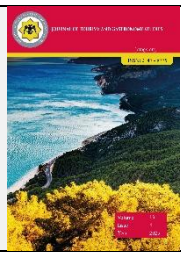
JOURNAL OF TOURISM AND GASTRONOMY STUDIES

ISSN: 2147 – 8775

Journal homepage: www.jotags.net



Halotherapy and Speleotherapy as Adjunctive Treatments for Respiratory Diseases: A Narrative Review with a Focus on Çankırı Salt Cave's Role in Health Tourism

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Article History

Received: 19.07.2025

Accepted: 03.12.2025

Keywords

Halotherapy

Speleotherapy

Health tourism

Çankırı salt cave

Abstract

This study explores the role of halotherapy and speleotherapy as adjunctive treatments for respiratory diseases, with a particular focus on the Çankırı Salt Cave in Turkiye as a health tourism destination. Halotherapy and speleotherapy are natural therapies that harness salt-rich environments to treat conditions such as asthma, chronic obstructive pulmonary disease (COPD), and bronchitis. These therapies have gained increasing recognition for their therapeutic benefits, particularly in improving respiratory health. However, despite their growing popularity, there is limited research on their integration into health tourism in Turkiye. This study aims to fill this gap by examining the therapeutic potential of the Çankırı Salt Cave, a site historically known for its natural salt reserves and emerging as a prominent health tourism attraction. Through a comprehensive literature review, the study investigates the therapeutic effects of halotherapy and speleotherapy in managing respiratory diseases while evaluating the potential of the Çankırı Salt Cave in health tourism. The findings suggest that these therapies have substantial potential to contribute to regional development by promoting sustainable tourism, offering a unique blend of health benefits and cultural experiences. The study highlights the need for further scientific validation to strengthen the role of these treatments within health tourism and to promote their global acceptance in the healthcare sector. Ultimately, this research emphasizes the significance of incorporating natural treatment methods into health tourism strategies, thereby supporting both individual health outcomes and regional economic development.

Article Type

Review Article

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DOI: 10.21325/jotags.2025.1771

INTRODUCTION

Health tourism, a multidimensional field encompassing multiple perspectives and factors, refers to both national and international travel undertaken for the purpose of receiving healthcare services. Health tourism includes not only travel for disease treatment but also travel aimed at disease prevention, health improvement, and enhancing the overall quality of life. Travel for treatment plays a significant role at the intersection of people's quest for health and well-being and global mobility, reshaping the traditional dynamics of health and tourism (Figueiredo, Abrantes, & Costa, 2024, p. 1). In recent years, health tourism has become a significant global sector, rapidly developing, particularly with the increased demand for alternative treatment methods. The global health tourism market has expanded in both developed and developing countries, facilitated by improved access to healthcare services and the growing popularity of natural healing methods. In this process, there has been an increasing interest in alternative and complementary therapies, which often utilize natural resources, aimed at treating illnesses and improving health. Today, many patients use complementary and alternative medicine (CAM) methods in the treatment of their diseases and/or the alleviation/removal of their symptoms (Tokem, 2006, p. 190).

Health tourism, which transforms natural resources and alternative treatment methods into economic value, not only provides treatment but also offers significant benefits such as contributing to local economies and supporting regional development. The increasing importance of the health tourism industry in recent years has made it a growing and economically expanding sector. Health tourism, by offering a combination of various treatment options, provides individuals with opportunities to improve both their physical and psychological health, leading to increasing interest and rapid growth in this sector. In this context, Halotherapy and speleotherapy have gained popularity in recent years and become an important part of health tourism, emerging as effective alternatives in the treatment of many health issues, particularly respiratory diseases. Speleotherapy (Greek speleon – cave, therapia – treatment) is a non-drug treatment method based on salt therapy, which involves long-term stays in the unique microenvironments of caves, grottoes, salt mines, and shafts (Nevzghoda & Nevzghoda, 2025, p. 2). Halotherapy is part of salt therapy derived from speleotherapy/speleoclimate, which comes from using a micro size of dry salt in aerosol form (such as sodium, potassium, magnesium, calcium, and sodium chloride) with stable air temperature (18–24ºC) and moderate to high humidity (40–60%) for inhalation inside a cave/imitation cave since the nineteenth century (Nugraha, Rhamdan, & Sari, 2024, p. 23).

Both Halotherapy and speleotherapy offer therapeutic effects for individuals with various chronic respiratory conditions, and scientific studies conducted in this field increasingly highlight the effectiveness of these methods. The growing demand for natural treatments continues to drive the rapid development of health tourism, and the benefits offered by treatment options like Halotherapy and speleotherapy further consolidate the growth in this area. The growing demand for alternative treatments like halotherapy and speleotherapy in health tourism offers significant regional development opportunities. In this regard, the integration of alternative treatments such as halotherapy and speleotherapy into health tourism provides an attractive option for tourists while also contributing to the economic development of the relevant region.

In recent years, as interest in alternative and complementary treatment methods has increased in the field of health tourism, natural therapeutic practices such as speleotherapy and halotherapy are attracting more attention. The use of salt caves for speleotherapy purposes has become widespread in many countries as a medical and complementary

treatment method, supported by scientific research. The Wieliczka Salt Mine in Poland is one of the most well-established speleotherapy centers used for the treatment of asthma and other respiratory diseases, where patients undergo treatment by inhaling dry salt aerosols in special underground rooms (Chervinskaya, 2007, p. 133). The Solotvyno Salt Cave in Ukraine has been offering speleotherapy since the Soviet era, providing clinical environments where 6-8 hour daily sessions lead to symptomatic relief in conditions like chronic bronchitis and asthma (Crisan-Dabija et al., 2021, p. 4). The Parajd Salt Cave in Romania is particularly noted for its speleotherapy applications for children, where therapeutic sessions are conducted in salt-based play areas, supported by the Romanian Ministry of Health (Nugraha, Rhamdan, & Sari, 2024, p. 25). The Berezniki Salt Cave in the Perm region of Russia stands out with research indicating positive developments in FEV1 measurements, which demonstrate improvements in lung function (Sandu, Mihaescu, & Filipeanu, 2019, p. 1). These practices demonstrate that salt therapy is internationally recognized as an effective complementary treatment method based on both traditional and scientific foundations. However, in Turkiye, studies in this field generally focus on thermal tourism and medical tourism, without systematically addressing the role of specific practices like halotherapy and speleotherapy within health tourism. In this context, the main aim of this study is to examine the position of halotherapy as an adjunctive treatment for respiratory diseases within health tourism and to explore the potential of the Çankırı Salt Cave in this regard. Thus, the study aims to fill the gap in the literature regarding the evaluation of local resources within the scope of health tourism, as well as to raise awareness of alternative treatment methods.

Methodologically, this study is based on a narrative literature review to examine the role of halotherapy and speleotherapy in health tourism, with a specific focus on the Çankırı Salt Cave in Turkiye. The aim is to synthesize existing evidence and evaluate the cave's potential as a health tourism destination. The Çankırı Salt Cave, selected as the research area, provides a natural environment for halotherapy applications and is an important destination for health tourism in Turkiye. Located within the boundaries of Çankırı province, this cave enhances the region's health tourism potential through its therapeutic opportunities offered by its natural salt reserves. This study employs a comprehensive literature review methodology to examine the role of halotherapy and speleotherapy as adjunctive treatments for respiratory diseases. The literature review includes a synthesis of previous research on the therapeutic effects of halotherapy and speleotherapy, their role within health tourism, and the potential of natural health centers such as the Çankırı Salt Cave.

The effects of halotherapy and speleotherapy on respiratory diseases, along with the health tourism potential of the Çankırı Salt Cave, have been discussed in light of existing academic sources. Additionally, the study aims to assess whether these natural treatment methods hold a broader potential within the context of health tourism. In the study, the effects of halotherapy on respiratory diseases and the opportunities this therapy offers for health tourism have been analyzed by drawing on existing literature. It has been observed by many individuals visiting the cave that the salty air inside the salt cave is beneficial for respiratory diseases. However, it is considered necessary for further research into this natural treatment method and a more comprehensive examination within the context of health tourism. Promoting the Çankırı Salt Cave, one of the most significant tourist attractions in Çankırı and known as the underground salt city of Çankırı, within the framework of health tourism, positioning the cave in the national and international health tourism market, would be an important step toward contributing to the local economy.

Literature Review

Speleotherapy and Halotherapy

Speleotherapy (from Greek speleon, meaning 'cave'), is a treatment method based on prolonged exposure to the unique microclimate of specialized areas such as karst caves, caverns, salt mines, etc. (Rashleigh, Smith, & Roberts, 2014, p. 240). Speleotherapy, as a complementary treatment option for chronic respiratory diseases, is a specific inhalation therapy method that takes advantage of the unique microclimate characteristics of mines and cave environments (Freidl et al., 2020, p. 2). However, to explain the effectiveness of salt therapy, a more in-depth exploration of the benefits provided by speleotherapy is required. The effectiveness of salt therapy stems from three main reasons (Vladeva & Panajotova, 2018, p. 24): First, salt has antibacterial, antimycotic, and anti-inflammatory effects. Research has shown that the environment in salt rooms is three times more sterile than the cleanest operating rooms. Second, salt has the ability to release negative ions, which neutralize positive charges. Lastly, when dry, salt exhibits superabsorbent properties, which means its capacity to absorb moisture is significantly high.

Clinical studies demonstrate speleotherapy's efficacy in improving respiratory function (Freidl et al., 2020; Sandu et al., 2019). This therapeutic approach highlights the positive impact of the unique microclimatic conditions of natural areas such as karst caves, salt mines, and similar environments on human health. Salt has been used by various cultures worldwide for thousands of years due to its health benefits and therapeutic effects. From a historical perspective, the scientific foundations of this treatment method began to take shape with the observations made by the Polish therapist Feliks Boczkowski in the mid-19th century on the health conditions of individuals working in salt mines. However, it was not until 1843 that the effectiveness of this treatment was scientifically proven by Boczkowski (Vladeva & Panajotova, 2018, p. 22). Boczkowski observed that, despite harsh working conditions and nutritional deficiencies, salt miners in Poland enjoyed remarkably good health. Furthermore, conditions such as the common cold and respiratory diseases, which were widely observed among the general population, were nearly absent in these miners. This led Boczkowski to conduct further research, and after extensive examinations, he concluded that the health benefits were related to the salty air that the miners inhaled daily. These observations by Boczkowski provided the initial evidence of the relationship between salty air and respiratory diseases and laid an important scientific foundation for the clinical usability of speleotherapy. As a result, salt mines in Poland and Eastern Europe gradually became popular sanatoriums, attracting visitors from all over the world. In 1958, after the establishment of the first salt therapy center for patients with lung diseases in the Wieliczka salt mines in the Krakow region of Poland, speleotherapy has become a traditional and effective non-pharmacological treatment method. Today, speleotherapy clinics based on natural caves have been established in various countries (Austria-Salzebad Salzeman, Poland-Wieliczka, Romania-Siget, Azerbaijan-Nakhchivan, Kyrgyzstan-Chon-Salt, Russia-Perm region-Berezniki, Ukraine-Artemovsk-Donetsk region, Belarus-Soligorsk) (Chervinskaya A., 2007, p. 133). These developments have strengthened the scientific foundations of speleotherapy and expanded its effectiveness to a wider audience. In this context, the acceptance of speleotherapy in the medical field continues to increase in light of both research and clinical experiences. Therefore, speleotherapy has not only gained popularity among the public but has also been recognized as a valid medical treatment option worldwide. In this regard, to better understand the clinical effectiveness of speleotherapy, a deeper perspective on the etymological origins and the mechanisms of its application is needed.

Etymologically derived from the Greek word halos (salt), halotherapy refers to the use of surface-adhering dehydrated oxygen or salt aerosol micro-particles to manage respiratory diseases (Peddibhotla, Nair, & Joby, 2024, p. 269). In situations where natural salt cave environments are unavailable, halotherapy, based on the principles of speleotherapy, is applied as a modern alternative. This method involves inhaling small salt particles in controlled environments designed to mimic the microclimate of a natural salt cave. These environments, known as halochambers, provide an effective therapeutic treatment (Rashleigh, Smith, & Roberts, 2014, p. 240). The health benefits of salt-rich environments have historical origins. Notably, in the 19th century, observations of salt miners in Poland suggested a remarkably low prevalence of respiratory ailments despite challenging working conditions, forming the empirical basis for speleotherapy (Chervinskaya & Zilber, 1995). However, the limited accessibility and geographical constraints of natural salt mines restricted the widespread adoption of this treatment. To overcome these barriers, controlled halotherapy was developed, which uses artificially constructed salt rooms to generate a dry sodium aerosol microclimate that mimics the conditions of natural salt caves (Rashleigh et al., 2014). This innovation has made the therapy accessible in diverse clinical and wellness settings worldwide, enabling further scientific investigation into its efficacy.

The construction of these artificial salt rooms and caves offers an important solution to increase the accessibility of halotherapy. These artificial environments intensify the healing effects of salt, similar to those found in natural salt caves, enabling patients to access treatment more easily. Halotherapy applications stand out as an effective and safe option for patients seeking alternative treatment methods, alongside modern medicine.

The Effect of Speleotherapy and Halotherapy on Respiratory Diseases

Speleotherapy, particularly after World War II, has been shown to be effective in individuals with chronic respiratory diseases and allergic reactions in Eastern and Central Europe. The unique microclimatic features of cave environments, such as high humidity, stable temperature, aerosolized minerals, low winds, and purified air, facilitate the expulsion of mucus, relax respiratory muscles, and support lung cleansing functions, contributing to treatment and allowing asthma patients to reduce their medication usage. However, there is limited data on microbiological air monitoring (Sancar & Alma, 2024, p. 206).

Moreover, studies in the relevant literature have highlighted the significant role of the microclimatic properties of speleotherapy in the treatment of respiratory diseases and the healing processes these properties provide. In this context, Yılmaz, Demirtaş Karaoba, & Perçin (2024), conducted a descriptive review study aiming to examine studies combining salt therapy (speleotherapy and halotherapy) with exercise from 2020 to 2024. In the study examining the research conducted between 2020 and 2024 on salt therapy (speleotherapy and halotherapy) and exercise, the relevant studies published in PubMed, Cochrane Library, Google Scholar, ResearchGate, and Scopus academic databases were scanned using the keywords "Halotherapy," "Speleotherapy," "Salt therapy," and "Exercise." The findings revealed that the combination of salt therapy (speleotherapy and halotherapy) and exercise improved the functionality, muscle strength (respiratory, upper extremity, and lower extremity), flexibility, balance, chest mobility, and endurance of individuals with chronic respiratory diseases. These findings indicate that while halotherapy and speleotherapy contribute to improvement in the respiratory system, exercise also has a positive impact on general health by increasing muscle strength and endurance. Specifically, exercise strengthens respiratory muscles and increases lung capacity, while salt therapy acts as a supportive factor in this process.

Halotherapy, a type of salt therapy that has been practiced since the 19th century and derived from speleotherapy/speleoclimatic treatment, is considered a useful adjunctive treatment for various medical conditions, particularly respiratory and dermatological diseases. It involves the use of dry salt aerosol (minerals such as sodium, potassium, magnesium, calcium, and sodium chloride) in cave-like environments with a fixed air temperature (18-24ºC) and medium to high humidity levels (40-60%) (Nugraha, Rhamdan, & Sari, 2024, p. 23). In halotherapy rooms, designed to simulate the environment of natural salt caves, salt particles are dispersed within a designated air flow, mimicking the therapeutic benefits provided by the atmosphere of a natural salt cave. During halotherapy (HT) sessions, individuals typically spend 30 to 60 minutes engaging in activities such as reading, meditation, or other relaxing practices. HT sessions are conducted in specialized health facilities that provide this service, following specific protocols. Halotherapy has emerged as an effective adjunctive treatment, particularly for conditions such as asthma, bronchitis, allergies, and skin diseases (Rashleigh, Smith, & Roberts, 2014). Salt aerosol has the potential to reduce inflammation in the airways, facilitate mucus expulsion, and promote the healing of mucosal structures. Furthermore, due to the antimicrobial properties of salt, it is believed to be effective against microbes and pathogens in the respiratory tract (Vladeva & Panajotova, 2018).

The ability to combine halotherapy with other physical therapy methods and pharmacological treatments makes it a preferred approach in the treatment of mild and moderate bronchial asthma, chronic obstructive bronchitis, post-pneumonia conditions, and various other respiratory and skin diseases (Vladeva & Panajotova, 2018, p. 22). In recent years, halotherapy has gained increasing trust worldwide and has rapidly spread to many countries, with numerous studies published proving its effectiveness and use in different diseases (Chervinskaya A. , 2007; Freidl et al., 2020; Crisan-Dabija et al., 2021; Nugraha et al., 2024; Figueiredo et al., 2024; Nistoreanu et al., 2024). As a natural and reliable treatment method, halotherapy involves the administration of fine dust particles to the upper part of the lower respiratory tract and has a significant role in the treatment of respiratory tract infections, asthma, allergic and chronic bronchitis, colds, pharyngitis, rhinitis, tonsillitis, chronic obstructive pulmonary disease (COPD), and various skin diseases. It is an important alternative treatment method recognized as both salt therapy and cave therapy, and several studies have shown that it is beneficial for chronic respiratory diseases (Uysal & Ulusinan, 2020, p. 1). Research has shown that halotherapy is particularly effective for COPD patients, helping to reduce symptoms and improve overall lung capacity (Sandu, Mihaescu, & Filipeanu, 2019). A study conducted by Yoseph et al. (2017) involving children aged 5 to 13 with mild asthma, who were not receiving anti-inflammatory treatment, randomly placed children into two groups. One group received treatment in a halogenerator-equipped salt room (treatment group), while the other group received treatment in a salt room without a halogenerator (control group). The study included 29 patients in the treatment group and 26 patients in the control group. After 7 weeks and 14 sessions of treatment, statistically significant improvements were observed in the treatment group diagnosed with mild asthma, whereas no changes occurred in the control group. No improvement was observed in spirometry and FeNO levels after treatment. However, the treatment group showed statistically significant improvements in most parameters of quality of life questionnaires. These findings suggest that halogenerator-equipped salt room therapy can have some positive effects on children with mild asthma.

In a study conducted by Al Achka, Geller, Slaney, & Layish (2015) between January and June 2012, the effects of halotherapy on patients with Cystic Fibrosis (a hereditary genetic disease that primarily affects the respiratory and digestive systems) were assessed. The study was conducted at a center in Orlando, USA, where the necessary

facilities for halotherapy (HT) sessions were provided. The participants included individuals aged 15 and older with a history of cystic fibrosis who had not previously participated in halotherapy. In total, 12 participants completed the study protocol and attended a total of nine HT sessions. The primary outcome measures of the study were evaluated at two different time points: before the first HT session and after the final HT session, with an average follow-up period of three weeks. The conducted pulmonary function tests showed an average increase of 9.25 points, with a statistically significant (p=0.124) difference, although this was interpreted as suggesting that patients may have experienced subjective relief from shortness of breath, but this improvement could not be definitively considered as conclusive evidence. Additionally, a 0.62-point improvement was observed in the SNOT-20 score, which assesses sinusitis symptoms. This finding was interpreted as mild relief from sinus problems experienced by the patients. When examining the quality of life survey results for CF patients, significant improvements were found in physical health, general health perception, and digestive areas, while no significant changes were detected in other aspects of quality of life. Throughout the study, no adverse effects such as chest tightness or wheezing were reported in relation to the HT sessions. This finding was interpreted as suggesting that halotherapy could be a safe complementary treatment option for CF patients. The limited changes in respiratory functions indicated that this treatment should be considered as a supportive option rather than a primary treatment for CF, and the improvements in patients' quality of life were seen as potentially providing psychosocial benefits as well.

Crisan-Dabija, Sandu, Popa, Scripcariu, Covic, & Burlacu (2021, p. 1) have stated that halotherapy, due to its proven benefits in the treatment and prevention of asthma and its ecological and environmentally friendly nature, provides a reliable therapeutic contribution to allopathic treatments, making it an important option for preventing or delaying exacerbations in asthma patients. The authors reviewed 18 original studies related to halotherapy in PubMed, MEDLINE, and EMBASE databases to investigate the effectiveness of halotherapy in the diagnosis, treatment, and prevention of asthma and to review the existing scientific data. The findings of the research were reported as follows:

Studies have shown that hypertonic salt aerosols may be as effective as histamine or methacholine tests in the diagnosis of asthma. Among the protective effects of halotherapy are the enhancement of mucociliary clearance and the facilitation of mucus expulsion from the airways. It has been stated that salt aerosols can reduce inflammation in the airways, potentially decreasing the frequency of asthma attacks. In children, hypertonic saline solutions have been reported to shorten hospital stays and alleviate symptoms. In terms of therapeutic effects, it has been observed that the use of hypertonic salt aerosols in combination with salbutamol improves respiratory functions during acute asthma attacks. In chronic asthma patients, dry salt inhalation has been found to enhance respiratory function and reduce attacks. Furthermore, it has been suggested that halotherapy may contribute to the prevention of bacterial infections in asthma patients. In conclusion, halotherapy may be an ecological, reliable, and supportive treatment method for asthma patients, providing positive effects in the diagnosis, treatment, and prevention processes. However, it is noted that more large-scale, evidence-based research is needed for halotherapy to be systematically included in clinical guidelines.

To systematically evaluate the therapeutic effects of speleotherapy and halotherapy on obstructive pulmonary diseases such as asthma and chronic obstructive pulmonary disease (COPD), a synthesis of key clinical studies is presented in Table 1. The table compiles research conducted across different populations and settings, highlighting

study designs, intervention techniques, and primary outcomes related to respiratory function, symptom alleviation, and quality of life. These studies collectively contribute to the evidence base supporting the use of salt-based therapies as adjunctive treatments in respiratory care.

Table 1. List of Studies Examining Effects of Speleotherapy and Halotherapy on Obstructive Pulmonary Disease, Including Asthma and COPD

Study	Respiratory Disorder	N	Study Design	Techniques	Results
Hedman et al., 2006	Asthma	32	Randomized controlled trial	Patients randomly assigned to treatment or placebo group; treatment room with salt generator; 5 times a week for 40 minutes for 2 weeks; placebo control group.	A significant improvement in FEV1 and a reduction in BHR was found for the intervention group.
Crisan-Dabija, R., A., & Mihaescu, T., 2012	Asthma/ COPD	128	Randomized, double blind, single crossover trial	Patients used salt inhaler for 20 minutes a day for 4 months.	A significant improvement was found in all spirometric parameters, including FVC, FEV1, and PEF. Also noted was an improvement in the health-related quality of life.
Lazarescu et al., 2014	Asthma, chronic allergic pathologies	19	Case control	Patients undergoing halotherapy measured against a control group undergoing at-home treatment.	Halotherapy caused a reduction of sensitivities in patients with bronchial asthma. HT also triggered an anti-inflammatory effect and was a healing mechanism.
Weinreich et al., 2014	COPD (GOLD Stage 3 and 4)	67	Cohort study	Patients assigned to one of 3 groups: Group 1: 20 sessions of halotherapy, in a salt chamber for 45 minutes over 5 weeks. Group 2: Inhalation of isotonic saline 3 times daily for 5 weeks; Group 3 as controls.	Both intervention groups had significantly improved walking distance and FEV1 during the treatment period. The halotherapy group also had improvement in SGRQ. Halotherapy appeared to be better tolerated than saline inhalation.
Bar-Yoseph et al., 2016	Asthma, mild	52	Randomized, double blind, controlled study	Evaluation of effects of salt room with halogenerator for intervention group compared to no halogenerator for control group; treatment period of 7 weeks and 14 sessions.	A statistically significant improvement was found in BHR in the intervention group as well as for most parameters of quality-of-life questionnaires.
Mazloomzadeh et al., 2017	Asthma, mild to moderate	34	Randomized crossover trial	Two groups receiving salt therapy by staying in a salt room for one hour, 3 times a week for 3 weeks.	Salt therapy had a significant effect on raising the morning and evening PEF in the second week of therapy for both groups.

Table 1. List of Studies Examining Effects of Speleotherapy and Halotherapy on Obstructive Pulmonary Disease, Including Asthma and COPD (cont.)

Eslaminejad et al., 2017	Chronic Obstructive Pulmonary Disease (COPD)	30	Double-blind, randomized, placebo-controlled, crossover pilot study	Intervention: Inhaled salt aerosol (halotherapy/speleotherapy) vs. placebo. Assessments: Spirometry (FEV1, FVC, FEV1/FVC), COPD Assessment Test (CAT), 6-minute walk test (6MWT), arterial oxygen saturation drop during 6MWT.	Halotherapy significantly improved 6-minute walking distance (p=0.02) and reduced arterial oxygen saturation drop during the test (p=0.01) in the intervention group. No significant improvement was found in CAT scores (p=0.77) or spirometry parameters (FEV1, FVC, FEV1/FVC) for the intervention group compared to controls.
Allahverdiyeva et al., 2023	Atopic (Allergic) Bronchial Asthma in Children (Mild and Moderate Persistent)	50	Prospective clinical study with comparison groups (non-randomized)	A course of speleotherapy (15 daily procedures) in the post-attack period at the "Duzdag" salt cave center. Regimen included adaptation, main treatment (4-9 hours/day in the cave), and re-adaptation phases.	Significant improvement in all spirometric parameters (FVC, FEV1, FEV1/FVC, FEF, PEF) in both mild and moderate asthma groups post treatment (p<0.01). Improvement was greater than in the drug-only comparison group. Led to decreased number of asthma attacks, reduced bronchodilator use, and improved respiratory function. Disease remission (6 months to 1.5 years) was observed in 70-80% of patients.
Abbreviations: COPD: chronic obstructive pulmonary disease; FVC: forced vital capacity; FEV1: forced expiratory volume in one second; FEV1/FVC: forced expiratory volume in 1 sec as a percentage of FVC; BHR: bronchial hyperresponsiveness; GOLD: Global Initiative on Obstructive Lung Disease; PEF: peak expiratory flow; FEF: forced expired flow at 25–75%.					

Halotherapy, particularly as an adjunctive treatment for respiratory diseases, stands out as a supportive therapy. Inhalation of salt-infused air has the potential to alleviate symptoms of these diseases while strengthening the immune system and having positive effects on overall health (Nevzghoda, & Nevzghoda, 2025, p. 2; Nugraha et al., 2024, p. 27). Since this treatment method offers a natural healing process, it has become an attractive option for patients seeking alternative therapies. Particularly for individuals who face difficulties accessing natural salt caves, artificial salt environments such as halotherapy rooms and halochambers make this treatment more accessible. These artificial environments simulate the microclimate of natural salt caves, providing a controlled and safe space for salt therapy. The increasing popularity of halotherapy applications highlights the potential of alternative treatment methods in the health field and offers the opportunity to reach a broader patient population.

Health Tourism and Çankırı Salt Cave

Health tourism is a rapidly growing sector that facilitates individuals traveling to different regions for treatment purposes. This sector encourages people to travel to various geographical areas to meet their healthcare needs, especially when factors such as access to high-quality healthcare services and cost-effectiveness come into play (Sungur, 2025, p. 244). The increasing popularity of health tourism allows for healthcare services to become more accessible on an international scale in an increasingly globalized world. Moreover, health tourism has strengthened

with the development of healthcare infrastructure in different countries, the increase in private healthcare facilities, and the widespread use of various treatment methods. This sector not only includes medical treatments and surgical services but also encompasses alternative treatment methods. Natural therapies such as halotherapy and speleotherapy are among the popular alternatives preferred within health tourism. Salt therapy offers treatment options for respiratory diseases, skin disorders, and stress-related health issues, and these methods, which provide a natural healing process, have become an important part of health tourism, particularly when applied in natural environments. Health tourism is expanding as a field that supports natural healing processes with the increasing interest in such alternative therapies. As health tourism grows, the popularity of alternative treatment methods like salt therapy is increasing, and Turkiye is becoming an important center in this field. Particularly, the therapeutic benefits offered by natural salt caves create a significant attraction in the context of health tourism.

One such valuable resource is the Çankırı Salt Cave, located 19 kilometers from the central district of Çankırı. This cave, which is believed to have been operated since the Hittite period, hosts Turkiye's largest rock salt reserves (Governorate of Çankırı, 2025). With 13 kilometers of the access road being a village group road and 5 kilometers via the designated Tourism Road, the Çankırı Salt Cave welcomes over 10,000 visitors per month (Çankırı Municipality, 2025). As a significant attraction in health tourism, the salt-based health applications at Çankırı Salt Cave serve as an effective alternative treatment for respiratory diseases while offering both therapeutic and tourist experiences for the visitors. From a health tourism perspective, Çankırı Salt Cave appeals not only to tourists visiting for treatment but also to travelers seeking to explore the region, making it an important tourist attraction. This contributes to the diversification of the region's tourism activities, leading to increased demand for accommodations, dining, transportation, and other tourist services. Thus, the health tourism potential of the Salt Cave contributes to the development of the region's overall tourism infrastructure and strengthens the concept of sustainable tourism. Health tourism not only strengthens the local economy but also plays a significant role in promoting the region's cultural and natural wealth at the national and international levels. The health tourism potential of Çankırı creates important opportunities for the diversification of the regional economy in line with sustainable development goals. In this context, Çankırı Salt Cave holds great potential in health tourism and, by supporting other tourist activities in the region, provides significant contributions to the local economy. Effectively harnessing this potential will promote sustainable development in the region and support economic growth. This process will strengthen the region's tourism infrastructure and enable social development.

Contribution to Regional Economy and Sustainable Tourism

One of the key dynamics of health tourism is that travel for treatment purposes not only addresses individual health issues but also offers significant opportunities for regional development and economic growth. These contributions occur not only directly through the healthcare services sector but also indirectly through other sectors. In addition to the benefits provided to the regional economy, the sustainability of health tourism is of critical importance in terms of ensuring environmental, economic, and social balance.

Tourists visiting a region for healthcare services contribute to increasing the revenue of local businesses by spending on accommodation, food and beverages, transportation, and other tourist activities. Furthermore, health tourism helps develop the region's tourism infrastructure, creates new job opportunities, and increases local government revenues. However, the sustainability of the health tourism sector depends on the effectiveness of quality

control mechanisms, the compliance of healthcare providers with international standards, and regulatory policy frameworks. The widespread growth of health tourism could challenge the capacity limits of local healthcare systems and increase potential health risks, making it crucial for stakeholders in the sector to carefully manage these processes. In this context, the management of health tourism is a critical factor for long-term sustainable development, not only for healthcare providers but also for the tourists visiting the region and the local population.

The sustainability of health tourism requires careful management across environmental, economic, and social dimensions. In this context, sustainable health tourism contributes to economic development while preserving the region's natural resources, cultural heritage, and social structure. From an environmental sustainability perspective, it is essential for health tourism destinations to adopt environmentally friendly practices, avoiding negative impacts such as over-tourism and resource depletion. This may include elements such as energy-efficient facilities, efficient water use, and waste management.

Social sustainability aims to ensure that the local population benefits equitably from the revenues generated by health tourism. Integrating the local community into the health tourism sector supports their participation in the workforce and improves income distribution in the region. However, it is also important to ensure the preservation of local culture and traditions during this process, ensuring that communities approach tourists and foreign guests with tolerance.

Economic sustainability aims to ensure that health tourism is not limited to short-term gains. This can be achieved through the development of strategies that strengthen the region's healthcare infrastructure and human resources in the long term. Investments in healthcare services and infrastructure improve local access to healthcare, while simultaneously creating a competitive health tourism sector on the international stage.

Çankırı Salt Cave, in this regard, serves as a focal point that contributes to the development of health tourism. Tourists visiting the salt cave come for either treatment purposes or for tourist exploration, and these visits lead to the revitalization of trade and the service sector in the region. Businesses catering to the needs of tourists, such as accommodation, dining, and transportation, not only stimulate economic growth but also facilitate the strengthening of the region's health tourism infrastructure. In terms of regional development, health tourism not only provides short-term economic contributions but also supports long-term sustainable growth. The development of health tourism requires the adoption of an environmentally friendly tourism approach, which helps preserve natural resources and contributes to the balance of local ecosystems. Moreover, such sustainable approaches have the potential to position the region as a nationally and internationally recognized health tourism hub.

The development of health tourism in Çankırı offers the potential to create new employment opportunities for the local population. In this context, new job opportunities are emerging in sectors such as hospitality, guiding, healthcare services, and transportation, contributing to the strengthening of the local economy. Moreover, health tourism enables tourists visiting the region to interact with local culture and traditions, making a significant contribution to the preservation of cultural diversity. This interaction can promote the broader recognition of the region's rich cultural heritage and traditions, thereby strengthening the social fabric.

The contributions of health tourism to the regional economy are not limited to trade; they also enable the improvement of local infrastructure, the enhancement of healthcare services, and the elevation of the living standards

of the local population. The contributions of health tourism to sustainable development are also of great importance. This development will not only ensure the efficient use of natural resources but also facilitate the implementation of environmentally friendly tourism strategies.

In conclusion, the development of health tourism and the potential offered by the Çankırı Salt Cave not only revitalizes the regional economy but also promotes sustainable development. With its unique structure and health tourism potential, the Çankırı Salt Cave provides a significant advantage for the region in becoming an internationally recognized health tourism hub. These processes could lead to the strengthening of the region's economic infrastructure, greater international recognition, and long-term collaborations. Thus, the impact of health tourism on regional development can bring about a sustainable transformation not only in economic terms but also in cultural and social aspects.

Conclusion and Recommendations

This narrative review has synthesized current evidence regarding the therapeutic potential of halotherapy and speleotherapy in managing respiratory diseases and evaluated the health tourism prospects of the Çankırı Salt Cave. The study highlights the positive effects of halotherapy and speleotherapy on respiratory diseases and presents findings that these treatment methods hold significant potential from a health tourism perspective. Additionally, the study emphasizes the potential of Çankırı Salt Cave to become an important destination in the field of health tourism.

According to the results of the study, the therapeutic effects of halotherapy and speleotherapy in the treatment of respiratory diseases have made these treatment methods an increasingly preferred alternative within the context of health tourism. These natural treatments, which utilize salty air and mineral-rich environments, have been supported by literature as providing therapeutic effects, particularly in the treatment of asthma, chronic obstructive pulmonary disease (COPD), bronchitis, and other respiratory diseases, contributing to the treatment process. In this context, regions with natural salt reserves, such as the Çankırı Salt Cave, hold significant potential in the field of health tourism.

However, one of the most important findings of this review is that the effectiveness of halotherapy and speleotherapy should be further supported by additional scientific data. While the existing literature highlights the potential benefits of these treatment methods, it is believed that the applications should be subjected to larger-scale clinical studies and systematic reviews. Such studies could provide a more detailed understanding of the effectiveness of halotherapy and speleotherapy in treating different respiratory diseases and strengthen the scientific foundations of these methods. Furthermore, a broader examination of the role of alternative treatments such as halotherapy and speleotherapy within health tourism would contribute to a better understanding of the potential of these treatment options.

The significance of the Çankırı Salt Cave in terms of health tourism lies not only in its appeal to tourists seeking treatment but also in its role as a major attraction for travelers wishing to explore the region. This creates significant opportunities for regional development and contributes to the revitalization of the local economy. Increasing the promotion of the salt cave in terms of health tourism can help strengthen the region's tourism infrastructure and contribute to sustainable development processes. Moreover, the contributions of health tourism to the local economy are not limited to direct healthcare services but also extend to sectors such as accommodation, transportation, and

other tourism-related services.

To this end, and based on the synthesized evidence, the following targeted recommendations are proposed:

For Policymakers (e.g., Ministry of Health, Ministry of Culture and Tourism): It is essential to establish a clear regulatory framework and certification standards for salt cave therapy centers to ensure patient safety, treatment quality, and adherence to hygienic protocols. Furthermore, integrating speleotherapy and halotherapy into the national health tourism strategy and related promotional campaigns would help position these therapies as a credible, value-added offering. The development of financial incentives could encourage sustainable investment in the surrounding tourism infrastructure.

For Health Tourism Planners and Local Authorities (e.g., Çankırı Municipality, Regional Tourism Agencies): Developing integrated visitor packages that combine therapeutic sessions with cultural, gastronomic, and ecological experiences in the Çankırı region is recommended. Concurrent investments in improving site accessibility, visitor facilities, and professional signage will enhance the overall tourist experience. Launching targeted marketing initiatives to position the Çankırı Salt Cave as a credible wellness destination for both domestic and international tourists is crucial for market penetration.

For Facility Operators and Service Providers: Adopting best practices in visitor management, implementing staff training in basic health communication, and ensuring transparent information dissemination regarding therapy sessions are fundamental operational priorities. Sustainable operational models that prioritize the environmental conservation of the cave and its surroundings should be implemented. Systematically collecting visitor feedback and health outcome data (with appropriate consent) will support continuous service improvement and contribute valuable data for broader research efforts.

For Researchers and Healthcare Institutions: Future studies should prioritize controlled clinical trials conducted specifically at the Çankırı Salt Cave to generate localized efficacy data. Research should also focus on systematic monitoring of the cave's microclimatic parameters and on conducting socio-economic impact analyses to quantify the benefits of health tourism development for the region.

In conclusion, this review demonstrates that halotherapy and speleotherapy represent a valuable adjunctive treatment option within health tourism, and the Çankırı Salt Cave possesses significant yet underutilized potential in this field. Strengthening the role of such natural treatments through evidence-based practice, strategic promotion, and sustainable management offers a compelling pathway to support regional economic development and diversify Turkiye's health tourism landscape. The sustainable management of this resource, guided by collaboration among all stakeholders, promises mutual benefits for public health and regional prosperity.

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