



# Evaluation of the Impact of the Consciousness Energy Healing Treatment on Physicochemical and Thermal Properties of Vitamin D<sub>3</sub> (Cholecalciferol)

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## Abstract

Vitamin D<sub>3</sub> (or cholecalciferol) is a fat-soluble vitamin widely used for the prevention and treatment of vitamin D deficiency disease. The aim of this study was to explore the impact of the Trivedi Effect®-Consciousness Energy Healing Treatment on the physical, chemical, and thermal properties of cholecalciferol using sophisticated analytical techniques. Cholecalciferol powder sample was divided into two parts, one part of cholecalciferol was considered as a control sample (no Biofield Treatment was provided), while second part received Biofield Energy Healing Treatment remotely by a popular Biofield Energy Healer, Dahryn Trivedi. The PXRD relative peak intensities and crystallite size of the treated cholecalciferol were significantly altered ranging from 17.35 to 60.14% and -30.02% to 99.79%, respectively compared to the control sample. The average crystallite sizes of the treated cholecalciferol were increased by 3.41% compared to the control sample. The particle size values in Dahryn's treated cholecalciferol were significantly increased by 2.91% (d<sub>10</sub>), 3.73% (d<sub>50</sub>), 19.59% (d<sub>90</sub>), and 15.53% {D (4,3)}, respectively; thus, the specific surface area was significantly decreased by 20.41% compared to the control sample. Similarly, the melting point and latent heat of fusion of the treated cholecalciferol were lowered by 0.76% and 2.60%, respectively compared with the control sample. The total weight loss in the treated cholecalciferol was decreased compared to the control sample. The T<sub>max</sub> of the treated cholecalciferol was decreased by 3.32% compared to the control sample. The Consciousness Energy Healing Treatment might produce a new polymorphic form of cholecalciferol which would improve powder flow ability, shape, and appearance compared with the control sample. The Consciousness Energy Healing Treated cholecalciferol would be beneficial to design better nutraceutical and pharmaceutical formulations for the treatment of vitamin D deficiency, rickets, osteoporosis, cancer, diabetes mellitus, etc.

**Keywords:** Cholecalciferol, Biofield Energy; The Trivedi Effect®; Consciousness Energy Healing Treatment; PXRD; PSA; DSC; TGA/DTG

**Abbreviations:** PXRD: The powder X-ray diffraction; PSA: Particle Size Analysis; SSA: Specific Surface Area;

TGA: Thermal Gravimetric Analysis; DTG: Differential thermogravimetric Analysis

## Introduction

Vitamin D<sub>3</sub> or cholecalciferol is a fat-soluble secosteroid having cyclopentanoperhydro-phenanthrene ring system and possess antirachitic activity. It is produced from 7-dehydrocholesterol by the photochemical reaction in the skin. It contains three double bonds which are usually responsible for the cis and trans conformation of cholecalciferol. It is air and light-sensitive compound [1,2]. It is a type of vitamin D which is found to be responsible for the enhancement of intestinal absorption of several vital minerals like calcium, zinc, magnesium, iron, and phosphate [3]. Vitamin D plays a vital role in several diseases, e.g., cancer, diabetes mellitus, rickets, osteoporosis, mental disorders, cardiovascular diseases, multiple sclerosis, infections [4-6]. Cholecalciferol is found in animal food sources, such as cod liver oil, milk, fatty fish like salmon, tuna, etc. Nowadays vitamin D deficiency is epidemic, mostly under-treated nutritional deficiency all over the world. Vitamin D can be used as a dietary supplement for the anticipation and treatment of vitamin D deficiency [5]. Cholecalciferol is a prohormone and is hydroxylated at position C-25 to convert 25-hydroxycholecalciferol (also known as calcidiol), which is more circulating form. Consequently, the second form 1,25-dihydroxycholecalciferol or calcitriol is biologically active [5-7]. Vitamin D toxicity i.e. hypercalcemia, polyuria, polydipsia, weakness, insomnia, mental retardation can be resultant with high dose supplementation [3]. The bioavailability and stability of vitamin D<sub>3</sub> is a major concern [1,2]. Physicochemical properties of nutraceutical and pharmaceutical compounds are very important for better bioavailability and therapeutic efficacy.

The Trivedi Effect®-Consciousness Energy Healing Treatment significantly altered the physicochemical and thermal properties of many pharmaceutical/nutraceutical compounds [8,9] and also improved the bioavailability of poorly bioavailable compounds (i.e., 25-hydroxyvitamin D<sub>3</sub>) in male Sprague-Dawley rats [10]. Biofield is referred as an energy matrix that that found surrounds the human body resulting from the constant movement of the electrically charged particles (i.e., ions, cells, etc.) inside the body and it continuously discharges the electromagnetic waves *via* bio-photons. The Biofield Energy Healers have the ability to harness the energy from the "Universe" and can transfer into any living or nonliving object(s) around the world. The process, where the object(s) receive the biofield energy and respond in a useful way is called as Biofield Energy Healing Treatment [11,12]. The Biofield Energy therapy has been recognized as a Complementary and Alternative Medicine health care approach by the National Center of Complementary and

Integrative Health with other therapies, medicines and practices such as homeopathy, yoga, Qi Gong, chiropractic/osteopathic manipulation, meditation, acupuncture, hypnotherapy, naturopathy, Ayurvedic medicine, Chinese herbs and medicines, Reiki, cranial sacral therapy, etc. [13]. The Bio field Energy Healing Treatment is also drawing importance in several fields include material science [14], organic compounds [15,16], microbiology [17], agriculture [18], biotechnology [19], genetics [20], medical [21], etc. Recent literature reported that the Consciousness Energy Healing Treatment has the astounding capability to alter physicochemical properties such as crystallite properties, particle properties, and thermal properties of various nutraceuticals through introducing a new polymorph [22-26]. The physicochemical of a pharmaceutical solid compound play an important role in drug product performance [27,28]. The Consciousness Energy Healing Treatment changes the physicochemical properties through the possible intervention of neutrinos [29]. Therefore, this study was performed to investigate the effect of the Trivedi Effect®-Consciousness Energy Healing Treatment on the physical, chemical, and thermal properties of cholecalciferol using modern and sophisticated analytical techniques.

## Materials and Methods

### Chemicals and reagents

The test sample cholecalciferol (>98%) was purchased from Sigma-Aldrich, India and other chemicals used during the experiments were also purchased in India.

### Consciousness energy healing treatment strategies

The powder sample of cholecalciferol was divided into two parts. One part of cholecalciferol did not receive Biofield Energy Treatment and considered as a control sample. But, the control cholecalciferol was treated with a "sham" healer who did not have any awareness about the Biofield Energy Treatment. While the second part of cholecalciferol was received the Trivedi Effect®-Consciousness Energy Healing Treatment remotely for 3 minutes by the well-known Biofield Energy Healer, Dahryn Trivedi, USA known as the Biofield Energy Treated cholecalciferol. After the treatment, the Biofield Energy Treated and control test samples were kept in sealed conditions and characterized using various analytical techniques.

### Characterization

The powder X-ray diffraction (PXRD) analysis of cholecalciferol powder sample was performed with the

help of PANalytical X'PERT3 powder X-ray diffractometer (UK) [22-24]. The average size of crystallites cholecalciferol powder was calculated from PXRD data using the Scherrer's formula (1)

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

Where  $k$  is the equipment constant,  $\lambda$  is the radiation wavelength,  $G$  is the crystallite size in nm,  $\beta$  is the full-width at half maximum, and  $\theta$  is the Bragg angle [30].

The particle size analysis (PSA) was performed using Malvern Mastersizer 3000 (UK) using the wet method [12-14]. Similarly, the differential scanning calorimetry (DSC) analysis of cholecalciferol was performed with the help of DSC Q2000 differential scanning calorimeter (USA). The thermogravimetric analysis (TGA) thermograms of cholecalciferol were obtained with the help of TGA Q500 thermoanalyzer (USA) apparatus [22-24]. The % change in the peak intensity, crystallite size, particle size, specific surface area, latent heat, melting point, weight loss and the maximum thermal degradation temperature of the treated cholecalciferol was calculated compared with the control cholecalciferol using the following equation2:

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

### Statistical analysis

All the values were represented as Mean  $\pm$  SD (standard

deviation) of independent experiment. The statistical analysis was performed using Sigma Plot statistical software (v11.0). For two groups comparison student's t-test was used. Statistically significant values were set at the level of  $p \leq 0.05$ .

## Results and Discussion

### Powder X-ray diffraction (PXRD) analysis

The PXRD diffractograms of the control and treated cholecalciferol samples of cholecalciferol (Figure 1) showed sharp and intense diffraction peaks indicating that both the samples were crystalline in nature. The values of the Bragg angle as shown in Figure 1 and other PXRD data of the control sample were matched with the reported values for cholecalciferol [1]. The PXRD diffractograms of the control and treated cholecalciferol samples showed the highest peak intensity (100%) at Bragg's angle ( $2\theta$ ) equal to  $18.2^\circ$  (Table 1, entry 14). The relative intensities of the PXRD peaks in the Biofield Energy Treated cholecalciferol were significantly decreased from 17.35% to 60.14% compared to the control sample. The crystallite sizes of the treated cholecalciferol were significantly altered ranging from 8.34% to 30.02% compared to the control sample. The average crystallite sizes of the Biofield Energy Treated cholecalciferol (44.55 nm) were increased by 3.41% compared to the control sample (43.08 nm).

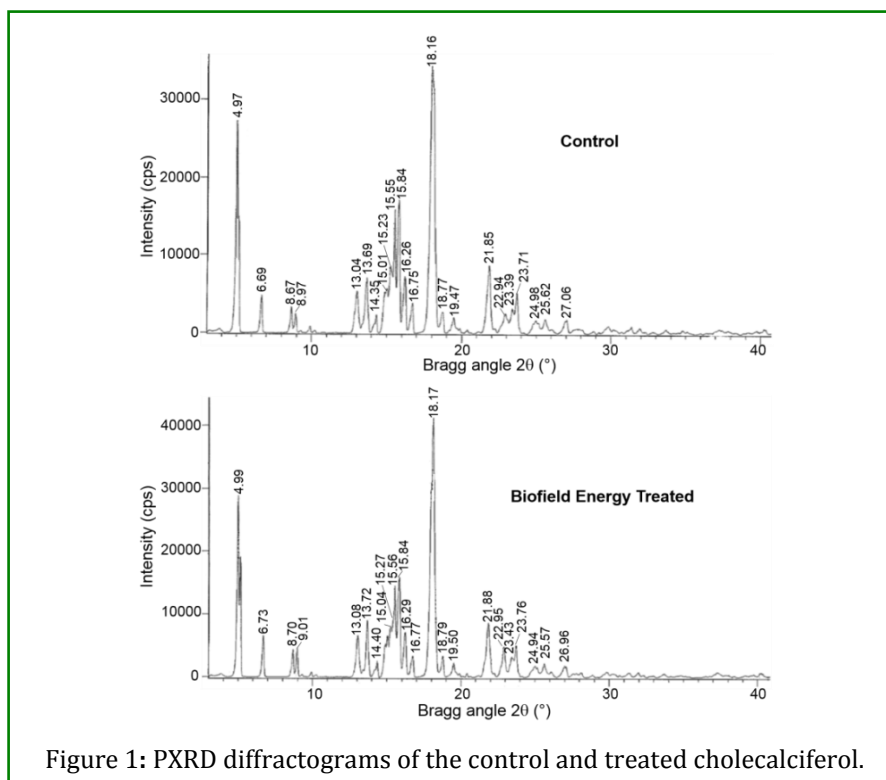


Figure 1: PXRD diffractograms of the control and treated cholecalciferol.

Entry No.	Bragg angle ( $^{\circ}2\theta$ )	Relative Intensity (%)			Crystallite size (G, nm)		
		Control	Treated	% change	Control	Treated	% change
1	5.0	96.91	67.31	-30.54	68.84	57.36	-16.67
2	6.7	15.79	13.05	-17.35	28.72	49.26	71.51
3	8.7	11.66	6.48	-44.43	49.32	43.15	-12.51
4	9.0	8.27	4.97	-39.90	34.52	34.52	0.00
5	13.1	19.09	10.51	-44.94	24.74	26.64	7.70
6	13.7	25.01	17.16	-31.39	49.53	34.66	-30.02
7	14.4	7.25	2.89	-60.14	38.54	49.57	28.61
8	15.0	20.07	11.64	-42.00	57.81	57.81	0.00
9	15.3	29.74	18.04	-39.34	43.41	43.41	0.00
10	15.6	56.35	30.95	-45.08	57.84	43.43	-24.93
11	15.9	56.88	31.52	-44.59	34.75	28.95	-16.67
12	16.3	23.2	10.73	-53.75	24.83	34.76	40.04
13	16.8	12.81	8.40	-34.43	31.62	28.98	-8.34
14	18.2	100	100	0.00	49.80	43.57	-12.51
15	18.8	8.81	5.03	-42.91	18.36	34.88	90.00
16	19.5	7.26	3.94	-45.73	38.80	38.80	0.00
17	21.9	30.88	17.33	-43.88	43.82	38.95	-11.12
18	22.9	8.88	4.02	-54.73	25.08	39.02	55.61
19	23.4	11.32	5.84	-48.41	70.24	58.53	-16.66
20	23.8	18.13	10.57	-41.70	70.28	50.26	-28.49
21	24.9	5.89	4.02	-31.75	44.07	88.05	99.79
22	25.6	6.48	2.61	-59.72	35.30	29.41	-16.69
23	27.0	6.24	3.72	-40.38	50.59	70.73	39.81
24	Average crystallite size $\pm$ standard deviation (SD)				43.08 $\pm$ 14.66	44.55 $\pm$ 14.32	3.41

Table 1: PXRD data for the control and treated cholecalciferol.

The significant changes in the crystallite size and relative intensities indicated that the crystal morphology of the Biofield Energy Treated cholecalciferol was modified compared to the control sample. The recent literature reported that treatment has the significant capability to introduce a new polymorph by modifying crystal morphology of the pharmaceuticals and nutraceuticals through altering the relative intensities and crystallite size of characteristic diffraction face [22-24,31]. Thus, the Trivedi Effect<sup>®</sup>-Consciousness Energy Healing Treatment probably introduced a new crystalline polymorphic form through the energy transferred into cholecalciferol. Polymorphic forms of pharmaceuticals have the significant effects on the drug performance, such as bioavailability, therapeutic efficacy, and toxicity, because their thermodynamic and physicochemical properties like melting point, energy, stability, and especially solubility, are different (probably better) from the original form [32,33]. Thus, it can be anticipated that Dahryn's Biofield Energy Treatment could be a very useful method for the production of novel crystal polymorph of cholecalciferol

that would provide an improvement in its therapeutic performance.

### Particle size distribution (PSD) analysis

The particle size distribution of both the control and Biofield Energy Treated cholecalciferol was evaluated and presented in Table 2. The particle size distribution of the control cholecalciferol was observed at  $d_{10}$  = 108.53  $\mu\text{m}$ ,  $d_{50}$  = 340.93  $\mu\text{m}$ ,  $d_{90}$  = 718.24  $\mu\text{m}$ , and  $D(4,3)$  = 380.52  $\mu\text{m}$ . Subsequently, the particle size distribution of the Biofield Energy Treated cholecalciferol was found at  $d_{10}$  = 111.69  $\mu\text{m}$ ,  $d_{50}$  = 353.65  $\mu\text{m}$ ,  $d_{90}$  = 858.94  $\mu\text{m}$ , and  $D(4,3)$  = 439.63  $\mu\text{m}$ . The particle size values at  $d_{10}$ ,  $d_{50}$ ,  $d_{90}$ , and  $D(4,3)$  in Dahryn's Biofield Energy Treated cholecalciferol were significantly increased by 2.91%, 3.73%, 19.59% and 15.53%, respectively compared to the control sample. The specific surface area (SSA) of Biofield Energy Treated cholecalciferol (31.47  $\text{m}^2/\text{Kg}$ ) was significantly reduced by 20.41% with respect to the control sample (39.54  $\text{m}^2/\text{Kg}$ ).

Parameter	d <sub>10</sub> (μm)	d <sub>50</sub> (μm)	d <sub>90</sub> (μm)	D(4,3) (μm)	SSA (m <sup>2</sup> /Kg)
Control	108.53	340.93	718.24	380.52	39.54
Biofield Treated	111.69	353.65	858.94	439.63	31.47
% change	2.91	3.73	19.59	15.53	-20.41

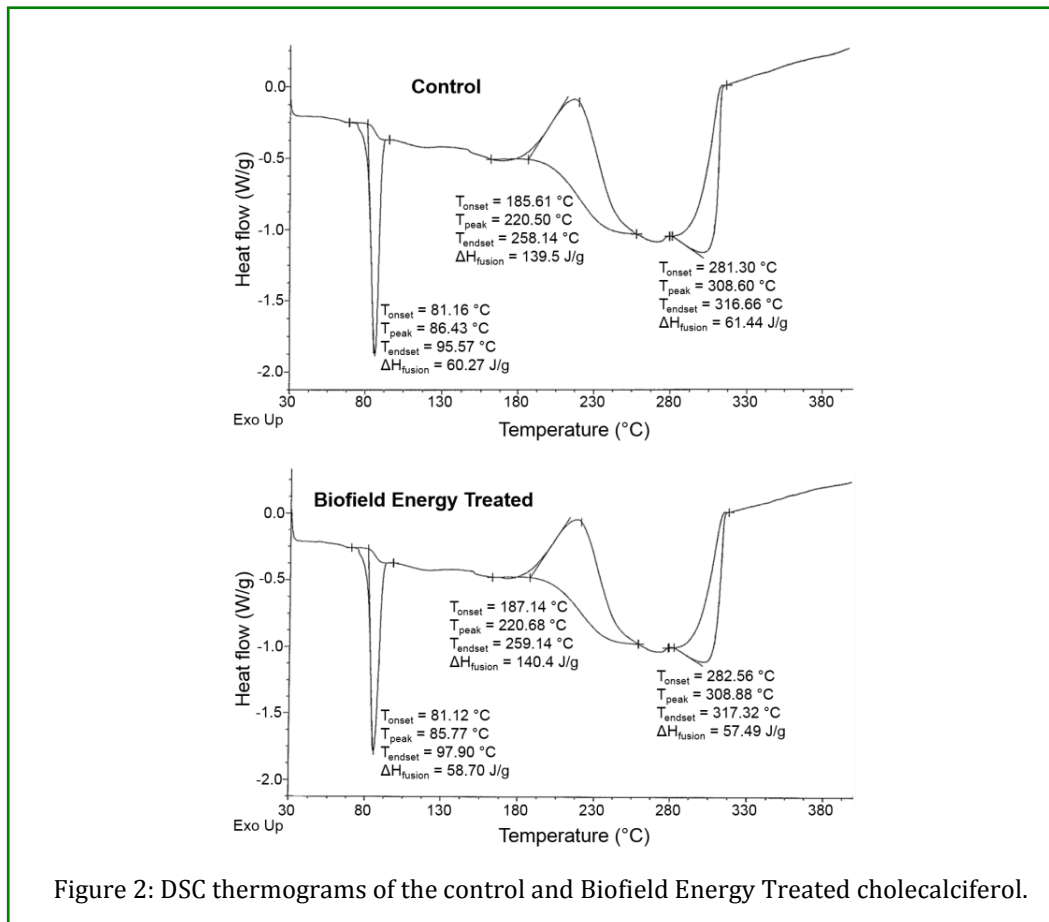
Table 2: Particle size distribution of the control and treated cholecalciferol.

d<sub>10</sub>, d<sub>50</sub>, and d<sub>90</sub>: 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.

The increased particle size and reduced surface area of the pharmaceutical compound are due to the enhanced the powder flowability, improved product shape, and appearance. It also affects the performance of formulations [34,35]. Thus, it is anticipated that the Trivedi Effect®-Consciousness Energy Healing Treated cholecalciferol might increase the powder flowability, shape and appearance of cholecalciferol. PXRD data also supported that the Biofield Energy Healing Treatment could change the size, shape, and appearance of cholecalciferol.

### Differential scanning calorimetric (DSC) analysis

The DSC thermo grams of the control and Biofield Energy Treated cholecalciferol samples (Figure 2) exhibited two endothermic peaks at nearly 86 and 309°C and one exothermic peak at nearly 221°C. Literature mentioned that the sharp endothermic peak at 86.30°C in the DSC curve is the melting point of cholecalciferol and exothermic peak at 206°C may be due to the decomposition of cholecalciferol [1]. The DSC analysis revealed that the melting point of the Biofield Energy Treated cholecalciferol was reduced by 0.76% compared to the control sample as shown in Table 3. After that, the latent heat of fusion ( $\Delta H$ ) of the Biofield Energy Treated cholecalciferol was decreased by 2.60% compared with the control sample.



Sample	Melting point/Decomposition Temperature (°C)			ΔH (J/g)		
	1 <sup>st</sup> Peak	2 <sup>nd</sup> Peak	3 <sup>rd</sup> Peak	1 <sup>st</sup> Peak	2 <sup>nd</sup> Peak	3 <sup>rd</sup> Peak
Control Sample	86.43	220.5	308.6	60.27	139.5	61.44
Biofield Energy Treated	85.77	220.68	308.88	58.7	140.4	57.49
%Change	-0.76	0.08	0.09	-2.6	0.65	-6.43

Table 3: DSC data for both control and treated cholecalciferol.  
ΔH: Latent heat of fusion/Enthalpy of decomposition.

So, Biofield Energy Treated cholecalciferol required less energy in the form of ΔH to undergo the process of melting after Dahryn's Biofield Energy Treatment. Consequently, the decomposition temperature and the latent heat of decomposition in the Biofield Energy Treated cholecalciferol were increased by 0.08%, and 0.65%, respectively, compared to the control sample. The 2<sup>nd</sup> broad endothermic peak at nearly 309°C may be the slow degradation of non-volatile intermediates produced during the thermal reaction. The melting point of this peak in the Biofield Energy Treated cholecalciferol was increased by 0.09% with a lowered and ΔH by 6.43% compared to the control sample. The results suggested that the thermal stability of the Biofield Energy Treated cholecalciferol was altered compared with the control sample.

### Thermal gravimetric analysis (TGA) / differential thermogravimetric analysis (DTG)

Koshy and Beyer described that the TGA curve of cholecalciferol exhibited a sharp drop in weight at 128°C that might be due to the boiling and possible splattering of the sample [1]. The thermograms of the control and Biofield Energy Treated cholecalciferol showed two steps of thermal degradation (Figure 3). The percentage weight loss in Biofield Energy Treated cholecalciferol was significantly increased by 36.04% in the 1<sup>st</sup> step of degradation, while the % weight loss in the 2<sup>nd</sup> step degradation which showed the major weight loss was reduced by 0.53% compared with the control sample (Table 4). The total weight loss in the Biofield Energy Treated cholecalciferol was decreased by 0.12% compared with the control sample (Table 4).

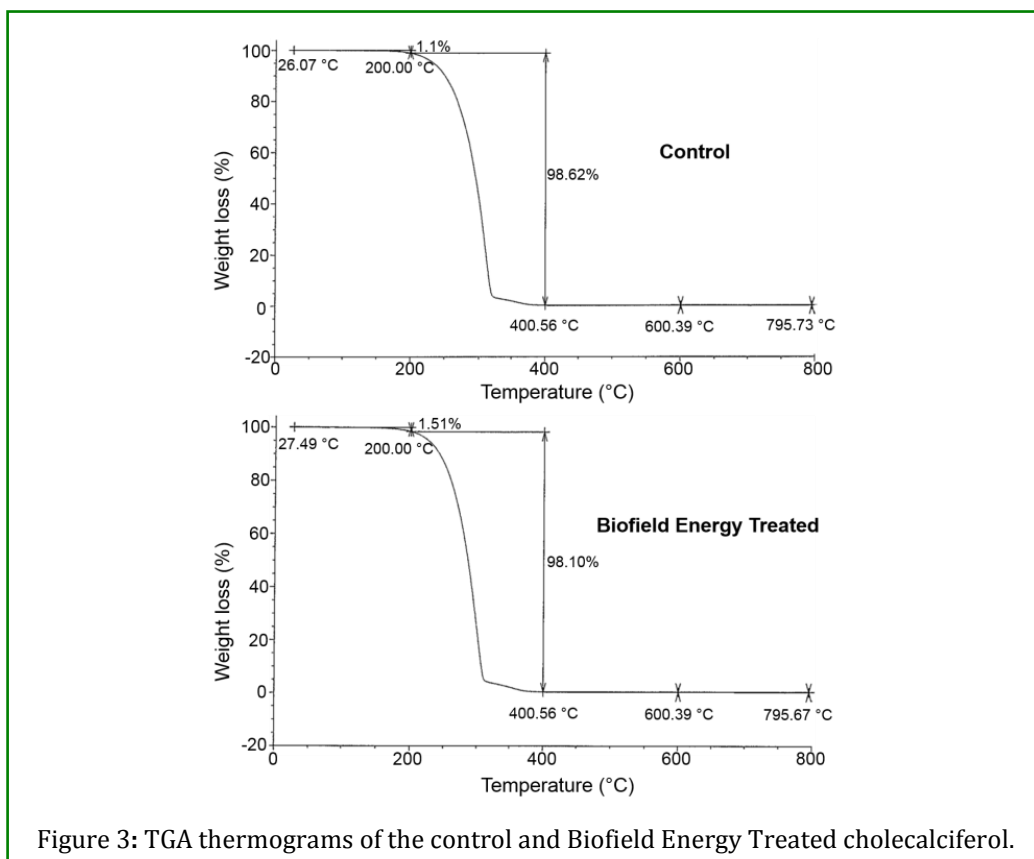


Figure 3: TGA thermograms of the control and Biofield Energy Treated cholecalciferol.

Sample	TGA; Weight loss (%)			$T_{max}$ (°C)
	1 <sup>st</sup> step	2 <sup>nd</sup> step	Total	
Control Sample	1.11	98.62	99.73	310.84
Biofield Energy Treated Sample	1.51	98.1	99.61	300.52
% Change	36.04	-0.53	-0.12	-3.32

Table 4: TGA/DTG data of the control and treated cholecalciferol.

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

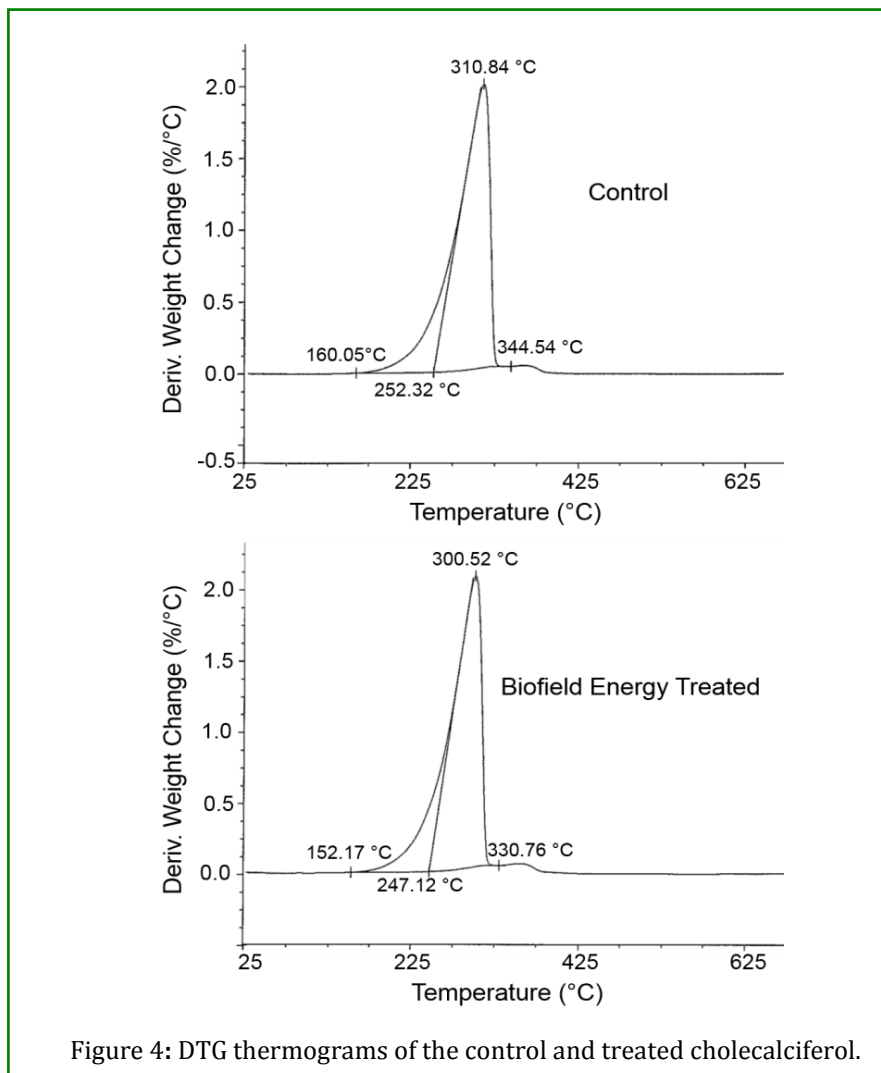


Figure 4: DTG thermograms of the control and treated cholecalciferol.

The DTG thermograms of the control and Biofield Energy Treated cholecalciferol (Figure 4) exhibited only one peak. The maximum thermal degradation temperature ( $T_{max}$ ) of the Biofield Energy Treated cholecalciferol (300.52°C) was decreased by 3.32% than the control sample (310.84 °C) as shown in Table 4. Overall, TGA/DTG revealed that the thermal stability of the treated cholecalciferol was considerably improved compared to the control sample.

## Conclusion

The experimental results revealed that the Trivedi Effect®-Consciousness Energy Healing Treatment showed the significant effects on the crystal properties, particle size, surface area, and thermal stability of cholecalciferol. The PXRD relative peak intensities and crystallite size of the Biofield Energy Treated cholecalciferol were significantly altered ranging from 17.35 to 60.14% and -

30.02% to 99.79%, respectively compared to the control sample. The average crystallite sizes of the treated cholecalciferol were increased by 3.41% compared to the control sample. The particle size values in Dahryn's Biofield Energy Treated cholecalciferol were significantly increased by 2.91% ( $d_{10}$ ), 3.73% ( $d_{50}$ ), 19.59% ( $d_{90}$ ), and 15.53% {D (4,3)}, respectively; thus, the specific surface area was significantly decreased by 20.41% compared to the control sample. The melting point and latent heat of fusion of the Biofield Energy Treated cholecalciferol were lowered by 0.76% and 2.60%, respectively compared with the control sample. The total weight loss in the Biofield Energy Treated cholecalciferol was decreased compared to the control sample. The  $T_{max}$  of the Biofield Energy Treated cholecalciferol was decreased by 3.32% compared to the control sample. Overall, the thermal analysis indicated that the thermal stability of the treated cholecalciferol was reduced compared to the control sample. The Consciousness Energy Healing Treatment might have produced a new polymorphic form of cholecalciferol which would improve powder shape, flowability, and appearance compared with the control sample. The Biofield Energy Treated cholecalciferol would be very suitable to design better nutraceutical and pharmaceutical formulations against vitamin D deficiency, rickets, osteoporosis, cancer, diabetes mellitus, mental disorders, cardiovascular diseases, multiple sclerosis, and infections.

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