of bioactive components as well (most often with an antibacterial effect), although it can also cause complications [23].

Among the mechanisms of action of hirudo-compounds, six main types were distinguished [14,19,21,22,24]:

- Analgesic and anti-inflammatory (bdellins and bdellastasin, eglin, antistasin, hirustasin, ghilantens, LDTI, bdellastazine, complement C1 inhibitor, guamerin and piguamerin, carboxypeptidase inhibitor);
- Degradation of the extracellular matrix (hyaluronidase, collagenase);
- Increase in blood flow (acetylcholine, histamine-like molecules);
- Inhibition of platelet function, anti-aggregation (apyrase, calin, saratin, decorsin);
- Anticoagulant (hirudins, destabilase, hementin and hementerin, factor Xa inhibitors, whitide, and whitmanin);
- Antimicrobial activity (destabilase, hyaluronidase).

### 1.4. Hirudotherapy Side Effects

Hirudotherapy is a relatively safe method, but it carries the risk of some side effects [17]. The most common are: infections, allergic reactions, anemia as a result of prolonged bleeding [25,26], and as a rare, severe complication, sepsis may occur [27]. Clients may experience discomfort at the site of leeches, i.e., itching lasting up to 3 days,

which occurs on average in 56% of patients, as well as pain and occasional hypotension resulting from passive bleeding after the procedure [17,28].

Bacteria isolated from leech saliva that can cause infection are *Aeromonas sp.* (e.g., *Aeromonas hydrophila*), *Pseudomonas fluorescens*, and other gram-negative bacteria. Immunosuppressed, debilitated or weakened patients are in the risk group to develop sepsis [20]. Local infections occur among 20% of patients. The severity of infection may range from mild cellulitis, through abscess and cellulitis, to bacteremia, septic shock, and even bone necrosis [25]. An epidermal cyst may also appear at the site of leech attachment [29]. In case of an infection, it is recommended to cleanse the affected tissues and administer antibiotics. The literature indicates that antibiotics can be added to the water in which the leeches are kept—this method effectively eliminates *Aeromonas sp.* [30,31].

Allergic reactions are the second most common side effect. They occur in about 21% of patients [25]. Usually, it is itching, burning and redness. Blistering and ulcerative necrosis are very rare. The itching lasts for a few days at most. Usually, allergic reactions appear after re-use of the same leech or self-treatment with leeches. Potential allergens have not been identified [25].

Anemia as a result of prolonged bleeding is rare, but the risk of this complication increases in proportion to the duration of therapy and the number of leeches used. The cause is a frequent and excessive use of leeches, leading to severe hemorrhages resulting in massive blood loss [32].

In aesthetically significant areas, where the skin is thin and the amount of subcutaneous tissue is small, scarring occurs occasionally (Figure 1). In most cases, it is observed that Y-shaped wounds resulting from a leech bite usually heal without scars or complications [33].

In order to minimize the risk of side effects, it is important to follow the procedures and rules for leech application. Hirudotherapy in many countries, including in the United States, Russia, Germany and England, is officially used by medical staff as a method of treatment, while Polish law describes this therapy as an unconventional measure. The aim of this study was to determine the opinion of experts working every day in their professional practice with hirudotherapy on the possibility of using it in cosmetology and skin care.

## 2. Cases Presentation

The study was conducted as an expert interview. The research tool was a categorized interview questionnaire using the CAWI (Computer Assisted Web Interview) technique. The research period covered the period from 13 August 2020 to 21 June 2021. The anonymous interview questionnaire consisted of a set of 11 questions, the last of which was an additional question and concerned the description of the case study. The questionnaire was sent by e-mail to ten experts from Poland, and three of them replied.

The group of subjects was selected using a non-probabilistic schema by targeted selection. They were experts, i.e., competent people with theoretical knowledge and practical skills gained during numerous courses and trainings. One of the study participants is a member of the British Association of Hirudotherapy. They have at least 5 years of experience in carrying out hirudotherapy treatments.

### 2.1. Hirudotherapy Use—Questionnaire for Experts

We asked about the motivation that led therapists to become interested in hirudotherapy. The career path began with the following points: as a transition from professional leech breeding to therapy, as a result of contact with hirudotherapy carried out in a family member, and the interest in the subject itself. In the following years, the respondents underwent numerous trainings and apprenticeships, and took part in courses and symposia, which very often took place abroad, e.g., in Russia, England and Ukraine. One of the experts admits: “Without specialized education, it is difficult to expect greater success in hirudotherapy”.

The respondents agree as regards the perception of hirudotherapy by the external environment: "People's reactions are extreme, it doesn't matter whether we are talking about people with medical education or not.". People who have had direct or indirect contact with this therapy in the past have a clearly positive attitude. There are people, including medical doctors, who describe this therapy as "bloodletting superstition", "black magic" or "charlatanism and the Middle Ages". It has been observed that the majority of women have a neutral to negative attitude to leeches, considering them disgusting, but usually the attitude changes to a positive one after 2–3 treatments. Men show a negative attitude more often than women. Nevertheless, interviewed experts promote hirudotherapy: "Leeches are an officially recognized therapeutic agent. I repeat this to my patients and medical doctors I know.". One expert notes that, over the last 10 years, the overall opinion about leeches has changed to a more positive one: "It is more and more common that medical doctors send some of their patients to me". Nowadays, hirudotherapy is still controversial, and the potential reasons for them are anxiety about the origin of leeches, as well as about the side effects, such as severe bleeding or allergic reactions. Discussion, especially among animal lovers, centers around the fact that leeches are used as "disposable needles" and are then put to sleep after a single treatment. Another respondent believes that the lack of legal regulations and supervision is controversial, as they lead to this therapy being conducted by incompetent people who do not have adequate preparation: "Contrary to popular opinion, leeches can be harmful. Working with human blood also requires responsibility and compliance with appropriate epidemiological procedures. I often come across the use of sanitary pads or cotton pads in dressings, which is unacceptable. During the symposium of hirudotherapists and hirudologists in Georgia, I conducted a survey, which shows that a large number of people do not use gloves during the procedure, even when applying a dressing, it puts the whole group of people dealing with hirudotherapy in a very bad light. There is also a big problem with proper preparation of the patient and explaining what to do after the procedure. A patient with a poorly made dressing that leaks quickly is left to fend for her/himself. Lack of proper preparation and care results in calling the Medical Rescue Team. Medical rescuers, seeing unprofessional dressings, mock hirudotherapy. Lack of adequate education and awareness of the risk of complications after the procedure means that the therapist does not know what to do with the patient when he has a problem. The patient goes to the medical doctor who, having no extensive knowledge about the treatment with use of leeches, introduces prophylactic antibiotic therapy."

The conducted study clearly indicates that the greatest increases in interest in hirudotherapy are caused by information in the media, both positive and negative: "The greatest increases are always seen after articles in the press, both positive and negative. People learn more about the method and sign up for the procedure. We had the biggest jump after the scandal in May 2008 involving Dr. Lenart (Polish orthopedic surgeon using leeches in a patient at risk of leg amputation, brought before a medical ethics committee)". Although mentions of hirudotherapy can multiply the number of patients, the effect is transient: "A newspaper article or television program can double the number of people interested—for a few days, of course.". Spoken word is also effective promotion: "Patients become interested if they hear about it on TV or know someone who has tried therapy."

Experts agree that clients usually choose this method due to the ineffectiveness of other methods, including pharmaceutical therapies, medical advice and surgery. They often refer to hirudotherapy as the "last resort". Some people benefit from leech therapy because "they believe in alternative medicine and don't want to use drugs, steroids, botox and hyaluronic acid".

In response to the question, "What dermatoses or cosmetological ailments are the most common among the customers?", the following dermatoses are given:

- psoriasis;
- rosacea and bacterial acne;
- atopic dermatitis;
- skin scars (especially after surgery);

- hard-to-heal wounds;
- tissue damage;
- wrinkles;
- cellulite;
- varicose veins;
- bruises;
- reddening of the skin;
- skin inflammation;
- to improve skin tone.

In the opinion of experts, the most common contraindications in people seeking hirudotherapy in Poland are:

- abnormalities in blood counts, anemia;
- use of anticoagulants;
- severe infections and severe allergies.

In the opinion of the surveyed experts, the post-treatment recommendations that cause the most difficulties to clients are:

- no scratching and touching the post-treatment area;
- changing the dressing on the hard-to-reach areas (e.g., on the back).

Some customers complain about the ban on soaking wounds because they cannot take a bath or go to the swimming pool. One of the experts replied that the recommendations after the procedure are not difficult to follow, but the clients do not stick to the rules and do not accept the fact that the day after the procedure they should rest, limit their physical activity, not scratch or soak the wound, wear clothes that will provide airflow around the dressing and refrain from drinking alcohol, as it worsens the bleeding. The expert also adds that before the procedure, the patient is informed in detail, fills in the patient's card and signs consent forms.

Among the most common side effects, respondents indicate: reddening of the skin, swelling, inflammation, and itching, although their occurrence depends on the patient's body and health condition, e.g., "smokers may experience much stronger reactions to a leech bite". None of the respondents stated the exacerbation of dermatological complaints, although there was mention of a one-off increase in back pain after the procedure.

## 2.2. Use of Hirudotherapy in a Cosmetic Salon

In the opinion of the experts, hirudotherapy provides the best results in the treatment of rosacea and various local inflammations, and one of the respondents stated high effectiveness in bruises, lipomas, skin scars and difficult-to-heal wounds. In the case of other dermatoses, all indicated that the treatment was more complicated, its duration had to be extended and the effectiveness was slightly lower.

Another question, regarding the popularity of using hirudotherapy in combating dermatoses or cosmetic ailments, and the possibility of having this therapy compete with other treatments performed in cosmetology salons, presented various answers. The first of the respondents declares that people undergoing treatment of dermatoses with leeches constitute about 5% of his patients. This expert also emphasized the importance of diet as the basis for therapy. Both the first and the second respondents recommend a leech blood-lifting mask to effectively and non-invasively reduce fine wrinkles, brighten the skin and smooth it. In their opinion, the effect is comparable to the effects of widely used cosmetic treatments that exfoliate the skin. However, the disadvantage of the mask is the risk of leaving traces on the skin after a bite of leeches, and the sight of a large amount of blood can also be problematic for the person subjected to the treatment. The last respondent believes that, when the knowledge about hirudotherapy and the healing properties of enzymes derived from leech saliva is disseminated, and when the visual effect of the treatments is noted, then hirudotherapy has a chance to compete with other methods. The effect of

therapy with leeches is expected to be longer than the effect of treatments performed in a cosmetology salon; however, these methods, although faster, are also more invasive.

As opportunities to increase interest in hirudotherapy in cosmetology, experts pay attention to media promotion, awareness-raising and education, and one of the experts recommends exhibitions with visual evidence of the effectiveness of the therapy. An important element is also the aforementioned lifting mask, which is rated much higher than other masks in a beauty salon; this has the potential to make hirudotherapy a field of competition with other cosmetology salons.

As barriers and threats to the development of hirudotherapy and its application in cosmetology, experts indicated the essence of a professional approach, having appropriate qualifications and competences: “With inexperienced and poorly qualified personnel, post-treatment problems will appear more often”. The feeling of discomfort caused by leeches applied to the face area, post-treatment bleeding and extended waiting time for the effect may be factors that constitute a barrier to the use of hirudotherapy in cosmetology.

### 2.3. Cases Description

The last question in the questionnaire was an additional element. It was addressed to experts in the form of a request for a description of a selected case undergoing leech therapy for the treatment of skin lesions.

First case: a 42-year-old woman suffered from psoriasis and psychiatric disorders for 7 years. The factors accompanying and triggering skin manifestations were stress and improper diet. Psoriatic lesions covered the entire body, including the scalp. Before the patient was admitted to the hirudotherapy office, she had 10 days of radiation therapy in the hospital. The condition of the skin after treatment hospital is shown in Figure 2.



**Figure 2.** The skin condition of a patient with psoriasis after 10 days of radiation in the hospital. Source: materials provided by one of the experts (with the consent of the patient).

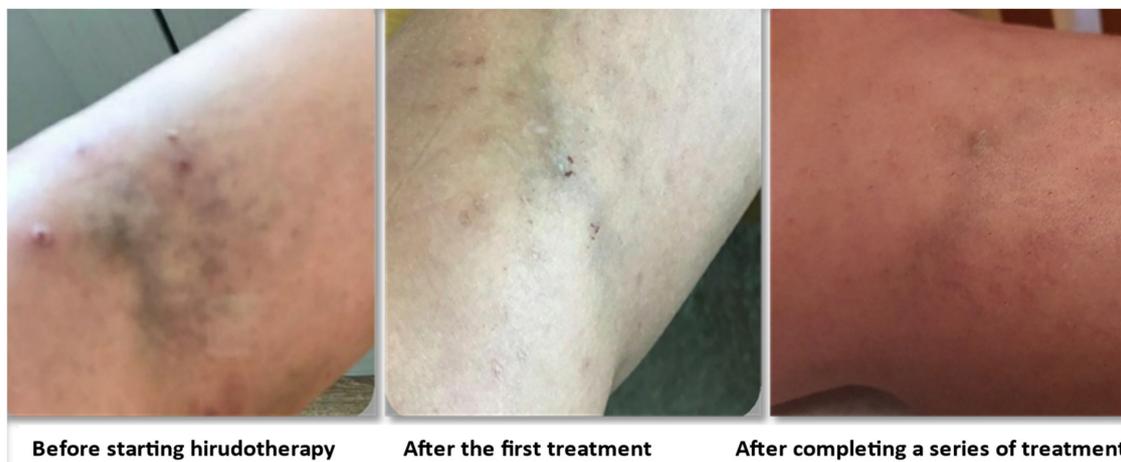
The therapy with leeches consisted of six sessions and a change of leeches was applied once a week: first week—5 leeches near the liver; and the second week—6 leeches near the kidneys (3 on each side). The therapy ended with an improvement in the condition of the skin (Figure 3).

Unfortunately, the patient returned to her old eating habits (including sweets, milk, pastries). Despite the recommended re-therapy with leeches after six months, the client did not follow the recommendation. After one year, the disease recurred.

Second case report: a 38-year-old woman suffering from varicose veins visible on the inside of her left leg, accompanied by pain. Hirudotherapy lasted 5 months. A max. of 3 to 4 leeches were placed every 4–6 days around the navel and around the areas affected by varicose veins. Pain and itching were reduced and the visual effect of the therapy can be seen in Figure 4.



**Figure 3.** Effect after six sessions of hirudotherapy in the treatment of psoriasis. Source: materials provided by one of the experts (with the consent of the patient).



**Figure 4.** The effects of leech therapy in the fight against varicose veins (from the left: before the therapy, during the therapy, and after the end of the series of treatments). Source: materials provided by one of the experts (with the consent of the patient).

### 3. Discussion

Currently, hirudotherapy is experiencing a revival. This is due to biochemical research, thanks to which it was possible to isolate bioactive compounds produced by leeches which are responsible for the therapeutic effect. Comparing hirudotherapy with conventional therapeutic, beauty and pharmacology treatments, it has a very wide range of possible applications in various fields of medicine, including cosmetology [1,33]. The surveyed specialists, however, indicate the need to have extensive knowledge and skills to provide people undergoing hirudotherapy with safe and effective treatments.

One of the most important substances produced by leeches for cosmetology, dermatology and aesthetic medicine is anti-elastase. Anti-aggregating and anticoagulant substances that play a significant role in restoring circulation (e.g., hirudin) are also of great importance. In addition, eglins and pessaries are responsible for the anti-inflammatory effect, additionally reducing swelling. Eglin C has antioxidant properties that are valuable for cosmetology. In the saliva of leeches, there are many other substances with medicinal properties with potentially beneficial effects for the skin [1,17–20,33].

The success of hirudotherapy and the final result are determined by many factors, such as the appropriate choice of the method of therapy, points of attaching leeches, their location and quantity, as well as the patient's compliance. The results of our study indicate that the most spectacular therapy concerns rosacea, local inflammations, bruises, lipomas, skin scars and difficult-to-heal wounds.

Scientific reports on hirudotherapy in the treatment of acne are rare so far. Acne vulgaris is a common, chronic disease that severely reduces the quality of life of the patients [34]. The treatment process is often long and causes numerous side effects [35]. Habeshian et al. report a case of a 25-year-old female patient suffering from acne vulgaris who underwent hirudotherapy treatments. Acne lesions had been present for 6 months and involved the skin on the face. Visits to dermatologists and pharmacological therapies did not prevent acne recurrence. Four one-week sessions were conducted at regular intervals with the use of 4–5 small leeches placed on the area of the lesions. A change in lifestyle, a healthy diet and the use of the Ayurvedic preparation were recommended. After the end of the therapy, the complete disappearance of acne lesions, itching, burning and pain was observed, as well as a significant reduction in facial discoloration.

In the literature, case reports or studies on the effectiveness of leeches in dermatological applications can be found, although there are very few reports on the success of therapy in the case of cosmetological indications, e.g., cellulite, scars, wrinkles, discoloration.

The experts surveyed indicated that people who are willing to use hirudotherapy often have contraindications to the treatments. Experts most often encounter abnormal blood counts, taking of anticoagulants, anemia, severe infections and allergies. The absolute contraindications also include diseases with a deficiency of coagulation factors, pregnancy and the period of breastfeeding, active peptic ulcer disease, as well as states of emaciation and weakness regardless of the cause. However, patients with these conditions do not come to hirudotherapy. Important contraindications also include the loss of a significant amount of blood in a short period of time, HIV and viral hepatitis infections, tuberculosis, cancer, menstruation, alcoholism, drug addiction and age under 10 years of age [17]. The abovementioned factors are not the cause of the rare use of hirudotherapy in cosmetology, as these contraindications are relatively similar to those of many treatments that are very popular in cosmetology, e.g., needle mesotherapy [36].

From a cosmetological point of view, one of the most important side effects is leaving a trace in the form of an inverted Y and the possibility of an epidermal cyst or scar formation. It is worth emphasizing that, by following the appropriate procedures, most of the side effects can be avoided. No aggravation of dermatological diseases is observed. Hirudotherapy is recognized as a safe, cost-effective and easy-to-use method of treatment [37].

Blood injury and injection phobia is estimated to occur in 3–4% of the general population [38]. This disorder is not a common enough phenomenon to be considered the main reason for the low interest in hirudotherapy but it is a constituent element. The reasons for negative attitudes are usually anxiety due to the risk of negative side effects, in particular hemorrhage, infection and severe allergy, as well as the uncertainty about the origin of the leeches. It is a major debate that leeches are disposed of after a single treatment. The use of a live animal as a tool, especially to improve one's appearance, raises ethical problems.

In our research, a gender difference in opinions about leech therapy was observed. Men show a more negative approach to hirudotherapy than women, who, despite feeling disgust, decide to undergo the treatment more often and more willingly. From the fact that people who have heard of or experienced this type of therapy before show clearly positive reactions, the following conclusion can be drawn: disseminating knowledge about hirudotherapy and its beneficial effects on health and improvement of appearance can increase the number of supporters of this method and increase the interest in it. Study participants also indicate that the reason they became interested in hirudotherapy and started a career in this field was due to prior contact or information about the method. The study shows that people undergoing hirudotherapy for cosmetic or dermatological purposes constitute only about 5% of all patients in offices and salons. However, the motivation for their choice is the ineffectiveness of other methods, mostly conventional ones. Some people are enthusiasts of natural medicine and are against the use of synthetic agents. In order to increase the number of patients willing to try hirudotherapy, media promotion should be used.

### Study Limitations and Strengths

The most important limitation of this study is the small number of experts who responded to the invitation to participate in the study and answered the questions submitted in the questionnaire. A strong point is the choice of specialists who have worked with medicinal leeches for a long time and, at the same time, perform treatments with aesthetic and dermatological purposes.

### 4. Conclusions

Hirudotherapy in cosmetology can find its permanent place, especially in anti-aging and anti-psoriatic therapies, and help to keep the skin looking young. However, this requires the dissemination of knowledge about the scientifically documented effectiveness of this method, and the appropriate target group for such treatments seems to be people interested in nature therapy and complementary medicine who do not want to use invasive anti-aging methods.

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