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Impact of Consciousness Energy Healing Treatment on the Physicochemical and Thermal Properties of Vitamin D_3 (Cholecalciferol)

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Research Article

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Abstract

Vitamin D_3 is a fat-soluble vitamin, which helps in the absorption of minerals like calcium, magnesium, iron, zinc, and phosphate and also responsible for other biological activity. The aim of the research work was to evaluate the impact of the Trivedi Effect®-Consciousness Energy Healing Treatment on the physicochemical, thermal, and behavioral properties of vitamin D_3 using PSA, PXRD, DSC, and TGA/DTG analytical technique. The vitamin D_3 powder sample was divided into two parts, one part of the sample was considered as control (no Biofield Energy Treatment was provided), while the other part was treated with the Trivedi Effect®-Consciousness Energy Healing Treatment remotely by a renowned Biofield Energy Healer, Dahryn Trivedi and termed as a treated sample. The particle size values in the treated vitamin D_3 powder sample were significantly decreased by 21.46%, 18.29%, 17.87%, and 18.11% at d^{10}, d_{50}, d_{90}, and D(4,3) compared to the control sample. Thus, the specific surface area of the treated sample (0.0317 m^2/g) was significantly increased by 16.97% compared to the control sample (0.0271 m^2/g). The PXRD data showed that the peak intensities and crystallite sizes of the treated vitamin D_3 powder sample were significantly altered ranging from -85.18% to 286.11% and -62.06% to 237%, respectively compared to the control sample. The average crystallite size of the treated sample (339.92 nm) was significantly decreased by 6.94% compared with the control sample (365.25 nm). The melting point and latent heat of fusion of the treated sample were slightly increased by 0.49% and 1.01%, respectively compared to the control sample. The total weight loss was decreased by 0.83%; hence the residue amount was significantly increased by 42.09% in the treated sample compared with the control sample. The maximum thermal degradation temperature was significantly increased by 9.82% in the treated sample compared with the control sample. The Trivedi Effect®-Consciousness Energy Healing Treatment generates a new polymorphic form of vitamin D_3 which might offer better solubility, dissolution, absorption, bioavailability, and be thermally more stable compared with the control sample. Hence, the Biofield Energy Treated vitamin D_3 would be more beneficial to maintain the overall quality of life and

increase the intestinal absorption of several vital minerals like calcium, magnesium, iron, zinc, and phosphate in the body. Similarly, it would be very much useful in designing novel nutraceutical/pharmaceutical formulations for the better therapeutic responses against hypovitaminosis D, rickets, osteoporosis, cardiovascular diseases, diabetes mellitus, cancer, mental disorders, infections, multiple sclerosis, etc.

Keywords: Vitamin D_3; The Trivedi Effect®; Consciousness Energy Healing Treatment; Complementary And Alternative Medicine; Particle Size; Surface Area; PXRD; DSC; TGA/DTG

Introduction

Cholecalciferol (1, 25-dihydroxyvitamin D or vitamin D_3) is a fat-soluble vitamin helps in the absorption of the minerals like calcium, magnesium, iron, zinc, and phosphate and responsible for other biological activity [1]. Human body produces vitamin D from 7-dehydrocholesterol by means of photochemical reaction in the skin due to ultraviolet light exposure. The main sources of vitamin D are the food items like cod liver oil, milk, fatty fish like salmon, and tuna, nutraceutical and pharmaceutical supplements. It plays an important role in maintaining the hypovitaminosis D, immunity, skeletal, cardiovascular, and reproductive systems [2,3]. It also plays an important role for the prevention and treatment of several diseases like rickets, osteoporosis, cardiovascular diseases, diabetes mellitus, cancer, mental disorders, infections, multiple sclerosis, etc. [4-6]. All over the world vitamin D_3 deficiency is pandemic, mostly under-diagnosed and under-treated nutritional deficiency. It can be used as a dietary supplement for the prevention and treatment of vitamin D_3 deficiency diseases [7]. The biologically active form of vitamin D_3 is 1, 25-dihydroxycholecalciferol also known as calcitriol [5-7]. Hypervitaminosis D can cause vomiting, constipation, hypercalcemia, kidney stone, polyuria, polydipsia, insomnia, weakness, confusion, and mental retardation [1]. As vitamin D_3 is a fat-soluble vitamin; it is insoluble in water and poor bioavailability. The other factors that directly affect its bioavailability are genetic factors, dietary fiber, and the effect of vitamin D_3 status [8,9]. Vitamin D_3 is very sensitive to the light and air [10,11]. Thus, stability, solubility, and bioavailability of vitamin D_3 are the major concern for the storage and pharmaceutical formulations. Scientists are carrying out extensive research work for the improvement of physicochemical properties of the pharmaceutical and nutraceutical compounds, because of its crucial role in dissolution, absorption, and bioavailability in the body [12].

The Trivedi Effect®-Consciousness Energy Healing Treatment has been proved experimentally that, it has a significant impact on various physicochemical properties such as particle size, surface area, thermal behaviour, and bioavailability of nutraceutical and pharmaceutical compounds [13-16]. The Trivedi Effect® is natural and only scientifically proven phenomenon in which an expert can harness this inherently intelligent energy from the Universe and transmit it anywhere on the planet through the possible mediation of neutrinos [17]. There is an infinite and para-dimensional unique electromagnetic field exists surrounding the body of every living organism originated from the continuous moment of the charged particles (ions, cells, blood, etc.) is called Biofield. The Biofield based Energy Healing Therapies have been reported with significantly beneficial outcomes against various disease conditions [18]. The National Institutes of Health/National Center for Complementary and Alternative Medicine (NIH/NCCAM) recommend and included the Energy therapy under the Complementary and Alternative Medicine (CAM) category along with other therapies, i.e., homeopathy, Ayurvedic medicine, naturopathy, acupuncture, acupressure, Tai Chi, Qi Gong, Reiki, healing touch, hypnotherapy, Rolfing, etc., which has been accepted by the most of the USA population with several advantages [19,20]. Similarly, the Trivedi Effect®-Consciousness Energy Healing Treatment has gained popularity all over the world and reported with the significant impact on the physicochemical, structural, and behavioral properties of metals, ceramics, and polymer [21-23], organic compounds [24,25], microorganisms [26,27], cancer cells [28,29], crops [30,31], etc. Seeing all these outstanding results, this study was designed to evaluate the impact of the Trivedi Effect®-Consciousness Energy Healing Treatment on the physicochemical, and thermal properties of vitamin D_3 using particle size analysis (PSA), powder X-ray diffraction (PXRD), differential scanning calorimetry (DSC), and thermo gravimetric analysis (TGA)/differential thermo gravimetric analysis (DTG).

Materials and Methods

Chemicals and Reagents

The vitamin D_3 powder sample (> 98%) was purchased from Sigma-Aldrich, India. All other chemicals used in the experiments were of analytical grade available in India.

Consciousness Energy Healing Treatment Strategies

The vitamin D_3 powder sample was divided into two equal parts. One part of the test sample was provided the Trivedi Effect®-Consciousness Energy Healing Treatment remotely under standard laboratory conditions for 3 minutes by a renowned Biofield Energy Healer, Dahryn Trivedi, USA, known as Biofield Energy Treated sample. However, the second part of vitamin D_3 did not treat with the Biofield Energy Treatment called as control sample. Later, the control sample was treated with a "sham" healer, where the "sham" healer did not have any knowledge about the Biofield Energy Treatment. After the treatment, the Biofield Energy Treated and untreated samples were kept in sealed conditions and characterized using PSA, PXRD, DSC, and TGA/DTG techniques.

Characterization

Particle Size Analysis (PSA): The particle size analysis of vitamin D_3 was conducted with the help of Malvern Mastersizer 2000, from the UK, with a detection range between 0.01 µm to 3000 µm using wet method [32,33]. The calculations were done by the using software Mastersizer Ver. 5.54.

The percent change in particle size (d) for vitamin D_3 at below 10% level (d_{10}), 50% level (d_{50}), 90% level (d_{90}), and D (4,3) was calculated using the following equation 1:

$$\% \text{ change in particle size} = \frac{[d_{Treated} - d_{Control}]}{d_{Control}} \times 100 \quad (1)$$

Where $d_{Control}$ and $d_{Treated}$ are the particle size (µm) at below 10% level (d_{10}), 50% level (d_{50}), and 90% level (d_{90}) of the control and treated samples, respectively.

The % change in surface area (S) was calculated using the following equation 2:

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

Where $S_{Control}$ and $S_{Treated}$ are the surface area of the control and the treated vitamin D_3, respectively.

Powder X-ray Diffraction (PXRD) Analysis: The PXRD analysis of vitamin D_3 was performed with the help of Rigaku Mini Flex-II Desktop X-ray diffract meter (Japan) [34,35]. The average size of individual crystallites was calculated from PXRD data using the Scherrer's formula (3)

$$G = k\lambda/\beta\cos\theta \quad (3)$$

Where k is the equipment constant (0.94), G is the crystallite size in nm, λ is the radiation wavelength (0.154056 nm for Kα1 emission), β is the full-width at half maximum, and θ is the Bragg angle [36].

The % change in crystallite size (G) of vitamin D_3 was calculated using the following equation 4:

$$\% \text{ change in crystallite size} = \frac{[G_{Treated} - G_{Control}]}{G_{Control}} \quad (4)$$

Where $G_{Control}$ and $G_{Treated}$ are the crystallite size of the control and the treated vitamin D_3 samples, respectively.

Differential Scanning Calorimetry (DSC): The DSC analysis of vitamin D_3 was performed with the help of DSC Q200, TA instruments. The sample of ~1-2 mg was loaded to the aluminum sample pan at a heating rate of 10°C/min from 30°C to 350°C [32,33]. The % change in melting point (T) was calculated using the following equation 5:

$$\% \text{ change in melting point} = \frac{[T_{Treated} - T_{Control}]}{T_{Control}} \times 100 \quad (5)$$

Where $T_{Control}$ and $T_{Treated}$ is the melting point of the control and treated samples, respectively.

The % change in the latent heat of fusion (ΔH) was calculated using the following equation 6:

$$\% \text{ change in latent heat of fusion} = \frac{[\Delta H_{Treated} - \Delta H_{Control}]}{\Delta H_{Control}} \times 100 \quad (6)$$

Where $\Delta H_{Control}$ and $\Delta H_{Treated}$ are the latent heat of fusion of the control and the treated vitamin D_3, respectively.

Thermal Gravimetric Analysis (TGA)/ Differential Thermogravimetric Analysis (DTG): TGA/DTG analysis of vitamin D_3 was performed with the help of TGA Q50TA instruments. A sample of ~1-4 mg was loaded to the platinum crucible at a heating rate of 10°C/min from 25°C to 1000°C with the recent literature [32,33]. The % change in weight loss (W) was calculated using the following equation 7:

$$\% \text{ change in weight loss} = \frac{[W_{\text{Treated}} - W_{\text{Control}}]}{W_{\text{Control}}} \times 100 \quad (7)$$

Where $W_{Control}$ and $W_{Treated}$ are the weight loss of the control and the treated vitamin D_3, respectively.

The % change in maximum thermal degradation temperature (T_{max}) (M) was calculated using the following equation 8:

$$\% \text{ change in Tmax (M)} = \frac{[M_{\text{Treated}} - M_{\text{Control}}]}{M_{\text{Control}}} \times 100 \quad (8)$$

Where $M_{Control}$ and $M_{Treated}$ are the T_{max} values of the control and the treated vitamin D_3, respectively.

Results and Discussion

Particle Size Analysis (PSA)

The particle sizes of both the control and Biofield Energy Treated vitamin D_3 were analyzed and the data are presented in Table 1. The particle size values of the control vitamin D_3 at d_{10}, d_{50}, d_{90}, and D(4,3) were 215.39 µm, 528.46 µm, 1048.92µm, and 582.64µm, respectively. Similarly, the particle sizes of the Biofield Energy Treated vitamin D_3 at d_{10}, d_{50}, d_{90}, and D(4,3) were 169.17 µm, 431.79 µm, 861.5 µm, and 477.15 µm, respectively. The particle size values in the Biofield Energy Treated vitamin D_3 were significantly decreased by 21.46%, 18.29%, 17.87%, and 18.11% at d_{10}, d_{50}, d_{90}, and D(4,3), respectively compared with the control sample. Thus, the specific surface area (SSA) of Biofield Energy Treated vitamin D_3 (0.0317 m^2/g) was significantly increased by 16.97% compared to the control sample (0.0271 m^2/g). From the results it was assumed that the Trivedi Effect®-Consciousness Energy Healing Treatment might be acting as an external force for breaking the larger particles of vitamin D_3 to smaller particles; hence increased the surface area. The particle size, shape, and surface area have their significant impact on the solubility, dissolution rate, absorption, bioavailability, and even the therapeutic efficacy of a drug substance [12,37]. Vitamin D_3 is a lipophilic compound and the solubility profile is very poor in water responsible for the poor bioavailability in the body [8,9]. Thus, the Biofield Energy Treated vitamin D_3 was expected to enhance the solubility, absorption, and therapeutic efficacy in the nutraceutical/pharmaceutical formulations.

Parameter	d_{10} (µm)	d_{50} (µm)	d_{90} (µm)	D(4,3)(µm)	SSA(m^2/g)
Control	215.39	528.46	1048.92	582.64	0.0271
Biofield Treated	169.17	431.79	861.50	477.15	0.0317
Percent change* (%)	-21.46	-18.29	-17.87	-18.11	16.97

Table 1: Particle size distribution of the control and Biofield Energy Treated vitamin D_3.

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. *denotes the percentage change in the Particle size distribution of the Biofield Energy Treated sample with respect to the control sample.

Powder X-ray Diffraction (PXRD) Analysis

The PXRD diffractograms of both the control and Biofield Energy Treated vitamin D_3 showed sharp and intense peaks (Figure 1), which indicated that both the samples were crystalline. Both the control and Biofield Energy Treated vitamin D_3 samples showed highest peak intensity at 2θ equal to 18.01° in the PXRD diffractograms (Table 2), entry 9. The peak intensities of the Biofield Energy Treated vitamin D_3 were significantly altered ranging from -85.18% to 286.11% compared to the control sample. Similarly, the crystallite sizes of the Biofield Energy Treated vitamin D_3 sample were significantly altered ranging from -62.06% to 237% compared to the control sample. Overall, the average crystallite size of the Biofield Energy Treated vitamin D_3 (339.92 nm) was significantly decreased by 6.94% compared with the control sample (365.25 nm).

Entry No.	Bragg angle (°2θ)		Peak Intensity (%)			Crystallite size (G, nm)		
	Control	Treated	Control	Treated	% change[a]	Control	Treated	% change[b]
1	5.10	4.93	823.00	122.00	-85.18	601.00	363.00	-39.60
2	6.69	6.54	236.00	182.00	-22.88	535.00	203.00	-62.06

3	8.89	8.79	340.00	333.00	-2.06	104.00	145.00	39.42
4	13.19	12.93	604.00	631.00	4.47	96.00	172.00	79.17
5	13.89	13.53	36.00	139.00	286.11	789.00	510.00	-35.36
6	15.18	15.43	269.00	831.00	208.92	353.00	165.00	-53.26
7	15.66	15.53	1151.00	559.00	-51.43	101.00	341.00	237.62
8	16.10	16.29	545.00	236.00	-56.70	123.00	244.00	98.37
9	18.01	17.99	2486.00	1121.00	-54.91	780.00	558.00	-28.46
10	21.66	21.43	250.00	56.00	-77.60	301.00	931.00	209.30
11	21.93	21.86	311.00	375.00	20.58	498.00	245.00	-50.80
12	23.68	23.57	335.00	410.00	22.39	102.00	202.00	98.04
13	Average crystallite size					365.25	339.92	-6.94

Table 2: PXRD data for the control and Biofield Energy Treated vitamin D_3.
[a]denotes the percentage change in the peak intensity of Biofield Energy Treated sample with respect to the control sample; [b]denotes the percentage change in the crystallite size of Biofield Energy Treated sample with respect to the control sample.

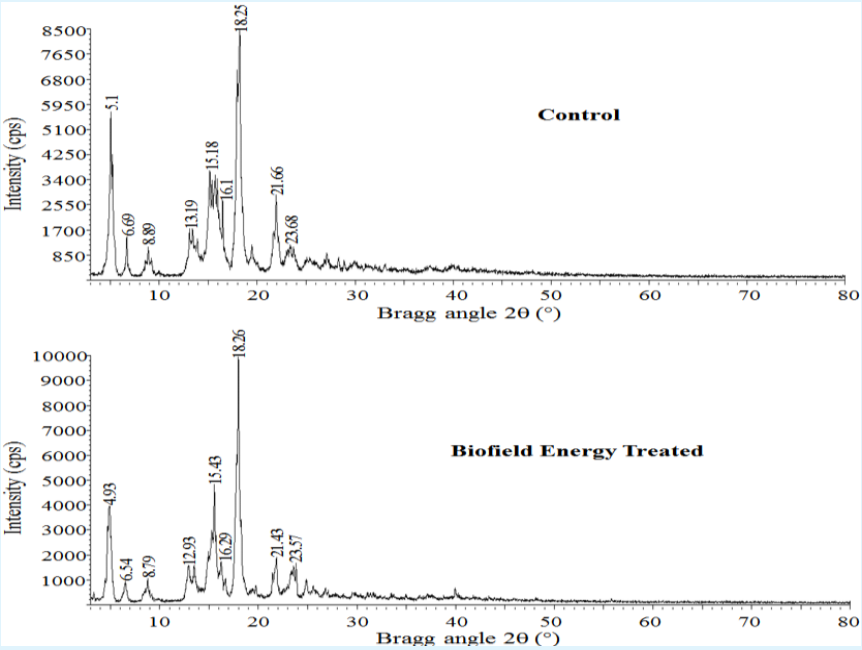

Figure 1: PXRD diffractograms of the control and Biofield Energy Treated vitamin D_3.

The experimental observations were significant with respect to the crystallite sizes and peak intensities indicated the modification of the crystal morphology of the Biofield Energy Treated vitamin D_3 compared to the control sample. The change in the peak intensity of the diffraction face of the crystalline compound indicated the alterations in the crystal morphology [38]. The alterations in the PXRD pattern provide the proof of polymorphic transitions [39,40]. The Trivedi Effect®-Consciousness Energy Healing Treatment assumed to be responsible for the new polymorphic form of vitamin D_3 probably through the Biofield Energy via neutrino oscillations [17]. The drug performance of the pharmaceuticals, such as bioavailability, therapeutic efficacy, and toxicity is different from the original form due to different polymorphic forms [12,41]. Therefore, the Trivedi Effect®-Consciousness Energy Healing Treated vitamin D_3 would be advantageous for the designing of novel

pharmaceutical formulations which would offer better therapeutic efficacy.

Differential Scanning Calorimetry (DSC) Analysis

The control and Biofield Energy Treated vitamin D_3 showed the sharp endothermic peak at 87.06°C and 87.49°C, respectively in the DSC thermograms (Figure 20). The literature reported data closely match to the experimental results [42]. Likewise, latent heat of fusion (ΔH_{fusion}) of the control and Biofield Energy Treated vitamin D_3 was 59.2 J/g and 59.8, respectively Table 3. The melting point and ΔH_{fusion} of the Biofield Energy Treated vitamin D_3 sample were increased by 0.49% and 1.01%, respectively compared to the control sample. Any change in the latent heat of fusion can be attributed to the disrupted intrinsic molecular and the crystal structure [43]. Therefore, the Trivedi Effect®-Consciousness Energy Healing Treatment assumed to be responsible for the disruption the molecular and crystal structure of vitamin D_3 leads to the improved the thermal stability of the treated sample compared with the control sample.

Sample	Melting Temp (°C)	ΔH_{fusion} (J/g)
Control Sample	87.06	59.20
Biofield Energy Treated	87.49	59.80
% Change*	0.49	1.01

Table 3: DSC data for both control and Biofield Energy Treated samples of vitamin D_3.

ΔH_{fusion}: Latent heat of fusion, *denotes the percentage change of the Biofield Energy Treated vitamin D_3 with respect to the control sample.

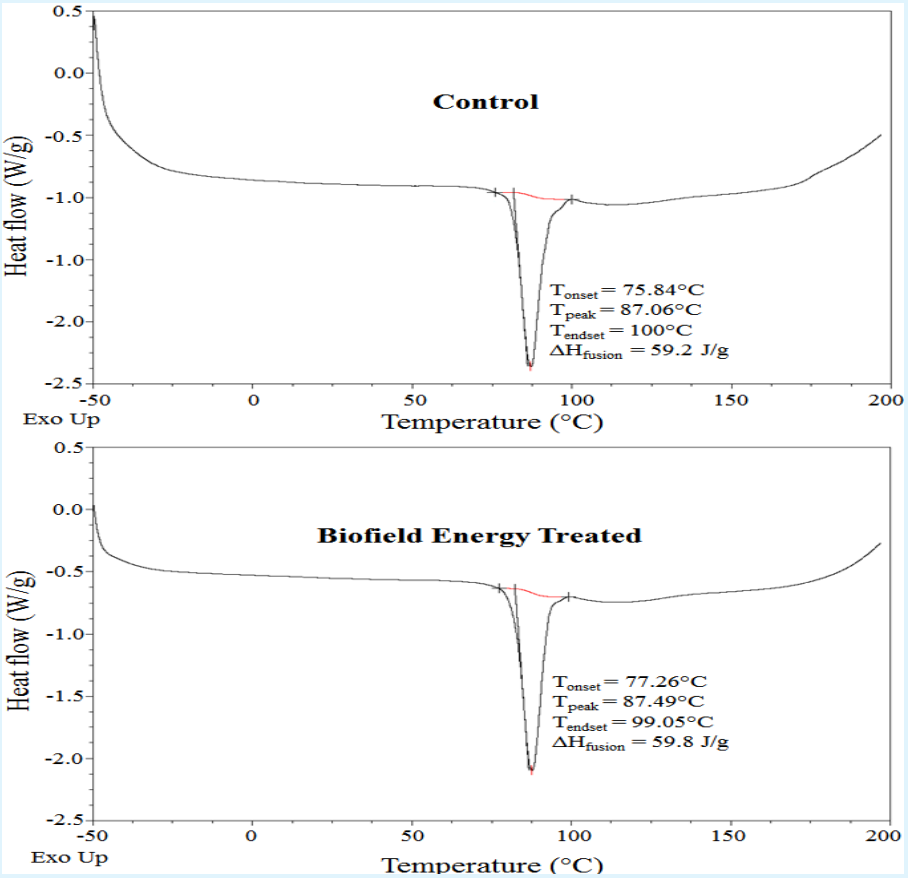

Figure 2: DSC thermograms of the control and Biofield Energy Treated vitamin D_3.

Thermal Gravimetric Analysis (TGA)/ Differential Thermo gravimetric Analysis (DTG)

The TGA thermograms of the control and Biofield Energy Treated vitamin D_3 samples showed one step of thermal degradation (Figure 3). The total weight loss of Biofield Energy Treated vitamin D_3 was decreased by 0.83% compared to the control sample (Table 4). Hence, the residue amount was significantly increased by 42.09% in the Biofield Energy Treated vitamin D_3 compared to the control sample (Table 4).

Sample	TGA		DTG
	Total weight loss (%)	Residue %	T_{max} (°C)
Control	98.066	1.934	259.17
Biofield Energy Treated	97.252	2.748	284.62
% Change*	-0.83	42.09	9.82

Table 4: TGA/DTG data of the control and Biofield Energy Treated samples of vitamin D_3.*denotes the percentage change of the Biofield Energy Treated sample with respect to the control sample.
T_{max} = the temperature at which maximum weight loss takes place in TG or peak temperature in DTG.

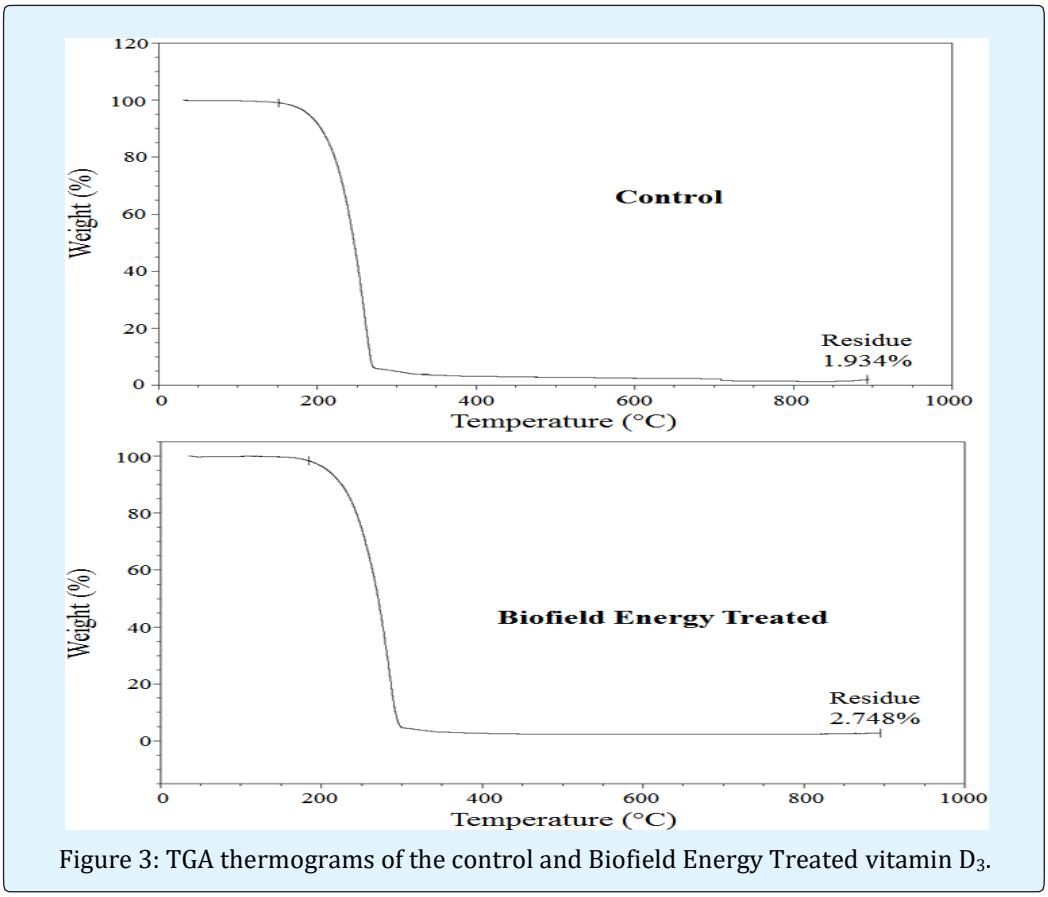

Figure 3: TGA thermograms of the control and Biofield Energy Treated vitamin D_3.

The DTG of the control and Biofield Energy Treated vitamin D_3 showed one peak maximum thermal degradation temperature (T_{max}) in the thermograms (Figure 4). The T_{max} of the Biofield Energy Treated sample (284.62°C) was significantly increased by 9.82% compared to the control sample (259.17°C). Overall, TGA/DTG data of vitamin D_3 samples revealed that the thermal stability of the Biofield Energy Treated sample was increased compared with the control sample.

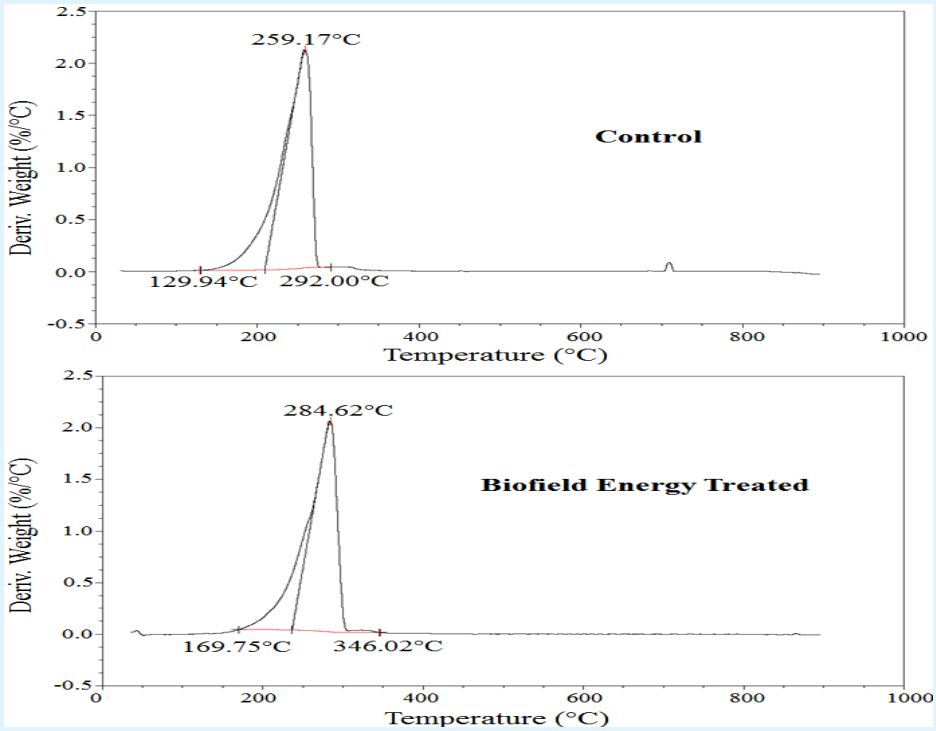

Figure 4: DTG thermograms of the control and Biofield Energy Treated vitamin D_3.

Conclusions

The Trivedi Effect®-Consciousness Energy Healing Treatment has the significant effects on the particle size, surface area, crystallite size, and thermal behavior of vitamin D_3. The particle size values in the Biofield Energy Treated vitamin D_3 powder sample were significantly decreased by 21.46%, 18.29%, 17.87%, and 18.11% at d_{10}, d_{50}, d_{90}, and D(4,3) compared to the control sample. Thus, the specific surface area of the Biofield Energy Treated sample was significantly increased by 16.97% compared to the control sample. The PXRD results showed that the peak intensities and crystallite sizes of the Biofield Energy Treated vitamin D_3 powder sample were significantly altered ranging from -85.18% to 286.11% and -62.06% to 237%, respectively compared to the control sample. The average crystallite size of the Biofield Energy Treated sample was significantly decreased by 6.94% compared with the control sample. The melting point and ΔH_{fusion} of the Biofield Energy Treated sample were slightly increased by 0.49% and 1.01%, respectively compared to the control sample. The total weight loss was decreased by 0.83%; hence the residue amount was significantly increased by 42.09% in the Biofield Energy Treated sample compared with the control sample. The T_{max} was significantly increased by 9.82% in the Biofield Energy Treated sample compared with the control sample. The Trivedi Effect®-Consciousness Energy Healing Treatment generates a new polymorphic form of vitamin D_3 which might offer better solubility, dissolution, absorption, bioavailability, and be thermally more stable compared with the control sample. Hence, the Biofield Energy Treated vitamin D_3 would be more beneficial to maintain the overall quality of life and increase the intestinal absorption of several vital minerals like calcium, magnesium, iron, zinc, and phosphate in the body. Similarly, it would be very much useful in designing novel nutraceutical/pharmaceutical formulations for the better therapeutic responses against hypovitaminosis D, rickets, osteoporosis, cardiovascular diseases, diabetes mellitus, cancer, mental disorders, infections, multiple sclerosis, etc.

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