International Journal of Advanced Science and Research
www.allsciencejournal.com
ISSN: 2455-4227
Received: 02-05-2021; Accepted: 16-05-2021; Published: 30-05-2021
Volume 6, Issue 2, 2021, Page No. 31-33

A chemical and mineralogical composition of dead sea mud

Nishikant S Lokhande
Department of Botany, Badrinarayan Barwale Mahavidyalaya, Jalna, Jalna, Maharashtra, India

Abstract
A laboratory analysis was performed to determine the chemical properties of the Dead Sea mud. Samples collected from dead sea mud, Israel. Several analytical techniques were used to determine the chemical and mineralogical compositions of mud sample. Parameters such as pH, EC, OC, P, K, Mn, Zn, Fe, Cu were studied. The main focus of the work was to document mud characteristics and to study the chemical properties. The mud samples were quite rich in K 737 (%), Ph (7.4). EC 6.8 (dSm^{-1})was the most abundant trace element in the samples followed by S.4.8 (meq/100 gm), Ca. 2.0 (meq/100 gm), Mg. 1.6 (meq/100 gm),Zn 0.83(meq/100 gm).There were significant differences in the elemental contents of mud samples collected from dead sea mud Israel.

Keywords: dead sea, mud, chemical, mineral

Introduction
The Dead Sea has been popular for its therapeutic and cosmetic properties. The unique climatic conditions in the Dead Sea area make it a renowned site worldwide for the field of climate therapy, which is a natural approach for the provision of medications for many human diseases including unusual exclusive salt composition of the water, a special natural mud, thermal mineral springs, Solar irradiation, oxygen-rich and bromine-rich haze. (Abeer 2017) [1]. The Dead Sea (DS), the lowest geographical location on earth, is considered to be the biggest natural saline reserve in the world. The sea's salt content, approximated to be (348 g/L), makes its salinity 10 times the typical salinity of oceans. The atmosphere of the Dead Sea is rich in oxygen by 10% more than any other typical sea, which might be attributed to its exceptionally low altitude. (Oumeish 1996) [20] Approximated to be 396 meter below sea level. (Falk et.al 2006) [11]. However, the unparalleled salinity is not the only extraordinary characteristic of the Dead Sea, as it contains natural thermo-mineral waters, mineral muds, higher bromine content in the air, as well as high selenium content of local drinking water. (Halevy and Sukenik 1998) [12]. Due to the rarity of its atmospheric and climatic features, the Dead Sea is considered to be an attractive destination for patients who seek a medication for diseases such as psoriasis (Abels and kipnis 1998, Even-Paz 1996) [4, 9] rheumatic disorders (Halevy and Sukenik 1998) [12], (Sukenik and Neumann. 1990) and atopic dermatitis (Halevy and Sukenik 1998) [12] Treatments are mainly based on bathing in the Dead Sea water while exposing the skin to filtered UV radiation, and mud packs prepared from highly saline black mineral mud that is rich in sulfide, which is found abundantly in the area (Sukenik and Neumann. 1990) [23], (Sukenik and Neumann, 1992) [24].

Materials and Methods
Physico-chemical properties and determination of mineral elements were analysed from soil health clinic, Krushi Vigyan Kendra M.S.S.M, Jalna District. Jalna. (M.S) India.

a. Analyses of chemical properties:
The analysis involves the estimation of pH, electrical conductivity (EC), Organic Carbon (OC) of the Dead Sea mud were carried out in the present study.

b. Determination of mineral elements
The elements were extracted from Dead Sea mud by the wet digest method. The digested sample was analyzed for the elemental composition using Atomic Absorption Spectrophotometer (AAS), P, K, Ca, Mg, S, Mn, Zn, Fe, and Cu were determined and the concentrations of the elements were presented in mg/L.

Results and Discussion

Table 1: Chemical and mineralogical composition of Dead Sea mud, Israel

Sr. No	Dead Sea mud, Israel	
	Sr.No-SP5089/18	
	Properties	Observations
1.	pH	7.4
2.	EC(dSm^{-1})	6.8
3.	OC (%)	0.68
4.	P (%)	1.4
5.	K (%)	737
6.	Ca (weq/100gm)	2.0
7.	Mg (weq/100gm)	1.6
8.	S (ppm)	4.8
9.	Mn(ppm)	1.8
10.	Zn(ppm)	0.83
11.	Fe (ppm)	1.4
12.	Cu (ppm)	0.36

Chemical and mineralogical composition of Dead Sea mud, Israel was observed. The results are mentioned in table1. It is clear from result summarized in table 1 that the mud samples were quite rich in Ph (7.4), EC 6.8 (dSm^{-1}) K 737 (%) was the most abundant trace element in the samples followed by S.4.8 (meq/100 gm), Ca. 2.0 (meq/100 gm),Mn.1.8(ppm), Mg. 1.6 (meq/100gm), Fe.1.4(ppm),

P(1.4), Zn.0.83(meq/100gm), OC.0.68(%), Cu(0.36).There were significant differences in the elemental contents of mud samples collected from dead sea mud Israel. Several workers have performed such type of experiments on Dead Sea mud. Abdel-Fattah and Pingitore (2009) [3] studied the composition of the Dead Sea mud samples from 3spots in the Jordanian side of the Dead Sea and observed that toxic heavy metals present in concentrations below standard levels. In the same investigation, 16 commercial Dead Sea mud-based and mud enhanced cosmetic products, which were marketed in Jordan and in the USA, were analyzed. Generally, cosmetic products have diluted minerals, except for cadmium, which was in levels exceeding those in the plain Dead Sea mud samples in several of the commercial muds and in one facial mask. It was concluded that there is risk regarding mineral toxicity from Dead Sea mud or Dead Sea mud-based products (Abdel-Fattah and Pingitore 2009) [3]. Similarly, (Khlaifat *et al*., 2010) [16]. Studied the physical and chemical properties of 24 different Dead Sea mud samples collected from three different locations on the eastern seaside of the Dead Sea. Their results showed that the mud samples were rich in some elements (Barium, Vanadium, Strontium, lead, cadmium and zinc), although there were significant differences between mud samples collected from different locations, there was no strong correlation between the location and the elements content. The most abundant element was strontium followed by barium, vanadium andlead, with the concentration ranges of 410–810, 155–380, 209–264, 108–114 part per million(ppm).

Benefits of Dead Sea Products.

Since ancient times, Dead Sea mud has been used for treatment of various skin disorders, as it contains high concentration of minerals (Halevy and Sukenik 1998) [12], (Hodak et.al 2003) [13], (Moses et.al 2006) [17]. Thus, Dead Sea mud can stimulate blood circulation, cleanse the skin from dead cells, enhance lymphatic flow and help in wounds healing and soothing irritation (Carretero 2002) [7], (Comacchi and Hercegova 2004) [6] Dead Sea mud salt solution rich in magnesium, has many therapeutic uses. It was proved that bathing in this salt solution improves functions of skin barriers and reduces dry skin inflammation (Proksch 2005) [14]. In addition to magnesium, other elements are present. This includes zinc, which plays a role in wound healing and epidermal regeneration (Iwata 1999) [15]. In addition, other medicinal properties of Dead Sea have been known for thousands of years. The major diseases that are frequently treated by Dead Sea balneotherapy are skin diseases and musculoskeletal diseases such as osteoarthritis, rheumatoid arthritis, ankylosing spondylitis, psoriasis, low back pain and other joint diseases, (Even-Paz and Shani 1989, Shani 1985) [10, 25] (Nasermoaddeli and Kagamimori 2005) [19]. Cosmetics products contain either Dead Sea mud or salts have been used for long years and many companies offer product lines that feature Dead Sea minerals. Such products include hand and body lotions, mineral peeling soaps, mineral mud soaps, bath salts, eye cream, cleansing mud masks, body exfoliates, body butter, sunscreens, lightening cream with sun protection factor, firming night creams, scalp masks, antidandruff shampoos, and products. Dead Sea water is widely used in cosmetics, because of its moisturizing and smoothing properties. This is ultimately due to the high magnesium content that enhances water retaining in the skin (Maorz, et.al 1997, Riyaz and Arakkal 2011) [18, 21]. and CaCl2 which provides the Dead Sea water its oily feel. (Even-Paz and Shani 1989, Schamberg 1978, Kudish et.al 2003) [10, 22, 16].

Conclusion

This paper has examined the physico-chemi characteristics of samples collected from dead sea mud, Israel. Characterization of Dead Sea mud showed quite rich in chemicals and minerals.

Acknowledgements

Author is grateful to the Principal, Badrinarayan Barwale Mahavidyalaya, Jalna Dist. Jalna (M.S.) India and for providing necessary facilities.

References.

1. Abeer Al, Bawab1, Ayat Bozeya, Saida Abu-Mallouh, Basha' er Abu Irmaileh, Ismail Daqour, Rund A. Abu-Zurayk, 2017.
2. The Dead Sea Mud and Salt: A Review of Its Characterization, Contaminants, and Beneficial Effects. The 2nd International Conference on Advanced Materials (ICAM-2017) IOP Publishing IOP Conf. Series: Materials Science and Engineering 305, 2018. 012003 doi:10.1088/1757-899X/305/1/012003.
3. Abdel-Fattah A, Pingitore NE. Environmental Geochemistry and Health,2009:31(4):487-492.
4. Abels D, kipnis V. A Dead Sea perspective clinics in Dermatology,1998:16:695-698.
5. Abu-Al-Basal M. Pakistan Journal of Biological Sciences,2012:15(7):306-315.
6. Comacchi C, Hercegova J. Journal of the European Academy of Dermatology and Venereology,2004:18:372-374.
7. Carretero MI. Applied Clay Science 21 155-163. [50] Proksch E, Nissen H P, Bremgartner M and Urqu-hart C 2005 International Journal of Dermatology,2002:44(2):151-157.
8. Even-Paz Z, Shani J. International Journal of Dermatology,1989:28(1):1-9.
9. Even-Paz Z. Israel journal of medical sciences,1996:32:511-515.
10. Even-Paz Z and Shani J. International Journal of Dermatology,1989:28(1):1-9.
11. Falk B, Nini A, Zigel L, Blau H. Pediatric pulmonology,2006:41(3):234.
12. Halevy S, Sukenik S. Ar-chives of Dermatology,1998:134(11):1416-1420.
13. Hodak E, Gottlieb AB, Segal T. Journal of the American Academy of Dermatology,2003:49(3):451-457.
14. Proksch E, Nissen HP, Bremgartner M, Urqu-hart C. International Journal of Dermatology,2005:44(2):151-157.
15. Iwata M, Takebayashi T, Ohta H, Alcalde RE, Itano Y, Matsumura T. Histochemistry and Cell Biology,1999:112(4):283-290.
16. Khlaifat A, Al-Khashman O, Qutob H. Materials Characterization 61 564-568. Kudish AI, Abels D and Harari M. International Journal of Dermatology,2010:42(5):359-365.
17. Moses SW, David M, Gold hammer E, Tal A, Sukenik S. The Israel Medical Association

Journal,2006:8(7):483-488.
18. Maorz, Yehuda S, Voss W. International Journal of Cosmetic Science,1997:19(3):105-110.
19. Nasermoaddeli A, Kagamimori S. Environmental Health and Preventive Medicine,2005:10:171-179.
20. Oumeish Y. Clinics in Dermatology,1996:14:659-664.
21. Riyaz N, Arakkal FR. The Indian Journal of Dermatology Venereology & Leprology,2011:77(2):128-134.
22. Schamberg IL. International Journal of Dermatology,1978:17(6):524-525.
23. Sukenik S, Buskila D, Neumann L. Annals of the Rheumatic Diseases,1990:49:99-102.
24. Sukenik S, Buskila D, Neumann L. Clinical Rheumatology,1992:11:243-247.
25. Shani J, Barak D, Levi D. Pharmacological Research Communications,1985:17(6):501-512.