

TYPES OF HEALTH TOURISM AND THE IMPORTANCE OF GEOTHERMAL RESOURCES IN HEALTH TOURISM

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Abstract

Health tourism is extremely important for the protection and improvement of health and the treatment of diseases. It can be described as broadest, most complex and most popular type of tourism. In this study, health tourism has been evaluated under five sub-types, as generally accepted in recent years. These are examined under the general headings of medical, thermal, SPA-wellness, thalassotherapy, senior citizen and disability tourism. Positive developments and progress are observed in health tourism types in Türkiye, as in the rest of the world. Underground resources are important natural resources for countries. Geothermal resources and geothermal gases also play a significant role in health tourism. Furthermore, it is necessary to utilize geothermal resources for electricity generation and central heating to ensure clean (quality) air, which is essential for maintaining health. Thermal tourism, the first type of health tourism that comes to mind, has maintained its importance from the past to the present. Thermal tourism, which stands out as a traditional and indispensable type of tourism, is generally carried out for two purposes: relaxation and treatment. All treatments applied using geothermal resources should be carried out based on the recommendations, advice, opinions and necessary assessments of relevant specialist physicians and auxiliary health personnel. This study aims to provide general information about types of health tourism and to emphasize the importance of geothermal resources and geothermal gases in health tourism.

Keywords: Geothermal, health tourism, thermal tourism

1. Introduction

One of the first definitions of health tourism was given by International Union of Travel Organizations (IUTO) in 1973 (Toncu, 2022). This definition states that it refers to “services provided in health facilities that utilize the natural resources of countries, especially their healing waters and climate.” Apart from this definition, health tourism can be defined in different ways. Some definitions can be summarized as follows:

- It is the act of traveling from one's place of residence to another place for the purpose of protecting and improving health and treating diseases and staying in the destination for at least 24 hours to benefit from health and tourism opportunities.
- Treatment-related travel between countries or cities for vacation purposes is considered tourism.
- These are journeys that people make from their place of residence to other places for reasons such as receiving healthcare or healthy aging.
- It is the act of people traveling and staying from one place to another for purposes such as health, travel, sightseeing, entertainment and relaxation.
- To find a more beneficial environment, seek alternative healing/therapeutic methods or visit healing water sources.

- Tourism refers to the movement of people from their place of residence to other locations to receive medical services (surgeries, dental and eye treatments organ transplants, diagnostic services, etc.) and services that are not purely medical (cosmetic surgeries, health and wellness, elderly care/treatment, etc.).

Health tourism can be considered one of the broadest, most complex and most popular types of tourism. Its sub-types are also increasing over time. Initially classified under three headings by Ministry of Health of the Republic of Türkiye after 1980, health tourism, which was again categorized under three separate names in 2017, has recently begun to be evaluated by experts in the field as five sub-types: medical tourism, thermal tourism, SPA-wellness tourism, thalassotherapy tourism and senior and disability tourism. Health tourism can also consist of the integration of its various types (Güngör, n.d-a; Tengilimoğlu, 2005; Aydın, 2011; Kantar & Işık, 2014; Özbek, 2015; Akdoğan & Hiçyorulmaz, 2018; Dinçer & Ezan; 2020; Buran, 2024).

2. Types of Health Tourism

2.1. Medical health tourism

Medical tourism, a significant component of health tourism, is a rapidly developing and growing type of tourism within the tourism industry. It can be defined as short-term or long-term travel by individuals from their home countries to other countries to receive healthcare services. It is also defined as all medical care and treatments received at a healthcare facility to address deteriorating health conditions. Furthermore, medical tourism can be summarized as treatment and surgical procedures individuals undergo in advanced healthcare facilities in another country at lower prices compared to their own.

Medical tourism encompasses medical care, including treatment and surgical services, where people travel to different countries. Services included within medical tourism are general health screenings such as check-ups, eye, dental and skin treatments orthopedics, gynecology, plastic-cosmetic-aesthetic surgery, prosthetic implantation, cancer treatment, neurosurgery organ transplants, heart surgery, diabetes treatment, IVF, hair transplantation, fillers, facelifts, neck and eyebrow lifts, mesotherapy and other qualified medical interventions and rehabilitation services.

Medical tourism primarily requires specialist physicians and other relevant healthcare personnel. In addition, it necessitates technological advancements in the medical field -including all necessary equipment- and an experienced team capable of providing high-quality and efficient healthcare services. Furthermore, costs, the country's global position, location and past successes are also considered. Türkiye holds a significant position in this type of tourism globally. It experiences an annual growth rate of 15-25% (depending on the year).

Medical tourism, in countries with increasing elderly populations, makes positive contributions to the national economy thanks to rapidly developing medical technology, expert medical teams, diagnostic and treatment methods, medicines, specialists and modern facilities. Since this type of tourism combines tourism and health purposes, it is also considered an important economic activity.

In medical tourism, individuals are drawn to countries, hospitals and specialist physicians who stand out for their success and price advantages. In Türkiye and worldwide, preferences are driven not by the country's tourist appeal, but by the cost and effectiveness of services. This is where medical tourism and medical travel come into play. The country's tourist attractions and diversity are insufficient. In this context, Türkiye boasts modern and high-quality service providers, healthcare institutions, skills, experience and expertise that stand out for their success. Furthermore, there are renowned Türk physicians/doctors, surgeons and physical and rehabilitation specialists. With these characteristics, Türkiye will continue to be among the top choices in the world for this type of tourism. Türkiye is among the top choices for medical tourism in the Asia-Middle East group of countries. Besides Türkiye, Brazil, India, Panama, Malaysia and Costa Rica are also considered successful in this type of tourism (Öztürk & Yazıcıoğlu, 2002; Özbek & Özbek, 2008; Akbulut, 2010; Karagülle, 2011; Şengül & Bulut, 2019; Şener, Baba, Uzelli, Akkuş, & Mertoğlu, 2022; Mızrak, 2025).

2.2. Spa-wellness tourism

Spa-wellness tourism can be defined as utilizing thermal springs (geothermal resources) in suitable and comfortable environments, along with extensive hotel services, for the purpose of rest, relaxation, feeling better, staying fit and enhancing beauty. Spa-wellness tourism is essentially intertwined with spa tourism and in some areas, these types of tourism complement each other. On the other hand, the boundaries between spa and wellness treatments may not be separate; these health services can be offered together. Spa-wellness tourism is also briefly referred to as beauty and wellness tourism.

In Latin, "salus" per spa, an acronym for "aquam" means "health through water" or "health/well-being from water." Spa varies depending on country and its purpose. In the early 19th century, it was used as a holistic treatment that involved drinking water and/or using it in various ways (hot, lukewarm, cold or dripping, showering, spraying, flowing etc.), ultimately leading to healing, health benefits from water use and feelings of relaxation, well-being and beauty gained through water. The goal of a spa is to achieve mental, spiritual and physical well-being, to enjoy a peaceful and relaxing vacation and to simultaneously cleanse the body of toxins.

In addition to therapies using spring/water at varying temperatures and healing mud, spa treatments also include facial manicures, pedicures, cosmetic care and various massage applications. A wide range of services are available, including swimming pools, steam baths, aromatherapy, facial and body treatments, seaweed masks, Türk baths, saunas, jacuzzis, bathtub treatments and various aromatic cures. Spa and wellness tourism is conducted by professional staff with the aim of relaxing body and reducing aches and pains.

According to the classification made by International Spa Association (ISPA) and European Spas Association (EUSPA), spas can be divided into eight subgroups/categories based on supply and demand: club spas, day spas, cruise ship spas, holiday destination spas, health/medical spas, thermal/mineral/geothermal spas, resort spas and day-trip spas.

ISPA and EUSPA, professional organizations, are associations that examine, inspect and certify facilities regarding practices, personnel, etc. Spas that are not certified by these associations cannot be included in promotional catalogs and are not accepted by insurance companies. ISPA and EUSPA professional organizations are supported by many countries (Güngör, n.d-b, 2013; Özbek & Özbek, 2008; Aydın, 2011; Karagülle, 2011).

Traditional spas are geothermal/thermal spas. However, other non-traditional spa treatments have also become popular in recent years. This type of tourism has also begun to gain traction in Türkiye. Spa treatments/services can generally be grouped under four main headings:

- a) Hydrotherapy (water therapy),
- b) Balneotherapy (therapies using hot springs/geothermal sources),
- c) Plant-seaweed-thermal/mud baths,
- d) Other applications.

Wellness refers to beneficial practices aimed at achieving health, vitality and maintaining a healthy and good life. Wellness care practices generally include phytotherapy (aromatherapy), various types of massage, nutrition and diet, color therapy, sound therapy, stone/mineral therapy, meditation, yoga, Ayurveda, Reiki, Shiatsu, Tai Chi, exercise, anti-aging/youthfulness treatments/fitness and sports. Wellness tourism can also be described as a type of tourism where people go on vacation to improve their health and well-being or to maintain their health.

Wellness tourism, which focuses on hot springs and thermal baths as well as other natural and traditional treatments and practices, is emerging as newest face of health tourism in Türkiye and around the world. This approach allows for the selection of health tourism activities and/or a classic holiday as a package deal. Spas, while not yet at the desired level, continue to occupy a central place in health tourism, showing tremendous growth and development. Alongside Türkiye's success in this field, this type of tourism will further develop with authentic and innovative approaches, especially with a healthier team spirit and the effective involvement of experts in the field (Karagülle & Doğan, 2002; Akan, 2010; Güngör, 2010; Karagülle, 2011; Yalçın, 2018; Buran, 2024).

2.3. Thalassotherapy tourism

Thalassotherapy is defined as a treatment system in which climate and elements of sea/ocean water are applied in a therapeutic manner under medical supervision and control for preventive, therapeutic and curative purposes. This type of health tourism was most famous therapy applied within the scope of spas in the past. In recent years, thalassotherapy tourism, which is accepted as a separate type of health tourism, involves opening the pores with sea/ocean water and beneficial minerals and elements begin to affect the body.

The term of thalassotherapy derived from Latin, can be defined as therapeutic utilization of the positive interaction of the marine environment with human health, under the supervision of a specialist physician. This includes elements such as maritime climate, sunlight, seawater (salt, minerals, active elements), sea mud, sea sand and gravel, aerosols, certain rocks, seaweed and other substances originating from or present in the sea. It is a contemporary rehabilitation

health practice based on natural healing resources. When seawater is heated and utilized through balneological methods, a “sea spa” treatment is created. Therefore, thalassotherapy is also referred to as therapy using seawater.

Thalassotherapy tourism, which was not considered within the scope of health tourism in its early years, has recently been recognized as a fifth sub-type of health tourism and is regarded as a new trend in the field.

Thalassotherapy originated in France, it is known to have a long history. Currently, the number of thalassotherapy facilities in Türkiye is quite small. However, Türkiye’s location surrounded by seas on three sides is significant for the future. With the natural potential offered by the seas surrounding Türkiye on three sides, will achieve a significant position in the world in the field of thalassotherapy if the right investments are made in the coming period.

Thalassotherapy encompasses traditional medical practices such as bathing, swimming, water aerobics, sand baths, sunbathing, massage, mud baths, seaweed baths, saunas and Türk baths. Additionally, treatments involving washing, showering and pouring, as well as appropriate water source/pool therapies aimed at improving neuromuscular and skeletal functions, can also be considered under the concept of thalassotherapy.

The requirements for becoming a thalassotherapy center are the facility must be very close to the sea; natural seawater must be transferred to the center/facility through a special, hygienic pipe and the seawater must be used only once without being left to stand for more than 48 hours. This includes heating the seawater to a maximum of 50°C, not applying any physico-chemical treatments to the seawater (no chlorine, bromine, ozone etc.) and adding fresh/live water to the treatment pools daily through a circulation system at a rate of 20% of the total water, all under the supervision of a specialist physician (Güngör, n.d-b; Uzel, 2008; Özbek, 2015).

2.4. Senior or disabled citizens tourism

Senior tourism is also referred to as elderly tourism, third-age tourism, aging tourism and geriatric tourism. This type of tourism is also called elderly and disabled care tourism. It is most often brought to the forefront and remembered during “Elderly Week” celebrated between March 18-24. Regarding aging, the Ministry of Family and Social Services of the Republic of Türkiye held the 1st Elderly Council in 2020 and the 2nd Elderly Council on April 21-22, 2026. While the Ministry of Family and Social Services of the Republic of Türkiye focuses on the general problems of the elderly and policy determination under the theme “Walking Together with Our Venerable Elders” the Ministry of Culture and Tourism and the Ministry of Health of the Republic of Türkiye deal with tourism and health issues.

This type of tourism is essentially a very important form of health tourism that should be constantly on the agenda every day of the year. It is a branch of science concerned with social and functional lives, quality of life, preventive medicine practices and the healthy aging process. Individuals aged 65 and over are considered potentially geriatric patients. Third-age tourism can be summarized as elderly people in need of care traveling to other countries to meet their care needs in clinical hotels.

The main goal of geriatric tourism is for individuals who, despite their chronological age, wish to remain young in mind and body, to complete their final years in the healthiest and most suitable environment by adhering to a healthy aging program, in line with the principle of successful aging.

The rapid increase in the elderly population around the world indicates that this type of tourism will become even more important in the coming years. The rise in the proportion of the elderly globally will have a significant impact on societies, countries and economies. Considering all these factors, individuals involved in this type of health tourism (particularly senior citizen tourism) will increasingly become one of the most important consumer groups.

Enable and even encourage the provision of healthcare services in overseas facilities in order to reduce rising costs. Particularly in Northern European/Scandinavian countries, there is a continuous search for solutions to the challenges in providing care and addressing the costs of neurological disorders in the elderly.

Disability care tourism is evaluated under many definitions. Briefly, it is considered within the scope of disability care tourism when disabled individuals participate in tourism activities. According to the World Tourism Organization, tourism is a necessity for human health and traveling for happiness is a fundamental right. However, although disabled individuals in need of care have the right to benefit from tourism activities (especially this sub-type of health tourism), they may experience difficulties in many areas such as booking/reserving accommodation, travel/transportation. Special care for disabled individuals, excursions and services are provided in clinic hotels and rehabilitation centers. The World Tourism Organization considers and accepts both geriatric medicine and disability care tourism as important and new sub-types of health tourism. In Türkiye, the best-equipped facilities for individuals in need of care are located in the provinces of Afyonkarahisar, Denizli, İzmir, Nevşehir, Ankara and Balıkesir.

Data from United Nations (UN) and World Health Organization (WHO) indicate that the world's population is rapidly aging and this phenomenon is not unique to developed countries; significant demographic changes are also occurring in developing and underdeveloped countries. Based on this reality, services for elderly and disabled individuals represent a large market. In this context, the following services are also relevant:

- Senior tourism (travel tours, occupational therapies),
- Senior citizen care services (in nursing homes or rehabilitation services),
- Rehabilitation services in clinical hotels,
- Special care and sightseeing tours for disabled people (Güngör, n.d-c; Karagülle & Doğan, 2002; Akkuş & Alan, 2016).

2.5. Thermal tourism

Thermal tourism, a very important sub-type of health tourism. It can be called geothermal tourism, balneology, thermomineral or therapeutic geothermal spring tourism and is a very broad type of health tourism. Primarily based on geothermal resources, this type of tourism aims to utilize the geothermal source holistically, benefiting from all its natural components. By taking advantage of the geothermal source's heat, dissolved minerals, steam, gases, peloid/therapeutic mud and facilities such as swimming pools at body-appropriate temperatures, the goal is to improve people's orthopedic and post-traumatic health.

Thermal tourism is a type of tourism that combines therapeutic treatments such as hot baths, drinking, inhalation and mud baths with supportive therapies like climate therapy, rehabilitation, exercise, psychotherapy and diet, as well as use of geothermal/thermal waters for entertainment and recreation.

Thermal tourism, the first element that comes to mind when considering health tourism, stands out as a traditional and indispensable type of tourism. Thermal treatments and visits to hot springs/spa resorts, whose history has always been linked to tourism, have in recent years begun to emerge not primarily as a domestic tourism phenomenon, but as an international one. In this regard, Türkiye is among the first countries that come to mind alongside Hungary, the Czech Republic and Germany. Thermal tourists/surgery seekers are no longer just customers, but are making their choices based on geothermal resources consciously and deliberately.

Türkiye's geothermal resources and natural mineral waters, with their healing and therapeutic properties and its five-thousand-year-old spa tradition, are developing day by day. It is believed that by continuing this tourism on a more scientific basis, spas in Türkiye will develop further, acting as a driving force and bringing Türkiye to the top rank it deserves in international prestige.

Thermal tourism is essentially carried out for two purposes.

- a) Thermal tourists seeking relaxation: These are thermal environments preferred by tourists -especially the elderly- for their natural surroundings, entertainment, relaxation and well-being.
- b) Therapeutic thermal tourism: This includes traveling to another country to benefit from thermal facilities for the treatment of illnesses diagnosed and indicated by qualified physicians in one's own country.

Thermal tourism activities can benefit not only sick individuals but also healthy individuals. This practice is particularly widespread in Europe, with examples including Hungary, the Czech Republic and Germany. The positive effects of thermal tourism primarily include well-being, vitality, entertainment and relaxation. Since geothermal resources do not exhibit significant seasonal variations, thermal tourism can take place throughout the four seasons/twelve months of the year.

During the Seljuk and Ottoman periods, spa/baths based on geothermal resources were well preserved, renovated and combined with the traditional Türk bath culture, resulting in the construction of many new bathhouses and spas. Examples include those in Bursa, Yalova and Ankara (Ayaş, Kızılcahamam). The Ottoman Empire also spread the Türk spa and bath culture beyond its borders, with the most geothermal-based Türk baths being built in Hungary. Although not on the scale and scope of today, some European countries, primarily Hungary, occasionally utilize geothermal resources for health purposes, in the form of original Türk bath.

Mustafa Kemal Pasha's positive experience with the thermal spring in Havza district of Samsun province in 1919 laid the foundation for a significant development in the following years. After the proclamation of the Republic and under Marshal Ghazi Mustafa Kemal Pasha's orders, the Çelik Palas Hotel was built on the Bursa Vakıflı Bahçe Thermal Springs in 1924, construction of the Yalova Thermal Springs began in 1936 and in 1938, the Department of Medical Ecology and Hydroclimatology was established within the Istanbul Faculty of Medicine, laying the foundations for medical balneology or in other words, modern spa medicine. Newly trained balneology specialists

began working in these facilities. The Yalova Thermal Springs, with their unique natural environment and treatment units (cure centers), became Türkiye's first modern thermal spa. Later further developed, these thermal springs in Yalova became popular destinations for domestic and foreign heads of state, members of parliament, famous athletes and artists for their health benefits. These thermal springs, used by famous people, have become very well-known both in Türkiye and around the world and many people have undergone geothermal-based treatments from those days to the present. In the past, geothermal utilization was carried out in facilities called "hot springs" or "thermal spas" while today it is carried out in more developed, modern/contemporary facilities called "thermal resorts/thermal complexes." Thermal complexes are divided into three sub-facilities/groups: thermal hotels, cure centers and spa parks.

Thermal Hotel: A star-rated hotel suitable for 14-21 day stays for treatment, relaxation and to meet all needs, with all its facilities and features, in every season.

Cure Center: Depending on the characteristics of the geothermal source, as well as supply and comprises wet areas where treatment is administered using therapeutic elements (dissolved minerals, gases, heat and steam), alongside dry environments/areas for supportive treatment and rehabilitation are performed.

Cure Park: Recreational facilities and businesses consist of various outdoor pools with suitable temperatures, various sports, game and walking areas, parks, entertainment, shopping centers, swimming pools, etc. (Güngör, n.d-a, n.d-c, 2008, 2010, 2013; Tengilimoğlu, 2005; Özbek & Özbek, 2008; Akan, 2010; Özbek, 2015; Şener, Baba, Uzelli, Akkuş, & Mertoğlu, 2022; Mızrak, 2025).

The definition and scope of geothermal resources may vary depending on the country, particularly regarding temperature. In Türkiye, the current legislation (Law No. 5686 on Geothermal Resources and Natural Mineral Waters) defines geothermal resources as: "sources where the temperature, due to the influence of the earth's crustal heat depending on the geological structure, is consistently above the regional average annual atmospheric temperature and which may contain a greater amount of dissolved substances and gases compared to surrounding waters; naturally occurring or extracted water, steam and gases, as well as those sent underground through human intervention and heated by the heat of the earth's crust or hot dry rocks, from which water, steam and gases can be obtained" (Güngör, n.d-b; Public Health Law, 1930; Regulations on Thermal Springs, 2001; Geothermal Resources and Natural Mineral Waters Law, 2007).

Thermal treatments include applications such as thermalism, balneotherapy, physiotherapy, hydrotherapy, peloidotherapy, heliotherapy, climatotherapy/climate cure, drinking cures, speleotherapy, physical therapy, psychotherapy, diet, inhalation, rehabilitation, climatism and uvalism.

In this type of health tourism, when spa treatments are divided into balneotherapy, physical therapy and rehabilitation and support units, treatment services are provided in the units detailed below.

Balneology refers to bath therapy. Balneotherapy is a stimulation-adaptation treatment method applied in the form of baths, drinking and inhalation cures using natural factors. Today, balneotherapy is applied as a non-drug method in many facilities/organizations such as spas and treatment centers for preventive, therapeutic and rehabilitative

(partial or complete correction of physiological and anatomical disorders) purposes. Balneotherapy is a treatment in which natural mineral water, geothermal resources, geothermal gases (natural carbon dioxide, radon, methane etc.) and peloids (healing muds) are applied in a predetermined manner and dosage, in the form of drinking, bathing, packs and inhalation (breathing) for a specific period and in the form of a cure. Balneotherapy can be indicated as a complement to conventional medicine methods in almost all diseases, especially chronic diseases.

In balneotherapy, the primary therapeutic effect occurs in applications using geothermal/thermal and natural mineral waters. Hydrotherapy, meaning “water therapy” emphasizes the physical properties of water, while balneotherapy applications utilize the chemical composition of the geothermal source for traditional treatment.

Both balneotherapy and hydrotherapy are used as traditional and complementary treatments to reduce pain and stiffness, improve posture, increase range of motion and thus improve quality of life. Balneotherapy and hydrotherapy are becoming increasingly widespread, leading to a rise in their application rates.

Balneology is stated to be an effective, well-tolerated, complementary approach in the treatment of cardiovascular, respiratory, gastrointestinal, endocrine, neurological, skin and rheumatic system diseases and balneotherapy is a suitable treatment for osteoarthritis (Güngör, n.d.-b, 2008, 2013; Communiqué Regarding the Production and Sale of Peloids, 2005; Özbek, 2015; Soysal, 2017).

Physical therapy and rehabilitation services are another important treatment method in thermal tourism. Within this scope, treatment approaches are applied to stroke patients, disabled individuals, general muscle and joint problems and common diseases such as herniated discs in the back and neck. Physical therapy and rehabilitation services are offered in various treatment units including orthopedics, pediatrics, occupational therapy, electrotherapy, exercise, conditioning, neurology, short-wave diathermy, laser application, magnetotherapy, eswt/shock wave therapy and hydrotherapy in thermal pools.

The increasing prevalence of musculoskeletal pain due to longer life expectancy, the high cost and accessibility problems of modern technologies and skepticism towards conventional treatment methods have led to a greater inclination towards traditional and complementary therapies.

Thermal tourism, with its wide range of facilities and diverse units that complement each other and its evolving and diversifying treatments, is expected to become even more popular in the coming years, both in Türkiye and around the world.

In thermal tourism, physicians specializing in medical ecology and hydroclimatology, as well as physical therapy and rehabilitation primarily provide services. In addition, physiotherapists, occupational therapists, rehabilitation specialists, electrotherapists and other specialists in physical therapy techniques are directly involved in providing these healthcare services alongside the relevant physicians.

Thermal tourism encompasses not only geothermal resources at suitable temperatures (generally 34-38°C) and those containing molten minerals, steam, gases and mud at higher temperatures, but also their healing properties at the desired level. In recent years, the development of this type of tourism for health reasons, particularly in complexes called thermal spa centers/hot spring treatment centers, has led to the emergence of the following services/concepts:

Uvalism: A type of cure (treatment) using fruits and vegetables that are the main products of certain regions or offering these products to those who enjoy using them.

Climatism: A treatment method applied in facilities established in coastal and mountain resorts to take advantage of the healing effects of fresh, clean air.

Speleotherapy: A cave microclimate treatment for chronic and allergic respiratory diseases, utilizing natural caves or underground salt (halite) mines.

Inhalation: This refers to the application of breathing in the particles/ aerosols (naturally dissolved mineral water) of geothermal sources.

Drinking cure: This is a drinking cure performed with natural mineral waters at a suitable temperature, either in thermal springs or in the place of residence.

Peloidotherapy: This involves the application of organic, therapeutic muds, formed within geothermal systems as a result of natural geological and/or biological events, in bath, pack or tampon forms at varying temperatures; it is a treatment using beneficial muds for health.

Hydrotherapy: This involves treatments such as lavage/irrigation (showering) with warm, fresh water.

Climatotherapy/climate treatment: The systematic and dosed application of climatic factors such as air temperature, humidity, wind speed and intensity, solar radiation and similar factors.

Physical therapy and rehabilitation: These include electrotherapy, exercise therapies, massages and other similar beneficial health practices used in thermal treatment.

Medical treatment: This refers to the administration of medication to the patient, tourist or spa guest, either locally or systemically, during natural spa therapy.

Cure treatment: This is a treatment method in which therapeutic effects are administered by repeating the treatment at specific doses, in a series, at regular intervals and over specific periods of time.

Supportive measures: These include health education, dietary interventions, the organisation of daily living activities, behavioural change training and psychological support methods.

Thermalism: The use of natural, naturally occurring geothermal resources -natural mineral/drinking waters- at suitable temperatures, such as hot springs, thermal baths and mineral waters, as a therapeutic tool in accordance with health regulations.

Heliotherapy: A treatment that uses sunlight at specific times/for a defined duration.

All these treatments are carried out based on the recommendations, advice, opinions and necessary assessments of the relevant specialist physicians and auxiliary health personnel (other relevant specialist health personnel) who fill

the content of the practices and concepts. All health-related practices should be performed under the guidance and assistance of these staffs (Güngör, n.d-a; Özbek & Özbek, 2008; Özbek, 2015).

3. The Advantages of Health Tourism Based on Geothermal Resources

Geothermal resources are a natural resource containing many healing elements and deserve comprehensive evaluation. The health advantage of geothermal resources lies in their relevance to frequently encountered issues such as stress, fatigue, poor mood and fitness, low morale and motivation and physical, visual and skin disorders. Geothermal resources and SPA centers are the most effective sources for addressing these problems. Examples include clean air and water, a gentle and calm microclimate, exercises, tourist tours, healing mud, minerals and clean water, swimming pools, bicycle paths, unpolluted natural therapeutic resources, physiotherapy, cosmeotherapy and walking paths in a blue-green, flower-filled environment. These practices are known to provide tourists/tourists with vitality, dynamism, beauty, rejuvenation, healing, relaxation, improved morale, motivation and energy (Özsarı & Karatana, 2013; Kantar & Işık, 2014; Akdoğan & Hiçyorulmaz, 2018).

Renewable energy sources for electricity generation are among the four pillars of state policy in combating climate change. In this context, it is necessary to utilize wind, solar and geothermal resources to ensure clean (quality) air, which is essential for maintaining health.

One of the healthiest ways to achieve the 2053 net-zero target is to maximize the potential of geothermal energy production and central/district heating (heating of residential buildings, workplaces and public and private sector buildings). This means much cheaper heating, cleaner (higher quality) air, clean energy production, clean oxygen, reduced greenhouse gas emissions and a transition to green transformation. Since all these contribute positively to a clean environment, geothermal resources are seen as very important in terms of their environmentally friendly and clean air advantages. As clean air, clean cities and clean breath are crucial for the country's air quality, which is very important for tourists, geothermal resources are also indispensable for health tourism due to their environmentally friendly, inexpensive and clean nature (Güngör, n.d-b, 2008, 2013; Buran, 2024).

Geothermal resources include natural gases of geothermal origin. These resources contain both liquid and gaseous phases. Gas release from geothermal resources is generally observed in the form of high-enthalpy/high-temperature steam.

Naturally occurring gases originating from geothermal sources, found within geothermal fluids, are used for various purposes. These natural gases consist of carbon dioxide, radon, methane, hydrogen sulfide, ammonia and hydrogen. Among these gases, radon is an important geothermal resource component in thermal SPA/tourism. It has been known since ancient times that in geothermal sources where radon is present in beneficial concentrations, spa treatments involving radon- rich steam are used to alleviate ailments such as joint, neck, back and spinal pain, skin diseases and shortness of breath and muscle spasms.

Radon is applied to the body in three different ways for therapeutic purposes: through the skin, lungs and gastrointestinal tract. In thermal springs, radon primarily enters the bloodstream through skin contact. The duration of stay and dosage in these springs are determined by the spa physician and relevant specialists.

The Türk Regulations on Thermal Springs do not specify a limit value for radon gas. In Europe, particularly in Germany, levels up to 666 Becquerel (Bq/liter) are considered beneficial in geothermal sources. Türkiye generally follows these values. While generally below this limit and sometimes varying, Nevşehir-Kozaklı thermal springs contain 378 Becquerel (Bq/liter) and Kuşadası-Davutlar thermal springs contain 36.8 Becquerel (Bq/liter) of radon (Güngör, n.d-a; n.d-b; n.d-c).

Radon gas, after certain diagnosed illnesses, provides youthfulness, vigor, vitality and freshness, keeping people energized. Therefore, thermal spas/thermal tourism facilities containing radon gas up to a certain concentration, as prescribed by a specialist physician, are among the preferred choices for thermal tourism operators. The natural presence/formation of radon gas in geothermal sources and its inhalation in appropriate doses adds richness, value and benefit to geothermal-based health tourism.

Geothermal resources and natural mineral waters are also referred to as “natural capital” and “nature’s natural pharmacy” around the world. One reason for this is the benefits and therapeutic properties provided by the naturally occurring dissolved minerals, heat and geothermal gases within geothermal resources.

Another natural gas found in geothermal resources is carbon dioxide (CO₂). Natural carbon dioxide is utilized in three forms (gas, liquid, dry ice) in various fields. Dry ice (the solid form of carbon dioxide) is produced from this natural carbon dioxide. Dry ice is used as a cooling agent in many applications. It is used in hospitals, within the cold chain, in the transportation of pharmaceuticals and food products, in meat cooling and in areas such as beauty. Thus, it plays an important role in ensuring that all foods are consumed in the healthiest way possible. Furthermore, dry ice is a clean coolant that does not leave any liquid when it melts sublimation (Güngör, 2013; Demir, Akbulut, & Güngör, 2015; Özbek, 2015).

4. Results

Efforts to develop health tourism are rapidly progressing globally, with many countries competing in this service sector. Türkiye, in particular, has been making strides in health tourism since 2010. These efforts have resulted in an increase in the number of tourists/visitors.

Health tourism can be undertaken individually and at different times or multiple types can be utilized simultaneously. Geothermal-based thermal tourism is considered to be one of the most prominent types of tourism in this regard.

Alongside the leading countries in health tourism globally, Türkiye also possesses natural advantages in terms of tourism types. Türkiye is ideally located for all sub-types of health tourism in terms of climate, sea, geothermal resources, trained healthcare personnel, facilities and transportation time and availability. In addition to providing an environment for year-round health tourism activities, Türkiye is among the few countries with experience and expertise in this field.

To reach the top level in the world in the main sector of health tourism, Türkiye needs more promotion and advertising. Organizing events such as international sports tournaments, congresses and meetings will help to better understand the importance and value of health tourism and will also increase foreign exchange earnings.

Identifying the problems, expectations, priorities and preferences related to the needs of health tourism is crucial for the development/improvement of the Türk health tourism sector and its sub-sectors. Furthermore, it is recommended that more effective and extensive studies be conducted and that best practices from around the world be researched and examined. In addition, it is suggested that a better team spirit and policy-making approach be developed regarding issues from different disciplines within health tourism.

Geothermal resources are the only renewable energy source that can be used continuously and integrated in the base load category and is the most utilized in health tourism around the world. Türkiye has approximately 84% potential in low-to-medium enthalpy/temperature geothermal resources that can be used in health tourism. This rate indicates that Türkiye can rise to the top ranks in the world in health tourism.

CONFLICT OF INTEREST

The authors declare that have any conflict of interest.

AUTHOR STATEMENT

The authors declare that there isn't ethical approval, consent to participate, consent for publication, availability of data and material, and code availability etc.

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