Effects of Hot Spring Tourism on Human Health

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Abstract:

Hot spring tourism is a tourism product based on experiencing the culture of hot spring baths. Unlike conventional tourism products, it offers multiple aspects such as cultural experience and physical and mental relaxation. It has attracted increasing attention as it meets the high demand of tourists for physical and mental well-being due to the stressful and competitive lifestyle in the modern society. The fundamental value of spring tourism lies in its influence on aspects such as health care and disease treatment. To provide a comprehensive understanding of the health values of hot spring tourism, this paper has reviewed the effects of hot spring on human health from the perspectives of heat and trace its elements and functions such as bathing. This paper aims to deepen the understanding of the relationship between hot spring tourism and human health, thereby providing a theoretical reference for the future development of hot spring tourism.

Keywords: Water; Hyperthermia; Spring tourism; Health

I. INTRODUCTION

Hot spring tourism is a tourist activity based on hot spring bathing that covers both physical and mental well-beings. It has attracted increasing attention because of its substantial value in the health care and treatment of the human body [1]. There are a great variety of hot springs. For example, according to the outlet water temperature, hot springs can be divided into four categories: high-temperature hot springs, hot springs, low-temperature hot springs, and cold mineral springs. Alternatively, according to the chemical substances within, they can be divided into multiple categories such as sulfate or carbonate springs [2]. Hot spring water is closely associated with geothermal heat. It often has a temperature above 25°C and contains multiple trace elements that are beneficial to human body. Therefore, hot springs have been used for health care and treating diseases for a long time and are considered as a natural resource for hydrotherapy and health preservation [3,4]. This paper reviews the relationship between hot spring and human health, mainly the effects of hot spring bathing on human body, so as to
deepen the understanding of the health values of hot spring tourism.

II. WHAT HOT SPRING TOURISM IS?

As a type of spring water, hot springs generally refer to the spring water that has formed either from natural underground emission or artificial drilling. The definition of the temperature of a hot spring varies across countries [5,6]. For example, Japan and South Africa believe that hot springs should have a temperature higher than 25ºC, whereas the United Kingdom, Germany, and France define it as higher than 20ºC [7]. Contrarily, while most scholars in China suggest that the temperature of the hot spring should be higher than the human skin temperature of 34ºC [8], in Guangdong, China, a hot spring is defined only when it is an underground or open hot spring with a temperature above or equal to 40ºC and contains trace elements beneficial to the human body [9]. Hot spring tourism uses hot spring bathing as the main content, during which tourists achieve the purposes of health preservation, relaxation, and vacation by experiencing the hot spring and the hot spring culture.

III. THE ORIGIN OF HOT SPRING TOURISM

Most of the areas where hot spring tourism have developed are in Europe, the United States, and Japan. Hot spring tourism has a long history [10]. As early as during the Roman Empire, people already recognized the therapeutic effect of hot springs. Hot springs were then propagated by the Greeks, Turks, and Romans in the North African coast, Greece, Turkey, South Germany, Switzerland, and the United Kingdom. Literature suggested that the first hot spring resort, “spa,” was popularized in a small town near Liege in south Belgium, and therefore it later became a synonym of hot spring resorts [11]. In 1562, Dr. W. Turner reviewed the therapeutic effects of the Bath Spa and other hot springs throughout Europe on various diseases [11]. In 1626, E. Faro further advertised the high quality of the Charliebit mineral spring in the Scarborough area [12]. In China, the desire for and thoughts on hot spring tourism as leisure and entertainment also started early, which could be traced back to the Qin and Han Dynasties [13]. At first, hot springs were mostly used for the health preservation and relaxation of emperors. Royal families built temporary imperial palaces around hot springs, and many famous mineral springs were reserved as important tourist attractions even before the Song Dynasty. At that time, most tourists went to the hot springs to physically recuperate as well as attend religious ceremonies and take a vacation. However, the development of the hot spring as a resource started late in the third-world countries including China, which only began at the end of the last century [14].

IV. THE HEALTH VALUES OF HOT SPRING TOURISM

The development of hot spring tourism is closely associated with people’s concern over their health. In the recent years, with the economic progress and growing focus on health, hot spring tourism has attracted increasing attention of the tourism industry and medical and health
care fields. Among all aspects, the value of hot spring treatment for human health has played a key role in promoting the development of hot spring tourism. For example, in Europe, the number of hot-spring-themed therapeutic resorts has grown significantly, the most famous of which is the Bath Spa in the United Kingdom. The health values of hot spring tourism mainly lie within the following perspectives:

4.1 The Health Value of Heat

Based on the temperature, hot springs can be categorized into four types: high-temperature hot springs (above 42°C), hot springs (between 34°C and 42°C), low-temperature hot springs (between 25°C and 34°C), and cold mineral springs (below 25°C) [15]. Most hot springs have high temperatures. Heat exhibits a major impact on the health preservation and treatment of the human body. Studies have confirmed that the human skin temperature is approximately 34°C. Upon contact with the hot spring, the blood vessels under the skin dilate and depress the excitability of nerves, thereby tranquilizing the mind and calming the body, achieving both physical and mental relaxation [16]. Long-term heat bath can lower blood pressure, improve coronary ischemia, and lift neurological dysfunction [17]. In addition, thermotherapy can promote anti-oxidation and delay aging and disease onset by enhancing the activities of catalase and superoxide dismutase [18]. Tumor is one of the major factors threatening human survival in modern society. Thermotherapy also presents therapeutic values for tumors, including the following: (1) Tumor cells are more sensitive to heat than are normal cells. Heat can damage tumor cells’ DNA and biological macromolecules, thereby inhibiting tumor cell proliferation [19]. (2) Tumor cells proliferate vigorously, causing the tumor to grow larger. Furthermore, the vascular structure and function of the tumor are abnormal and distributed unevenly. Therefore, when tumor tissues are heated, the heat will not dissipate quickly with the blood flow, leaving the tumor cells in a heated status for a long time, eventually leading to damage of the tumor cells [20]. (3) The increase in tumor volume causes a poor blood supply within the tumor, resulting in hypoxia of tumor cells, which is an important factor reducing the efficacy of chemotherapy and radiotherapy. Contrarily, heat can promote blood circulation and increase blood flow distribution, which lifts the hypoxic state of tumor and increases the sensitivity of tumor cells to chemotherapy and radiotherapy, thereby improving the efficacy [21].(4) Heat can stimulate the activity of the immune system and enhance the ability of the immune cells to attack tumor cells [22,23]. Therefore, it improves the anti-cancer ability of patients from their own autoimmunity perspective, consequently improving their life quality and prognosis [24,25].

4.2 The Health Value of Mineral Components

According to the difference in trace elements, hot springs can be categorized into sulfur springs, radioactive springs, mixed-energy springs, carbonate springs, salt springs, sulfate springs, iron springs, sodium bicarbonate springs, alum springs, acid springs, pure springs, carbon dioxide springs, etc [26]. These springs contain a wide variety of minerals, including essential elements such as nitrogen, potassium, sodium, carbon, sulfur, phosphorus, chlorine, calcium, magnesium, hydrogen, and oxygen, as well as trace elements such as selenium, silicon,
fluorine, molybdenum, cobalt, nickel, copper, zinc, iron, manganese, tin, and iodine. These mineral components can enter the body through the skin, mouth, and even breath to participate in metabolism and element exchange, thereby exhibiting a therapeutic effect [27]. Different elements present different health values, as does bathing in different springs. For example, carbon dioxide springs can relieve muscle and joint pain by dilating blood vessels [28]. The SO42- in sulfate springs demonstrates a therapeutic effect for eczema [29]. The free hydrogen sulfide in sulfur springs can treat heart disease and arteriosclerosis. Acid springs have a strong bactericidal effect and therefore are effective in treating fungal infections such as athlete’s foot and sputum [30]. Lastly, named after their radioactivity, radioactive springs help to treat cancer and diabetes [31,32].

4.3 The Health Value of Bathing

The basic contents of hot spring tourism are bathing activities. When people bathe and soak in hot springs, their chest and abdomen will experience both pressure and buoyancy from water, causing pressured breathing, which stimulates muscles and tissues and facilitates gastrointestinal peristalsis and urination [33]. When the body is soaked in water, the skin will experience an even pressure stimulation that enhances blood circulation and improves cardiovascular functions [34]. In addition, the contact and penetration of various mineral water bodies and streams with the human body can stimulate nerves and rub the skin. Under the effect of buoyancy, the joints and limbs are less stressed and more flexible, providing the body with an experience of massage that helps in the recovery of joints and muscles [35]. Therefore, hot spring bathing not only cleanses the body, but also offers health care benefits such as tranquilization and relaxation as well as disease treatment. Combined with the synergistic effects of the mineral components contained in different hot springs, hot spring bathing becomes an enjoyment that soothes the mood, relieves stress, beautifies the skin, improves physical strength, and preserves health.

4.4 The Health Value of the Environment

Hot springs are closely related to natural conditions including volcanoes and geothermal heat. Therefore, as a tourism product, hot spring tourism exhibits typical environmental characteristics. More specifically, in terms of nature, hot spring resorts are usually located in mountains or along the sea [36]. The geological features often include odd stones, famous mountains and rivers, exotic flowers and ancient trees, and sometimes rare animals and plants, coupled with obvious winter and summer seasonal characteristics. In terms of humanities, hot springs are often associated with various legends and allusions, and have ancient architecture, human customs, traditional cultures, and other characteristics [37]. Consequently, in addition to the bathing experience, the environment and cultural experiences are also an important part of the hot spring tourism, which plays an equally important role in health care. By viewing, appreciating, and relishing the natural scenery and human history of hot springs, tourists are provided with a spiritual enjoyment that helps to achieve the comprehensive relaxation of body and mind as well as preservation of health and well-being (as shown in Table I).
TABLE I. The health value of hot spring tourism

<table>
<thead>
<tr>
<th>Health value categories</th>
<th>Core functions</th>
<th>The embodiment of health value</th>
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</thead>
<tbody>
<tr>
<td>The health value of heat</td>
<td>Thermal stimulation</td>
<td>Calm down</td>
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<td></td>
<td>Anti-oxidation</td>
<td>Anti-Aging</td>
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<td></td>
<td>Antitumor</td>
<td>Tumor cells are heat sensitive</td>
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<td></td>
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<td>Tumor tissue warming up</td>
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<td></td>
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<td>Improvement of tumor hypoxia</td>
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<td></td>
<td></td>
<td>Anti-tumor immune activation</td>
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<tr>
<td>The health value of minerals</td>
<td>Carbon dioxide</td>
<td>Dilate blood vessels and relieve soreness</td>
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<td></td>
<td>Sulfate ion</td>
<td>Eczema, diabetes</td>
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<tr>
<td></td>
<td>Sulfur</td>
<td>Heart disease and arteriosclerosis</td>
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<td></td>
<td>PH acidic</td>
<td>Sterilization</td>
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<tr>
<td></td>
<td>Radioactivity</td>
<td>Tumor, asthma</td>
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<td>The health value of bathing</td>
<td>Water pressure</td>
<td>Promote gastrointestinal motility and metabolism</td>
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<tr>
<td></td>
<td>Penetration</td>
<td>Stimulate the nerves</td>
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<tr>
<td></td>
<td>Buoyancy</td>
<td>Relax muscles and joints</td>
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<td></td>
<td>Minerals</td>
<td>Body Cleaner</td>
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<tr>
<td>The health value of environmental</td>
<td>Precious mountains and stones</td>
<td>Natural sense of mind and body</td>
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<tr>
<td></td>
<td>Precious flowers</td>
<td>Natural sense of mind and body</td>
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<td></td>
<td>Ancient building</td>
<td>Enjoyment of cultural experience</td>
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<td></td>
<td>Local customs</td>
<td>Enjoyment of cultural experience</td>
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<td></td>
<td>Humanity history</td>
<td>Enjoyment of cultural experience</td>
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</tbody>
</table>

V. PROBLEMS AND PROSPECTS

As a tourism product, hot spring tourism has attracted the attention of the tourism industry and has since developed rapidly. However, there are still problems in improving the health value for the human body and promoting the development of hot spring tourism, which mainly include the following.

5.1 The Scientific Evaluation of the Health Value of Hot Springs

The health values of hot springs have been widely verified, demonstrating significant effects in disease treatment, rehabilitation and prognosis, and preventive health care. However, from a scientific point of view, there is insufficient systematic proof. For example, scientific evaluation of the efficacy of hot spring for certain diseases should be conducted, including more representative prospective studies and clinical randomized controlled trials, so as to provide a more in-depth and objective evaluation of the health values of hot springs.

5.2 Standardized Management is the Premise of Realizing the Health Values of Hot Springs

Due to various physical and chemical properties, different types of hot springs have different effects and contraindications for tourists with different diseases and individual needs. For example, people with high blood pressure should avoid soaking in high-temperature hot
springs (water temperature above 42ºC), as the high temperature will increase the heart rate and accelerates the blood circulation, and the resultant escalated stroke volume may further increase the risk of high blood pressure. People with infectious diseases (including sexually transmitted diseases and infectious skin diseases) should be strictly prohibited from entering the spring. Patients with acute diseases, high fever, severe heat and kidney damage, severe anemia, and advanced tumors and those who cannot take care of themselves should avoid bathing in the spring. It is not advisable to bathe in the hot spring immediately after consuming meals or alcohol, overworking, or taking sleeping pills. In addition, it is not advisable to bathe in the hot spring immediately before and after sex, because bathing in the hot spring will cause the superficial blood vessels to dilate and most of the blood to concentrate on the body surface. As the sexual organs are suddenly congested, the body must rapidly adjust the distribution of blood throughout the body, which may lead to imbalance of the circulation, causing symptoms including dizziness, fatigue, palpitation, hypoglycemia, and cerebral ischemia. In addition, appropriate measures for tourists with special needs must be formulated. For example, accidents are more likely to occur among tourists with elderly individuals with physical weakness, inflexible action, unstable walking and standing, poor eyesight, cardiovascular and cerebrovascular diseases, and so on. Therefore, bath towels or non-slippery mats should be placed on the bathroom floor to prevent slipping. Furthermore, elderly people with physical weakness and inflexible action should be accompanied when bathing. In some springs where the water temperatures are high, the accompanying or service personnel should adjust the water temperature and tighten the hot water tap to prevent burns. In addition, indications of the soaking time, temperature, and water level should be provided to prevent excessive sweating that may induce syncope and stroke. Lastly, as the space is enclosed, oxygen deficiency should be closely monitored and prevented.

In summary, the hot spring institutions should prepare informative materials and notify the tourists based on the water quality and temperature of different hot springs so as to prevent potential dangers.

5.3 The Effect of Quality Management on Health

The quality of the hot spring water must be strictly monitored. As the hot spring is formed by heating of the underground water when going through the geothermal area and returning to the ground, its quality changes dynamically and therefore should be closely monitored at appropriate intervals. The hot spring institutions should ensure that the hot spring is produced naturally, the quality of the water is clean, there is no pollution, and no disinfectants are used. Inferior and deteriorated hot springs due to natural factors such as geographical changes or human factors introduce harmful substances to the spring water. Deteriorated hot spring containing large amounts of chemicals such as chloroform and trichloroethylene will endanger human health.

VI. CONCLUSION
With the continuous development of the society, people’s understanding of the value of life has grown increasingly more profound, and they have become equally concerned about physical and mental health. In addition to disease treatment, people are paying increasing attention to health preservation and preventive health care, leading to a dramatic increase in the demand for health care products. As one type of health industry, hot spring tourism covers multiple health care and service functions including disease treatment, rehabilitation, regulation of sub-health status and fitness and relaxation, making it the best carrier for the development of health care tourism. However, most people nowadays recognize hot springs as a leisure and tourism destination, but have insufficient understanding of the value hot spring offers in health preservation and disease prevention. Therefore, this paper has focused on the effects of hot spring hydrotherapy on human health, and conducted an in-depth investigation on the values of different functions of the hot spring on human health in an attempt to raise people’s awareness of the health values of hot spring tourism, thereby promoting its development.

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