

The Role Of Natural Mineral Dead Sea Waters Therapy In Various Rheumatic Diseases

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Abstract: The modern era treating skin diseases psoriasis and rheumatoid arthritis using the properties of natural mineral and thermal waters at the Dead Sea and effective results have also been observed with other skin problems. The determination of mineral elements concentration in the dead sea water were analyzed using Electrochemical methods, differential pulse stripping voltammetry (DPSV) performed on a hanging mercury drop electrode (HMDE). Also, chemical parameters were studied using Spectrophotometer.

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1. Introduction

For over 1500 years the general curative powers and therapeutic advantages of the Dead Sea have been well recognized. Historical figures such as King Herod and Queen Cleopatra utilized the Dead Sea for medicinal and cosmetic purposes. The modern era for treating skin diseases at the Dead Sea began in 1959 with psoriasis being the principal dermatologic disease treated but effective results have also been observed with other skin problems (Abels and Kipnis 1998). The belief in the healing properties of natural mineral and thermal waters dates back to antiquity, also known as balneotherapy, medical hydrology, or thermal therapy, became popular for the treatment of various musculoskeletal conditions in Europe during the eighteenth century and later in countries outside of Europe (Sukenik et al., 1999). Thermal water may have a beneficial effect on the formation of free radicals. The therapeutic efficacy of mineral vs. tap water is different, although bathing in hot water itself reduces enzymes catalase or superoxide dismutase or glutathione peroxidase activities. The mode of action of balneotherapy has not yet been fully understood. Publications on the absorption of trace elements from mineral water are scarce (Halevy et al., 2001). More papers are available on the hormonal effects of balneotherapy, e.g., on its influence on beta-endorphin and cortisol levels (Pizzoferrato et al., 2000, Bellometti et al., 2002 and Bellometti et al., 2005) Literature data on the interaction between balneotherapy and the antioxidant system are insufficient. Nevertheless, the vast majority of these publications assert the favorable influence of balneotherapy on antioxidative processes. In his

study conducted on patients with Type II diabetes, and described the beneficial effect of balneotherapy on the glutathione metabolism of platelets (Ohtsuka et al., 1996). Also emphasized the positive effect of radon-containing medicinal baths on the activity of superoxide dismutase (SOD) and catalase (Yamaoka et al., 2004) and reported the reduction of SOD activity in patients with rheumatoid arthritis undergoing treatment with sulfuric water (Grabski et al., 2004) which concluded likewise after 3 weeks of balneotherapy (Ekmekcioglu et al., 2002) and demonstrated the reduction of elevated, as well as the normalization of low, peroxidase activity. The author concludes that the balance between pro- and antioxidant processes cannot be regarded as the single relevant attribute in appraising the efficacy of balneotherapy (Loos et al., 2003) and devoted several papers to the antioxidant property of balneotherapy (Bellometti et al., 1996). In conclusion, mineral water may exert a beneficial influence on the antioxidant system. Bathing in mineral vs. tap water induces different changes in enzyme activity. Regardless of its composition, mineral water can mitigate abnormally elevated enzymatic activity and further studies are necessary to elucidate the mechanism of the antioxidant action of balneotherapy (Bender et al., 2007).

2. Materials and methods

Gathering samples: Sea water samples were chosen from the Dead sea water.

The apparatus used in the study :

1- The concentration of mineral elements were measured by Polarograph instrumental 746 VA trace

analyzer with 747 VA stand or from Metrohm company .

WE Multi Mode Electrode (MME)

Mercury drop capillary for MME

AE Pt rod electrode

RE Ag/AgCl reference system c(KCl) = 3

Electrolyte vessel filled with c(KCl) = 3 mol/L

The information storage is done by a computer, from Toshiba company 757 VA computracy joined with the device.

2- Spectrophotometer company Hach Lange/LPV 42299 – 00001.

3. Results and discussion

The Dead Sea, Figure 1. is the lowest point anywhere on Earth. When it was measured, by the end of November 2009, the Dead Sea was some 422.15 m below mean sea level. It has earned its name due to the high salinity values of its water, being by far the saltiest with a salinity value of 30% (salinity about 277 g/kg). To put this in perspective, water from the Dead Sea is about ten times more salty than ordinary sea water . Throughout history the Dead Sea has been an important source of salt and potash for the peoples living in the region and abroad (Khlaifat et al., 2010).

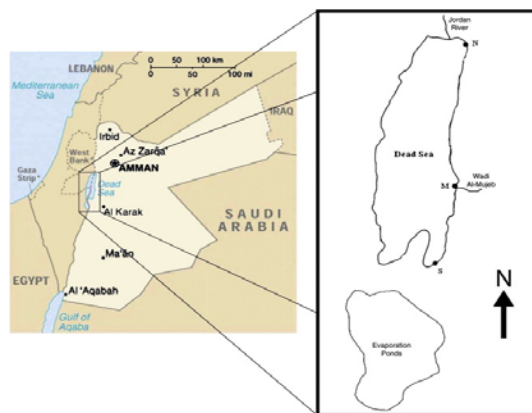


Figure 1. Dead Sea and Sampling Points.

Table 1. shows the chemical parameters of the Dead Sea water. They have been analyzed using SPSS program , at significant ($p < 0.01$).

While PH – Value was neutral. Also table 1.shows total total soluble solid salts was (763700 mg/l) and it can be seen that ammonia was (24 mg/l) while alkalinity, it was (270 mg/l).

Table 1. Chemical Parameters of the Dead Sea water

Chemical Parameter	Mean \pm S.D.
PH - Value (25°C)	7 ± 0.0001
Total soluble solid salts	763700 ± 0.0012
Total alkalinity (mg/l)	270 ± 0.0002
Ammonia (mg/l)	24 ± 0.0028

Physical Parameters: (turbidity, color, smell) of Dead Sea water have been studied, they are clear and turbidity was (1.38 mg/l).

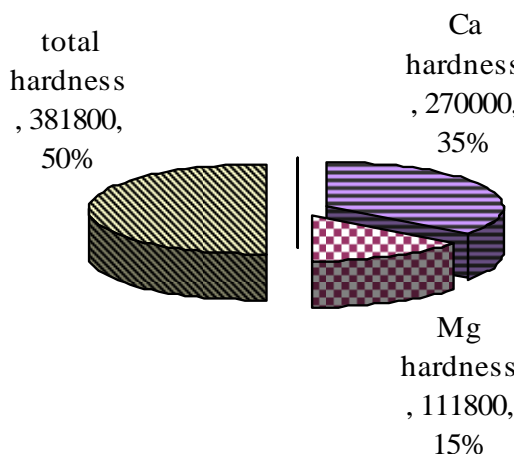


Figure 2. Ca,Mg and Total hardness(mg/l)

Figure 2. Shows Mg hardness of Dead Sea water was about (15%=111800 mg/l) while about (35%=270000mg/l) in Ca hardness and about (50%=381800mg/l) for total hardness of Dead Sea water.

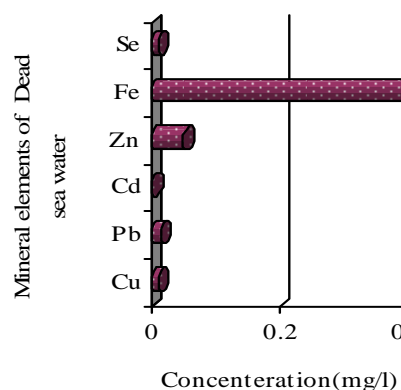


Figure 3. Mean concentration of mineral elements of Dead sea water .

It is clear from Figure 3. that, the mean concentration of mineral elements in Dead sea water is, as follows:

1. The highest mean concentration Fe element is found, that it reached (40ppm).
2. The lowest mean concentration Cd was within (0.00175ppm).
3. Mean concentration Cu was within (0.011ppm), and while, it was for Zn element within (0.05ppm) in Dead sea water.
4. Mean concentration Se element is found to reached (0.01ppm).

Also it is clarified from Figure 3 that the highest concentration of all in Dead sea water under the study is as follows : Fe element > Zn element > Cu element > Se element > Pb element > Cd element. Bacterial contamination of Dead sea water can be a problem. Table 2. shows bacteriological parameters ,it approved that no bacterial contamination is presented (E.coli bacteria , Fecal coliform and total count of bacteria).

Table 2. Bacteriological Parameters of Dead sea water

Bacteriology	Dead sea water / Mean \pm S.D.
Total count of bacteria	Null
E.coli bacteria	-ve
Fecal coliform	-ve

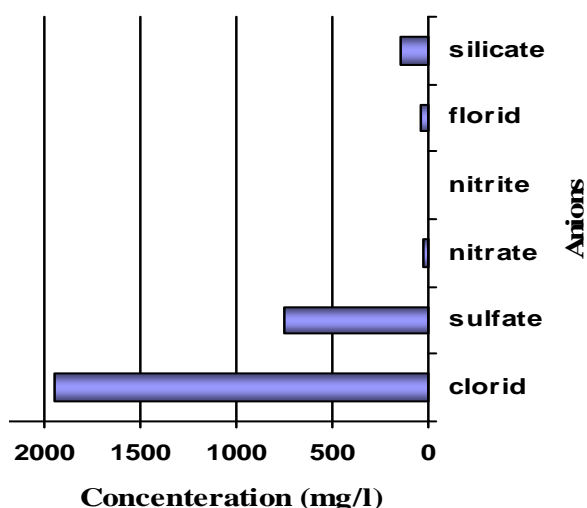


Figure 4. Concentration of anions in Dead sea water

Figure 4 shows that the concentration of sulfate (SO_4^{-2}) in Dead sea water was (750 mg/l).

The highest mean concentration was found with chloride (Cl^-) noticed from the Figure is (194540mg/l) , while the lowest concentration was of florid it reached (42 mg/l) in Dead sea water .

Also the study proved that mean concentration of silicate reached (150 mg/l) .Also, the results show that the concentration of nitrate was found to be (31.8 mg/l) and for nitrite was (0.344 mg/l) in the Dead sea water.

Conclusion

Balneotherapy is becoming an increasingly popular therapeutic modality for the management of musculoskeletal disorders. Among others, this trend is partially explained by the beneficial effect of mineral water on the antioxidant system. It is yet undecided whether the magnitude of the therapeutic effect of mineral water is influenced by its composition; whether this effect is different in inflammatory and in degenerative disorders; or whether balneotherapy can mitigate the formation of free radicals permanently.

The obtained results shows high total soluble solid salts of Dead sea water, and total soluble solid salts amounted to about (763700 mg/l) while pH – Value was Neutral and, the total alkalinity was (270 mg/l). Also it can be seen that ammonia was (24 mg/l) and , the total hardness were (381800 mg/l) , while Mg hardness was (111800 mg/l) and Ca hardness of Dead sea water was (270000 mg/l). Also it is clarified from results that,

-The highest mean concentration of mineral element was Fe element in Dead sea water

- Concentration Cd in Dead sea water was the lowest mean concentration.

-Also the highest concentrations in Dead sea water under the study is as follows: Fe element > Zn element > Cu element > Se element > Pb element > Cd element.

- Also the bacteriological parameters approved that no bacterial contamination was presented (E.coli bacteria , Fecal coliform , and total count of bacteria was nill).

- The highest mean concentration of anions was found with chloride (Cl^-) which is noticed to be (194540mg/l) , while the lowest concentration of nitrite was found (0.344 mg/l) in Dead sea water.

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