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Primljeno/Received: 10.11.2016.
Prihvaćeno/Accepted: 21.4.2017.
Rad ima dvije pozitivne recenzije
Pregledni rad/Review

UDK 338.48-6:615.8(497.541Lipik)(091)“18“
615.838(497.541Lipik)(091)“18“

MEDICAL DEVICES IN THE SERVICE OF TOURISM IN THE XIX. CENTURY

Sažetak: Termalne i ljekovite vode već tisućljećima označavaju privlačnost ljudima. Na području Karpatske kotline, kultura kupanja je stara više od dvije tisuće godina, budući da su već i stari Rimljani koristili ljekovite izvore, a za vrijeme Austro-Ugarske Monarhije kupališni život je doživio procvat. Zdravstveni turizam unutar turizma počeo se razvijati u prvoj polovici XIX. stoljeća, bazirajući se na prirodne resurse, prije svega na termalne vode, a na temelju dužih kura i zdravstvenih tretmana. Kupališta su polako postala napućena i razvojem medicine nudila su oporavak od raznih bolesti, zbog čega su postala omiljena u krugu građana, kao što je Lipik. U drugoj polovici XIX. stoljeća voda iz Lipika je bila predmet ispitivanja brojnih istraživača. Na temelju istraživanja utvrdili su dobar sastav tvorbenih elemenata lipičke vode, njezino ljekovito djelovanje putem visokog prirodnog stupnja topline i fizikalnih karakteristika izvora, što je jedinstveno u Europi. Lipičku vodu su prije svega koristili protiv bolesti kostiju i krvi, odnosno protiv tegoba od kostobolja. U liječenju su koristili ljekovitu vodu i izvorsku sol, što su nadopunjavali fizioterapijama. Pored lipičkih specijalnih medicinskih pomagala, ljekovitih kupelji i načina liječenja ispijanjem vode koristili su i dodatna medicinska pomagala, kao što su kupelji s ugljičnim dioksidom, inhalatorij, masaža, dijetalna kuhinja i ljekarna, što su utemeljili uspješnost mjesta u kontekstu kupališnog turizma.

Ključne riječi: turizam, kupališna kultura, kupalište Lipik, ljekovita voda, medicinska pomagala

Introduction

Bath has become widespread among people at a certain level of culture, so the refreshing, healing beneficial effect of thermal waters was more and more widely used by a variety of nations. The creators of bathing culture were the ancient Greeks, who not only used thermal water externally in various ways but also consumed it. The bathing culture of the ancient Greeks was perfected by the Romans. At the time of the Romans “therme” meant a high-quality mainly leisure bath, while “balnea” was a simpler however healing-oriented spa facility. These baths could be found in a large number throughout the whole empire in particular in larger cities. In the Middle Ages periods of decline and development followed each other alternately. In the period of prosperity of spa culture the range of spa services was expanding while near the baths supplementary services varied according to different needs (Terleczyk, 2005). As a consequence, hospitals, hotels and restaurants were established nearby the spas which resulted in the emergence of baths. In the first half of the XIX. century bathing culture widened due to the fact that during looking for artesian water thermal water welled up from the deep in several places and their quality and composition essentially defined their therapeutic value. The chemical composition of the thermal water was mainly influenced by the rock mass of which cracks water has passed through therefore they got different features. The analysis and mapping of the chemical composition of thermal waters began this time. The right performance of water analysis was carried out in special water analysis laboratory research institutions mainly by internationally renowned chemist and pharmacist professors. In parallel with the chemical analysis of the thermal waters their medically prescribed correct use started because of their application as long term cures and those were complemented with physiotherapy treatments as well. At that time medical cures provided an effective solution primarily for mental, physical regeneration and treatment of some diseases (Szabó, 2015). With the development of medical science thermal water products and medical devices have been successfully applied in musculoskeletal diseases and accident rehabilitation in addition to effectively dealing with newer and newer diseases such as upper respiratory diseases, metabolic and circulatory diseases and gynaecological problems as well. The research and use of “balneo-physiotherapy” in the nineteenth century came to the front in countries - such as the Austro-Hungarian Empire - of which hydro-thermal mineral water situation was favourable (van Tubergen - van der Linden, 2002). The importance of bath situation is showed by the fact that for the purpose of therapeutic use of thermal waters William Tauffer⁸⁸ has finally established the Hungarian Balneological Society, in which doctors, geologists and engineers conducted research (Győry, 1936).

⁸⁸ 2, July, 1851 (Koložsvár) – 7, December, 1934 (Budapest), obstetrician, gynaecologist, university professor

In the XIX. century the popularity of health resorts increased across Europe and in their neighbourhood the use of medical devices and patient treatment started to flourish (Csermely, 2002). Besides complex medical procedures in spa resorts dietary practices has begun and modern massage techniques from Sweden began their conquest with medical supervision. The golden age of spa life was in the nineteenth century by when due to socio-economic changes health has become more important and visiting baths was fashionable from the part of the civilian population contributing to the development of medical tourism (Csiffáry, 2004). The existence of non-medical services and devices resulted in that they become a basic criterion (Happ, 2008). In order to further enhance the awareness of medical factors of Hungarian baths a number of institutions has been established in the country being dominant in point of tourism (Törzsök - Galambos, 2015). More and more people were looking for healing cures using the strength of thermal water which were also promoted by the newspapers including Lipik (Csapó et.al, 2007). At the end of the 1860s railway was built in Lipik and that greatly contributed to the attendance of the bath (Bali-Gulyás, 2012).

1. Lipik

Lipik town lied in the Austro-Hungarian Empire, Ban of Slavonia, Pozega County and the Pakrac District, in the scenic valley of the then Parka creek. According to 1891 year figures the population of the town was 235 Croatian, Serbian, Hungarian and German people. Near the town lies 152 meters above sea level the bath of the same name, Lipik-bath (Csiffáry, 2004). Lipik bath's spring-water was led onto the surface through 234.77 meters of pipe unifying four other older springs. The Lipik artesian fount formed between 1868 and 1870 was one of the greatest engineering works of Vilmos Zsigmondy, a mining engineer (Alliquander, 1982).

2. The analyses of the Lipik water in the XIX. century

The thermal water of the Lipik spring was first analyzed from the second half of the XIX. century in a number of universities and research institutes of the Austro-Hungarian Empire. In 1839 Dr. Rudolf Wagner physician, professor (Budapest) carried out the first chemical analysis of the Lipik water and - based on studies - found Lipik's water easily soluble thermal water being in the first place among all known thermal waters in Europe. Then the analysis of the Lipik thermo mineral water was carried out by Professor Josef Saagen (Vienna). Professor Saagen as the greatest balneologist of his age stated on the basis of his own researches that Lipik water is "really unique among the continent's healing springs" (Seegen, 1858). Later the chemical components of the Lipik water were analyzed by Professor Heller (Vienna) in 1870

and in 1885 and 1887 in the Mineral Chemical Analysis Institute founded by Professor Dr. Béla Lengyel (Budapest) in 1884 which have given the following results (See: table 1).

Table: the chemical composition of the Lipik water

	SOLID COMPONENTS G/L	CATIONS (%)	ANIONS (%)
Sodium	8,4995	88,38	-
Potassium	0,8973	5,48	-
Calcium	0,2800	3,37	-
Magnesium	0,1392	2,77	-
Chlorine	3,7346	-	25,16
Iodine	0,1200	-	0,23
Nitric acid – residues	0,0100	-	0,05
Sulphuric acid residues	2,5876	-	12,89
Carbonic acid residues	7,7346	-	61,67
Silica	0,6738	-	-
Arsenic, aluminium, bromine, iron, lead...	in traces	-	-
Total	24,6766	100,00	100,00

Source: Proszty, 1963; own design

Professor Dr. Lengyel also stated that the water in addition to its solid components also contains free and bound semi-carbonic acid (9.4468) its specific weight is 1.00257 kilograms with a temperature of 64^o Celsius. Dr. Béla Lengyel summarizing his test results found that the Lipik water has an excellent chemical composition, particularly with regard to the fact that hardly any other thermal water can be compared to it. In tests it was found that the Lipik water was characterized by large amounts of sodium carbonate (88.38%), the decent amount of salt and sulphuric acid salts and iodine content. Professor Lengyel compared the composition of the Lipik thermo mineral water with thermal waters of the most significant medical places at that time (Aachen, Karlsbad, Wiesbaden, Vichy). He found that the Lipik thermal water can be best compared with Karlsbad thermal water among the analyzed healing waters. Dr. Béla Lengyel saw the advantages of the Lipik thermo mineral water in opposition to Karlsbad water in the advantageous relationship between salt, sulphates, and sodium hydrogen carbonate. This finding was based on the following: in the Karlsbad water sodium bicarbonate is only 1.8 times more than salt, however, in the Lipik water it has a much better value of 3.1. The amount of sulphuric acid in Karlsbad water is 1.4 times as much as sodium hydrogen carbonate

and to its advantage in Lipik water it is preferably only 0.2 times higher. Professor Lengyel on the basis of the results of his research he considered Lipik water a medicinal mineral water (Lengyel, 1874). In 1890, Professor Dr. Károly Than (Budapest, Hungary) conducted further studies with the Lipik water. Professor Than especially revealed the relation of iodine and other components in Lipik water (Markó et al., 2003) (table 2).

Table: The iodine content of solid elements of mineral waters containing iodine

	LIPIK WATER	HALL WATER ⁸⁹	CSÍZ ⁹⁰ WATER	KREUZNACH ⁹¹ WATER
Iodine content of solid elements (%)	0,491	0,287	0,208	0,002

Source: MTA, 1890; own design

Dr. Than Károly's tests showed that the amount of solid elements in the Lipik mineral water is not significant, but the relative iodine content of solid elements is much more significant than in other waters of similar nature he had studied before. According to Professor Árpád Bókai president of the National Association of Balneology the Lipik mineral water has similar properties as the Ems⁹² water in Germany. Based on his measurements he demonstrated that salts dissolved in the Lipik mineral water can almost be completely separated according to the dilution. Based on his hypothesis the medical results of the Lipik mineral water are due to this fact (Kern, 1878). On the basis of examinations on the spot by Dr. Béla Szilárd (Steiner) it was found that gases flowing out of the Lipik mineral water have radioactive properties. His on-site tests were supported by laboratory test results⁹³ according to which the Lipik water has a high rate of perfect radioactivity (Palló, 1981).

⁸⁹ Bad Hall (Austria)

⁹⁰ Csíz (Slovakia)

⁹¹ Bad Kreuznach (Germany)

⁹² "Ems consists of two parts, the village and bath; together with 4000 inhabitants. The bath has a number of hot springs all with an alkaline nature and the warmest among them reaches 42 Reauraur degrees. The water is clear and slightly bluish, tastes slightly salty, spicy and alkaline and resembles a little bit of the flavour of almond shells. If it stands for a longer time we can find remains like cinnamon at the bottom of the vessel consisting of whitewash and mine. It is mostly used in the gastro- and kidney problems, rash and tumors. It has a huge impact on the nervous system, too. It is suspected that the Ems healing springs were already known to the Romans as a number of Roman coins, old building remains and even the founding stones of a Roman castle were found there."
Source: Vasárnapi Újság, 1871, Volume 18, No 31., 30 July.

⁹³ Laboratoire de Produits Radioactifs, Paris (France)

3. Lipik well products and medical indications

3.1. Medicinal water

By the end of the XIX. century it was established on the basis of the results obtained with many years of experience and experimentation that the Lipik mineral water easily dissolves with a salt and iodine content and whose therapeutic effect comes from its specific chemical composition and physical properties making it unique in Europe. The Lipik mineral water's medical effects essentially depend on two factors: essentially boosting metabolism (1) and strongly advancing absorption progress (2) (Marschalkó, 1895). These facts were supported by the then medical science's view that the therapeutic effects of radioactive water are more efficient and effective which is beneficial for the human body's metabolism. The excellence of Lipik mineral water was due to its perfect radioactive properties. The medicinal value of Lipik water was further increased by the high natural temperature of the mineral water. In Lipik - unlike other spas where the water of springs was introduced to baths only after being artificially heated and thereby there was a change in their composition –the huge mass of water of the spring rushed through the pools through six large cooler surfaces. The Lipik spa water was not mixed with other water so it reached the baths in the natural form and in its original state.

3.2. Spring-salt

After the distillation of the Lipik thermal water spring salt was extracted and after crystallization a concentrated salt tincture remained. As a result of the significant sodium hydrocarbon and salt content and low sulphuric acid content Lipik spring salt is similar to that of Ems and Vichy⁹⁴ products. By virtue of its composition the Lipik salt was on the one hand used for drinking cures, promoting digestion, on the other hand, for inhalation, used for the purposes of inhalation therapy. Its use was helped by the low content of sulphuric acid salt that did not irritate sensitive mucous membranes so it was particularly applied for people with weaker bodies especially children (Zala Journal, 1908). The Lipik spring salt was released by the Board of Directors of the Lipik Spa in ¼, ½ and 1-kilogramm cans.

3.3. Medical indications

In therapeutic use of medicinal waters they can exert their effects through their physical and chemical properties (Fioravanti et. al 2011). These physical effects include mechanical and heat effects of the water (Hungarian Balneology Association, 2007). Among the mechanical factors buoyancy, consistency, hydrodynamic effect, hydrostatic pressure and immersion can result in physiological changes (Sramek et. al 2008). On the basis of their chemical proper-

⁹⁴ Mid-French town.

ties and mineral composition mineral waters are classified into different groups (Tefner et al, 2011.). They exert their therapeutic effects for the human body in various diseases by their different mineral composition (Schulhof, 1957; Bender, 2014). Mineral waters due to their beneficial effect on the body can also be used as bath cures and drinking cures (Csermely, 2009). Therefore the Lipik thermal spring water was used for both bathing and drinking cures. As natural thermal water, according to current knowledge it possessed an unparalleled high degree of heat. Therefore it was recommended for the treatment of all diseases which – on the basis of many years of experience – healed excellently through the use of akrototherms⁹⁵.

These included rheumatic diseases such as arthritis (rheuma), rheumatic gout (arthritis), the ischias and the old cases of metal toxicity. Year by year the number of patients increased who had a fancy for sulphuric thermal waters and used them for years without any results but after spending a couple of time in Lipik they could completely get rid of chronic (long-term) diseases. Furthermore, successes of the Lipik thermal water were reported for those diseases, which resulted in the formation of effusion (accumulation of fluid inflammation) in the pleura, in the women pelvis and in the area of the appendix. It became widely known that Lipik spa is also great for musculoskeletal diseases; bone fractures, the weakened muscles and paralysis, as well as treating mutations remained behind surgeries to treat residual lesions. Thanks to the lucky juncture of two therapeutic factors - the physical and chemical properties of the thermal water - and the halogen nature of the water provided the medical effect therefore the success of Lipik spa was clear from the very beginning. As a result the use of the thermal water was efficient in frequent diseases of the age that were hardly manageable by medicines like rachitis⁹⁶, tuberculosis of the cervical lymph nodes, the initial and chronic forms of gland mutations and the most stubborn cases of syphilis. It is likely that in the case of the latter forms of diseases in addition to the physical factors of the water its chemical elements have also played a leading role in healing and the two healing factors enhanced each other. Significant results have been reached in treating anaemia in young girls and among metabolic disorders anaemic disturbances caused by nutritional failure have totally been eliminated in Lipik spa. Later a number of very interesting studies were written from classical results which were experienced during the application of the Lipik water as a drinking cure for internal diseases, especially gastrointestinal diseases. The results were first obtained empirically and were later supported by clinical observations and trials (Szállási, 1975). Thanks to these early observations and studies later it was proven theoretically and practically, too that in the proper dosage and besides proper diet the Lipik water normalizes the stomach malfunctioning, secretion of gastric juice either

⁹⁵ Clean, or indifferent thermal water, Plural noun.

⁹⁶ Abnormal Vitamin D deficiency.

increased or decreased, or the formation of hydrochloric acid either necessary or unnecessary, the torpidness of stomach and intestinal muscles and their innervations problems.

The spring's special advantage was that besides a high content of sodium bicarbonate (about 2 ‰) it contained only a very small amount of free carbonic acid. The thermal water – thanks to this property - was very suitable for the safe treatment of gastrointestinal functional disorders in opposition to the waters containing higher amounts of sulphuric acid salts like the Karlsbad water where on several occasions disturbances occurred during its use which made it impossible to continue the drinking cure. For such reasons the suspension of the application of Lipik thermal water has never taken place. Even then it was realized that the warm alkaline waters mainly if they contain salt have a first-class expectorant effect (Boleman, 1887). Therefore the Lipik water which erupted to the surface with a 64°C temperature was most comparable to the French Vichy with its 45°C eruption-temperature and it reached its most significant achievements in the gastro-intestinal catarrhal diseases, the formation of stones and sand in kidneys and vesica, chronic renal pelvis and cystitis, gall stone and jaundice. Thanks to the salt content it became a competitor of EMS and other foreign warm salty⁹⁷ waters. The results achieved in treating the chronic diseases of the respiratory system (nose, pharynx, larynx) were attributed to the combined salt and twice carbonated sodium content of the Lipik thermal water. Furthermore another speciality of Lipik was curing diabetes but also good progress has been made in the lower abdomen pain, fatty liver, and also in the treatment of psoriasis. Summarizing the medical contraindications it can be concluded that thanks to the high natural temperature and physical properties of the Lipik water doctors reached significant results with rheumatism, stomach-intestinal, respiratory diseases, in treatment of certain dermatological and internal organ diseases by using bathing and drinking cures. The diseases of the XIX. century's society caused significant problems later on so the actuality of the balneotherapy treatments remained (Hojcska, 2015).

4. Medical devices in the service of medical tourism

The spa in Lipik is spread over in the middle of a several acres big well-kept park, which was developed for health tourism in accordance with the most modern pharmaceutical water requirements at that time. The water sanitation building had a separate women's and men's special department where personnel performed tasks around the baths skillfully and they pre-

⁹⁷ The sour water is a group of mineral waters (based on the presence of constituents) of which main constituent is the once and twice-carbonated sodium and (especially in the cold waters) free carbon dioxide.

pared medical procedures around the guests. In all cases the professional staff carried out the activities under strict medical supervision. Being aware of the diversity of medical indications Lipik provided numerous medical devices in the service of medical tourism like drinking cures, the thermal bath, carbon dioxide bath, a spa masks, the inhalatorium, massage, diet cuisine and pharmacy. In Lipik basically two medical device groups were applied used the Lipik special and Lipik supplementary medical devices.

4.1. Special medical devices of Lipik

The Lipik advanced and special medical devices included drinking cures and spa, of which basis was given by a crystal clear water in its original condition free from soil water, bacteria and other contaminants mineral water.

4.1.1. Drinking cures

The 640 Celsius degrees healing water was used for drinking cures more or less cooled according to medical instructions, for which the drinking fountain was built (Figure 1).



Figure 1: Lipik spring and drinking fountain
Source: Zemplén Museum, Szerencs

The drinking cure according to the indications could be performed by bath tourists either at home or on the spot. For the drinking cures the healing water could be bought in bottles (25 pieces / box) at the directorate of the Lipik bath.

4.1.2. Spas

In Lipik spa institutes on the basis of the diversity of diseases treated and different needs of spa tourists, different baths were designed: Public bath, Turkish bath, Bathtub, Roman bath, Stone bath (Figure 2), Marble Spa, Salon Spa, Fizzy bath.



Figure 2: Stone bath

Source: Zemplén Museum, Szerencs

The spas were designed partly according to the common and partly to individual (special) needs of the guests. Among the spas baths can be found from the simplest to the most de luxe ones like a Marble bath (Figure 3).

4.1.2.1. Private bath

The number of private bathrooms in Lipik was more than a hundred which were open in the summer high season from 4 o'clock in the morning until 18 o'clock in the evening. The bathing classes for spa guests were only available in the order of prior registration.

4.1.2.2. Common baths

Among the common baths public baths were the easiest designed and furnished whereas the salon and marble bath were designed and furnished with large luxury. Lipik's valuable and interesting uniqueness and among all baths the most elegant baths was called the Roman Baths. In the Roman baths there were more large swimming pools with different temperatures which were in direct contact with the steam baths, so patients in the bath could receive complex medical treatment.



Figure 3: Marble Baths
Source: National Széchenyi Library, Budapest

4.1.2.3. Winter bath

The winter bath was built in one together with the hotel called Dépendence (Figure 4) forming an integral unit so that the hotel guests could reach the spa facilities comfortably whatever the weather conditions have been.



Figure 4: Dépendence Hotel
Source: Zemplén Museum, Szerencs

In the spa building individual and common baths were built taking into account the then prevailing balneology science. The white marble bath was built at a considerable cost and carbonated baths were also designed. The pools and tubs of the winter baths contrary to their names were not only in operation in winter but throughout the whole year.

4.2. Lipik additional medical devices

The effervescent bath, the inhalatorium, massage, diet cuisine and pharmacy were not special Lipik medical devices but also those that were advisable to apply in Lipik, too. These additional medical devices on the one hand, were used to complement and combine the specific cure of participants in Lipik medical tourism and, on the other hand, make it available for the holiday-makers as well as the accompanying persons. The additional medical devices have been built in the most modern and practical ways according to the age, Lipik's reputation and its specialized medical instruments.

4.2.1. Inhalatorium

For the purpose of inhalation treatment an inhalatorium was constructed in an ornate part of the building with inhalation cabins. The cabins were equipped with Dr. Bulling's most modern breathing apparatus that were the most up-to-date at that time. With the breathing apparatus primarily Lipik thermal water and spring salt treatments and, secondly, other medicine treatments were used with continuously monitoring the vapour temperature and the duration of treatment.

4.2.2. Massage

In Lipik spa there was a great emphasis on massages, so in the Water Medical Institute separate massage rooms were designed for women and men. In the massage qualified masseuses and masseurs worked together with other certified unskilled workers. The employees working in massage performed their work in accordance with medical standards.

4.2.3. Diet cuisine

The Lipik Bath Board recognized the need for diet food, which was basically developed due to two factors. On the one hand, they wanted to enhance the positive effects of drinking and bath cures and, on the other hand, to serve the needs of the large number of patients with stomach and kidney problems. The dietary cuisine was introduced in the restaurant called Kúrszalon⁹⁸ with a varied diet to suit a variety of dietary criteria.

⁹⁸ Bath and community space, which was built for the purpose of care and entertainment in an ornate building with a restaurant, café, play-rooms.

4.2.4. Pharmacy

In Lipik there is a beautifully designed and well-equipped pharmacy having all Lipik spring products and other foreign pharmaceutical products at the service of bath tourists. In Lipik spa all the medical devices met the most strict hygiene standards of the age. Cleanness in an exemplary manner in the most modern form was provided by a superheated steam-powered disinfectant machine.

Conclusion

The bath in Lipik was developed according to its spring products and medical indications that immediately went into to the service of tourism. On the basis of differentiated needs of medical tourists Lipik special medical devices, baths and drinking cures were designed which was only available under medical supervision. Non-special Lipik medical devices were established as well on the one hand, to complement and combine the specific cure of participants in Lipik medical tourism and, on the other hand, make it available for the holiday-makers as well as the accompanying persons. New investments and new therapeutic tools were introduced into Lipik spa that proved its ability for medical tourism development.

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Zalai Közlöny, 1908. május 4. Nagykanizsa

SUMMARY

Medical devices in the service of tourism in the XIX. century

Thermal and medicinal waters have been something attractive for humans for centuries. In the Carpathian hollow, the culture of spa bathing is over two thousand years old. Even Ancient Romans used medicinal wells and the spa life bloomed during the Austro-Hungarian Monarchy. Health tourism within the more general notion of tourism began to develop in the first half of the 19th century and it was based on natural resources, thermal waters foremost, based on longer cures and health treatments. Spas slowly became populated and offered recovery from various ailments with the development of medicine, which made them favorite for citizens of places such as Lipik. In the second half of the 19th century, Lipik water was the subject of tests for numerous investigators. Based on research, they established a beneficial combination of the elements of the water in Lipik, as well as its medicinal properties brought on by the degree of warmth and physical characteristics of the spring, which is unique in Europe. The water from Lipik was firstly used against bone and blood ailments i.e. gout. Medicinal water and salts were used in the treatment. Those were supplemented by physical therapy. Apart from the special medicinal supplements of Lipik, the medicinal baths and treatments by water drinking, additional medicinal supplements were used, such as spas with carbon dioxide, inhalators, massages, diet kitchens, and drugstores. All of these established the success of this place in the context of spa tourism.

Key words: Lipik, treatment center, spa, healthcare.