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Study of the Effect of Consciousness Energy Healing Treatment on the Natural Product Berberine Chloride

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Research Article

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Abstract

Berberine chloride is an isoquinoline alkaloid that has antimicrobial activity against bacteria, viruses, chlamydia, fungi, protozoans, and helminths, etc. The study was designed with the aim to evaluate the influence of the Trivedi Effect®-Consciousness Energy Healing Treatment on the physicochemical and thermal properties of berberine chloride by using modern analytical techniques. For this study, the berberine chloride sample was divided into two parts among which, one part was named as control as no Biofield Energy Treatment was given to it; while the other part received the Consciousness Energy Healing Treatment remotely by a renowned Biofield Energy Healer, Alice Branton and named as the Biofield Energy Treated sample. The PXRD results revealed some changes in the Bragg's angle of peaks along with -7.24% to 188.78% alterations in the peak intensities and -65.88% to 135.42% changes in the crystallite sizes of the treated sample. Also, there was 1.91% decrease in the average crystallite size of the treated sample compared to the control sample. The particle size of the treated sample was significantly reduced by 20.16% (d_{10}), 17.21% (d_{50}), 27.53% (d_{90}), and 27.36% {D(4,3)}; along with 15.31% increase in the specific surface area compared with the control sample. The total weight loss was significantly reduced by 25.81%; however, the residue amount was significantly increased by 55.04% in the treated sample compared to the control sample. Besides, the DSC thermogram showed four peaks, in which the peak temperatures of the treated sample corresponding to 1st, 2nd, 3rd, and 4th peak were altered by -2.26%, 3.55%, -4.50%, and -0.69%, respectively. Moreover, the latent heat for 1st, 2nd, 3rd, and 4th peak of the treated sample were significantly reduced by 24.04%, 42.44%, 44.26%, and 47.78%, respectively, compared with the control sample. The results showed that the Trivedi Effect®-Consciousness Energy Healing Treatment might help in improving the solubility, absorption, and bioavailability of berberine chloride compared with the control sample. Hence, the Consciousness Energy Healing Treatment would be useful for designing the novel nutraceutical/pharmaceutical formulations of berberine

chloride with improved drug profile for the treatment of various microbial diseases and disorders such as diarrhea, gastroenteritis, hypertension, tumor, malaria, hyperglycemia, inflammation, arrhythmia, infections, *etc*.

Keywords: Berberine Chloride; Consciousness Energy Healing Treatment; Complementary and Alternative Medicine; The Trivedi Effect®; PXRD; Particle Size; TGA/DTG; DSC

Introduction

Berberine is an isoquinoline alkaloid and is derived from the stem and root of various medicinal plants such as *Hydrastis canadensis*, *Berberis aristata*, *Berberis aquifolium*, *Coptis japonica*, *Phellodendron amurense*, and *Berberis vulgaris*, *etc.* [1]. The use of berberine has been evident for its antimicrobial activity against bacteria, viruses, fungi, chlamydia, protozoans, and helminths, *etc*. In traditional Eastern medicine, it is widely used for centuries as a treatment against diarrhoea and gastroenteritis [2]. Berberine has a wide range of pharmacological activities and is also used for various ailments related to skin and eye [3,4]. Berberine hydrochloride is also used as diaphoretic, antiplasmodial [5,6], anti-hypertensive [7], anti-malaria [8], anti-arrhythmic [9,10], antitumor [11,12], anti-hyperglycemic [13], anti-inflammatory [14,15], anti-oxidative [16], antifungal [17], and cerebro-protective [18] activities. Some studies also reported its role in reducing the lipid and cholesterol accumulations in the liver as well as in the liver [19]. Berberine is used in clinical practice in the form of its salts *i.e.,* berberine chloride and berberine sulfate in the form of immediate release tablet and capsule [20].

Although it has been known for its wide-range therapeutic potential, however, the studies reported that it required high bioavailability in the plasma for the treatment of systemic disorders [10,21]. It is known that the bioavailability and stability profile of a drug is affected by its analytical profile [22]. Moreover, the physicochemical properties play the crucial role in deciding the solubility, absorption, and bioavailability profile of any compound. Therefore, it is advised to improve the physiochemical properties of the drug to attain its maximum biological activities [23].

The Consciousness Energy Healing Treatment is used in these days as an approach to modify the structural, physical, and thermal properties of the drugs and pharmaceutical compounds. Biofield Energy Healing is an Energy therapy, which was accepted for its use against many diseases by the National Institutes of Health (NIH) and National Center for Complementary and Alternative Medicine (NCCAM) and included it under the Complementary and Alternative Medicine (CAM) along with homeopathy, naturopathy, acupuncture, Ayurvedic medicine, acupressure, Reiki, hypnotherapy, Tai Chi, Qi Gong, healing touch, Rolfing, etc., [24]. A human has the ability to harness energy from the universe and can transmit it to any living organism(s) or non-living object(s) around the globe.

The Trivedi Effect®-Consciousness Energy Healing Treatment has been reported for its impact on agricultural productivity [25,26], physicochemical properties of metals, chemicals, ceramics and polymers [27-29], biotechnology [30,31], antimicrobial activity [32-34], bioavailability [35-37], nutraceuticals [38,39], skin health [40], bone health [41], and cancer research [42]. The objective of the present work was to establish the physicochemical and thermal characteristics of Biofield Energy Treated berberine chloride and to characterize the impact of Consciousness Energy Healing Treatment on the properties of berberine chloride.

Materials and Methods

Chemicals and Reagents

Berberine chloride was purchased from Tokyo Chemical Industry Co., Ltd., Japan and the other chemicals used in the experiments were purchased in India.

Consciousness Energy Healing Treatment Strategies

The test sample berberine chloride was divided into two equal parts. One part of berberine chloride sample was received the Trivedi Effect®-Consciousness Energy Healing Treatment remotely under standard laboratory conditions for 3 minutes by the renowned Biofield Energy Healer, Alice Branton, USA, and known as a Biofield Energy Treated berberine chloride sample. However, the second part of berberine chloride was considered as a control sample, to which no Biofield Energy Treatment was provided, but was treated with a “sham” healer. The “sham” healer did not have any knowledge about the Biofield Energy Treatment. After the treatment, both the samples were kept in sealed conditions and characterized using sophisticated analytical techniques.

Characterization

The PXRD, PSA, TGA/DTG, and DSC analysis of berberine chloride were performed. The PXRD analysis of berberine chloride powder berberine chloride was performed with the help of Rigaku MiniFlex-II Desktop X-ray diffractometer (Japan) [43,44]. The average size of crystallites was calculated from PXRD data using the Scherrer's formula (1)

$$G = k\lambda/\beta\cos\theta \qquad (1)$$

Where G is the crystallite size in nm, k is the equipment constant, λ is the radiation wavelength, β is the full-width at half maximum, and θ is the Bragg angle [45].

Similarly, The PSA was performed using Malvern Mastersizer 2000 (the UK) using the wet method [46,47]. The TGA/DTG thermograms of berberine chloride were obtained with the help of TGA Q50 TA instruments. The DSC analysis of berberine chloride was performed with the help of DSC Q200, TA instruments [48].

The % change in peak intensity, crystallite size, particle size, specific surface area (SSA), weight loss, the maximum thermal degradation temperature, melting point, and latent heat, of the Biofield Energy Treated berberine chloride was calculated compared with the control sample using the following equation 2:

$$\%\ \text{change} = \frac{[\text{Treated} - \text{Control}]}{\text{Control}} \times 100 \quad (2)$$

Results and Discussion

Powder X-Ray Diffraction (PXRD) Analysis

The PXRD diffractograms of the control and Biofield Energy Treated berberine chloride samples are shown in Figure 1. The diffractograms of the control and Biofield Energy Treated sample regarding the Bragg's angle, relative intensities, and crystallite sizes were given in Table 1. The PXRD data showed that there were some alterations in the Bragg's angles of the characteristic peaks of the Biofield Energy Treated sample when compared to the control sample. Besides, it was observed that the peak intensities of those peaks of the Biofield Energy Treated sample were significantly altered ranging from -7.24% to 188.78% in comparison to the control sample. Moreover, the crystallite sizes of the Biofield Energy Treated berberine chloride sample corresponding to the characteristic peaks also showed alterations in the range of -65.88% to 135.42% compared with the control sample. Besides, the average crystallite size of the Biofield Energy Treated sample (213.08 nm) was found to be significantly reduced by 1.91% compared with the control sample (209.08 nm).

Nowadays, it is considered that the crystal morphology and crystalline structure of the compounds can be altered using the Biofield Energy Treatment that might act by affecting the Bragg's angle, peak intensities and crystallite size of the compounds and thereby may form its new polymorph [49]. Thus, in this study, the PXRD results might indicate the formation of a new polymorph of berberine chloride as there are significant alterations in the peak intensities and crystallite size of the treated sample compared with the control sample. Moreover, the physical modifications taking place in the drug moiety such as altering the crystal habit might enhance the solubility, dissolution, and bioavailability of the drug [50]. Hence, the Biofield Energy Treated berberine chloride might show more solubility, dissolution, and bioavailability compared with the control sample.

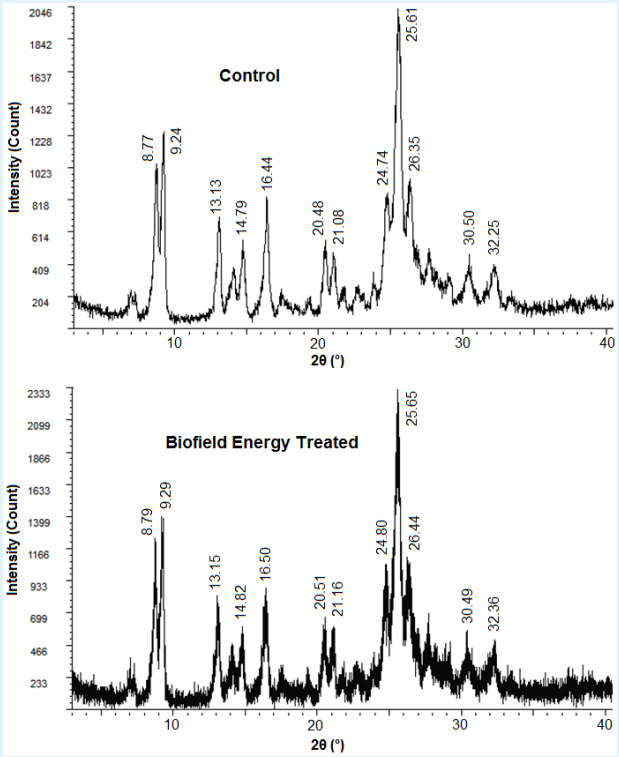

Figure 1: PXRD diffractograms of the control and Biofield Energy Treated berberine chloride.

Entry No.	Bragg angle (°2θ)		Intensity (cps)			Crystallite size (G, nm)		
	Control	Treated	Control	Treated	% change	Control	Treated	% change
1	8.77	8.79	237	221	-6.75	249	242	-2.81
2	9.24	9.29	290	269	-7.24	272	271	-0.37
3	13.13	13.15	146	154	5.48	241	235	-2.49
4	14.79	14.82	106	198	86.79	207	190	-8.21
5	16.44	16.5	159	155	-2.52	210	216	2.86
6	20.48	20.51	89	90	1.12	247	243	-1.62
7	21.08	21.16	83	81	-2.41	223	247	10.76
8	24.74	24.8	252	283	12.3	192	205	6.77
9	25.61	25.65	629	760	20.83	191	209	9.42
10	26.35	26.44	205	592	188.78	211	72	-65.88
11	30.5	30.49	40	80	100	96	226	135.42
12	32.25	32.36	81	102	25.93	170	201	18.24

Table 1: PXRD data for the control and Biofield Energy Treated berberine chloride.

Particle Size Analysis (PSA)

The particle size data of the control and Biofield Energy Treated samples corresponding to 10% level (d_{10}), 50% level (d_{50}), 90% level (d_{90}), and D(4,3) was presented in Table 2. The data showed significant alterations in the particle size distributions of the Biofield Energy Treated berberine chloride sample. It was observed that the particle sizes at d_{10}, d_{50}, d_{90}, and D(4, 3) of the Biofield Energy Treated sample were significantly reduced by 20.16%, 17.21%, 27.53%, and 27.36%, respectively, compared to the control sample.

Parameter	d_{10} (µm)	d_{50} (µm)	d_{90} (µm)	D(4,3)(µm)	SSA(m^2/g)
Control	2.43	16.62	137.93	48.61	1.11
Biofield Energy Treated	1.94	13.76	99.95	35.31	1.28
Percent change (%)	-20.16	-17.21	-27.53	-27.36	15.31

Table 2: Particle size distribution of the control and Biofield Energy Treated berberine chloride.
d_{10}, d_{50}, and d_{90}: particle diameter corresponding to 10%, 50%, and 90% of the cumulative distribution, D(4,3): the average mass-volume diameter, and SSA: the specific surface area.

Moreover, the surface area data of the sample revealed that the reduced particle size of the treated sample also affected the specific surface area of the Biofield Energy Treated sample (1.28 m^2/g) that was found to be increased by 15.31% compared with the SSA of the control sample (1.11 m^2/g). The particle size distribution of any drug is known for its major role in deciding the performance of drugs such as its dissolution, absorption, and bioavailability in the body [51,52]. Moreover, the decreased particle size and increased surface area are used as important techniques to improve the solubility, absorption and bioavailability profile of drug [53]. Thus, this study revealed that the bioavailability profile of the Biofield Energy Treated berberine chloride might be improved when used in formulation development compared with the control sample.

Thermal Gravimetric Analysis (TGA)/ Differential Thermogravimetric Analysis (DTG)

The thermal stability profile of the control and Biofield Energy Treated berberine chloride samples were analysed with the help of TGA/DTG technique. According to the literature, the TG–DTG curve of berberine chloride showed four main successive steps of mass loss in the temperature range of 350 to 520 K. Also, it was reported that berberine hydrochloride is thermally stable up to 350 K [54]. The TGA thermograms of the control and the Biofield Energy Treated samples (Figure 2) of berberine chloride were observed similar to the reported literature. The TGA results showed that the total weight loss of the Biofield Energy Treated sample during thermal degradation was 50.51%, which was 25.81% less compared to the total

weight loss of the control sample (68.08%). Therefore, it resulted in 55.04% increase in the residue amount of the Biofield Energy Treated sample (Table 3) compared to the control sample. Hence, the thermal stability of the Biofield Energy Treated sample was observed to be significantly improved compared to the control sample.

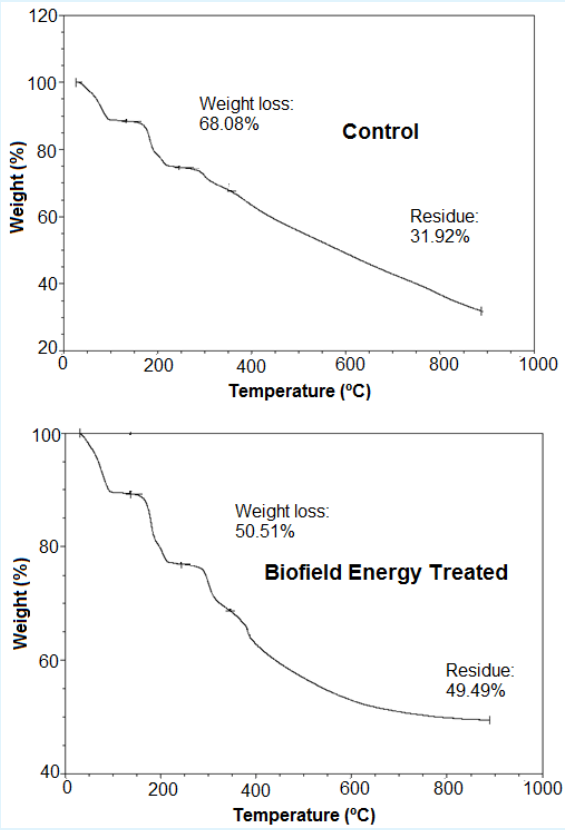

Figure 2: TGA thermograms of the control and Biofield Energy Treated berberine chloride.

Sample	TGA		DTG T_{max} (°C)			
	Total weight loss (%)	Residue %	Peak 1	Peak 2	Peak 3	Peak 4
Control	68.08	31.92	84.34	181.91	298	385.34
Biofield Energy Treated	50.51	49.49	79.87	179.46	299.92	383.88
% Change	-25.81	55.04	-5.3	-1.35	0.64	-0.38

Table 3: TGA/DTG data of the control and Biofield Energy Treated samples of berberine chloride.

T_{max} = the temperature at which maximum weight loss takes place in TG or peak temperature in DTG.

Besides, according to literature, the DTG curve of berberine chloride showed four peaks and the thermal decomposition products corresponding to these peaks are H_2O (379K), CO (421K), CO (490K), and H_2O (514K) [54]. In this study, the DTG thermogram of the control and Biofield Energy Treated sample also contains four peaks (Figure 3) and their temperatures are similar as reported in the literature. The results revealed that the maximum degradation temperature (T_{max}) of the 1st, 2nd, and 4th peak of the treated sample was decreased by 5.30%, 1.35%, and 0.38%, respectively; while the T_{max} corresponding to 3rd peak was slightly increased by 0.64%, compared to the control sample. Overall, the TGA/DTG studies indicated the alterations in the thermal stability profile of the Biofield Energy Treated berberine chloride sample compared to the control sample.

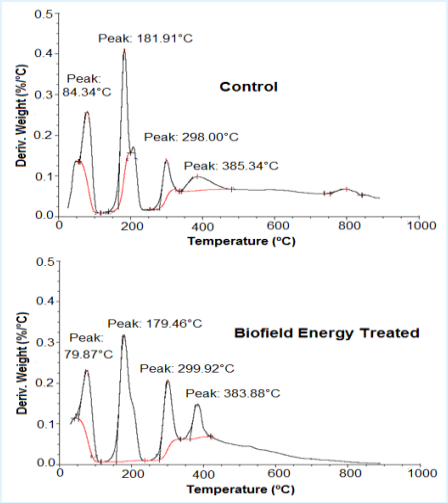

Figure 3: DTG thermograms of the control and Biofield Energy Treated berberine chloride.

Differential Scanning Calorimetry (DSSC) Analysis

The DSC technique is used here to study the melting and thermal degradation behaviour of the pharmaceutical compound [55]. The literature reported that the DSC curve of berberine chloride showed four intense peaks in the temperature range of 350 to 520 K that corresponds to the four steps of mass loss as shown in TG-DTG curve [54]. In this study, the DSC thermo grams of the control and Biofield Energy Treated samples (Figure 4) were observed to possess similar peaks in the same temperature range, as reported in the literature. Moreover, the further results showed that the peak temperatures of the treated sample corresponding to 1st, 3rd, and 4th peak were decreased by 2.26%, 4.50%, and 0.69%, respectively; while the peak temperature of 2nd peak was increased by 3.55%, compared to the control samples. Besides, the latent heat of fusion (ΔH) of the Biofield Energy Treated sample corresponding to 1st, 2nd, 3rd, and 4th peak were significantly reduced by 24.04%, 42.44%, 44.26%, and 47.78%, respectively, compared with the control sample (Table 4).

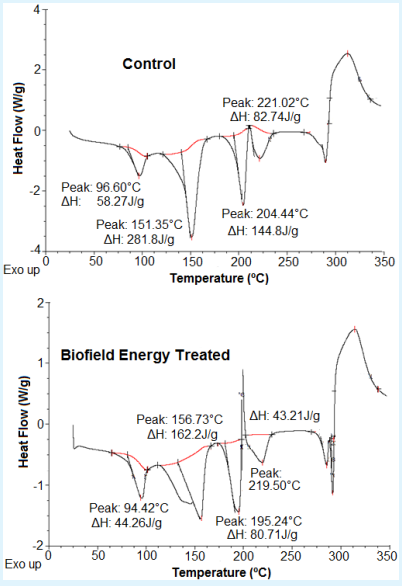

Figure 4: DSC thermograms of the control and Biofield Energy Treated berberine chloride.

Peak	Description	Peak Temperature (°C)	ΔH_{fusion} (J/g)
Peak 1	Control sample	96.60	58.27
	Biofield Energy Treated sample	94.42	44.26
	% Change	-2.26	-24.04
Peak 2	Control sample	151.35	281.80
	Biofield Energy Treated sample	156.73	162.20
	% Change	3.55	-42.44
Peak 3	Control sample	204.44	144.80
	Biofield Energy Treated sample	195.24	80.71
	% Change	-4.50	-44.26
Peak 4	Control sample	221.02	82.74
	Biofield Energy Treated sample	219.50	43.21
% Change		-0.69	-47.78

Table 4: Comparison of DSC data between the control and Biofield Energy Treated berberine chloride.
ΔH: Latent heat of fusion.

The results revealed that the Biofield Energy Treated sample needs less energy in the form of latent heat to undergo the process of fusion, compared with the control sample. Such alterations in ΔH of the treated sample might occur due to some changes in the crystallization structure of the berberine chloride sample after the Biofield Energy Treatment [55]. Overall, the study showed that there is an alteration in the melting and thermal stability profile of the treated berberine chloride sample compared with the control sample.

Conclusion

The current study revealed the significant impacts of the Trivedi Effect®-Consciousness Energy Healing Treatment on the physiochemical properties of berberine chloride. The PXRD peak intensities and the crystallite sizes of the Biofield Energy Treated sample were altered ranging from -7.24% to 188.78% and -65.88% to 135.42%, respectively, compared to the control sample. The Biofield Energy Treated sample also showed changes in the average crystallite size, which was observed to be reduced by 1.91% compared with the control sample. Such changes might happen due to the formation of the novel polymorph of berberine chloride after the Biofield Energy Treatment that may affect the performance of drug within the body.

The study also revealed that the particle sizes of the Biofield Energy Treated sample were significantly decreased at d_{10}, d_{50}, d_{90}, and D(4,3) by 20.16%, 17.21%, 27.53%, and 27.36%, respectively compared with the control sample. It further significantly increased the specific surface area of the Biofield Energy Treated berberine chloride by 15.31%, compared with the control sample.

These changes pertaining to the particle size and surface area of the Biofield Energy Treated sample may help in enhancing the solubility, dissolution, and bioavailability parameters of berberine chloride in comparison to the control sample. The total weight loss was significantly reduced by 25.81%; however, the residue amount was significantly increased by 55.04% in the treated sample compared to the control sample. Besides, the DSC thermogram showed four peaks, in which the peak temperatures of the treated sample corresponding to 1st, 2nd, 3rd, and 4th peak were altered by -2.26%, 3.55%, -4.50%, and -0.69%, respectively.

Moreover, the latent heat for 1st, 2nd, 3rd, and 4th peak of the treated sample were significantly reduced by 24.04%, 42.44%, 44.26%, and 47.78%, respectively, compared with the control sample. The overall study concluded that the Trivedi Effect®-Consciousness Energy Healing Treatment may help in producing a new polymorphic form of berberine chloride that might improve its solubility, dissolution, absorption and bioavailability profile along with the thermal stability, compared with the control sample.

Therefore, the Consciousness Energy Healing Treated berberine chloride may be used in formulating the novel pharmaceutical/nutraceutical products that might prove to be more clinically effective for the treatment of various microbial diseases and disorders such as diarrhea, gastroenteritis, ailments related to skin and eye, hypertension, tumor, malaria, hyperglycemia, inflammation, arrhythmia, fungal and plasmodial infections, *etc*.

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