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Spectroscopic and Calorimetric Evaluation of the Consciousness Energy Healing Treated Metronidazole

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Abstract

Metronidazole is an antibiotic and used for the treatment of the diseases caused by the anaerobic bacteria and protozoa. The aim of this research work was to estimate the impact of the Trivedi Effect[®]-Consciousness Energy Healing Treatment on the physicochemical, thermal behavior of metronidazole using modern analytical techniques. The test sample metronidazole was divided into two parts. One part of the sample did not receive the Biofield Energy Treatment and called as a control sample. While the other part was received the Consciousness Energy Healing Treatment remotely by a well-known Biofield Energy Healer, Gopal Nayak and termed as a treated sample. The particle size values in the treated metronidazole powder sample were significantly decreased by 25.47% (d_{10}), 12.96% (d_{50}), 11.16% (d_{90}), and 13.49% {D (4,3)}; thus, the specific surface area was significantly increased by 33.21% compared to the control sample. The powder XRD peak intensities and crystallite sizes of the treated powder sample were significantly altered ranging from -43.4% to 396.77% and -67.47% to 187.56%, respectively; whereas, the average crystallite size was significantly decreased by 13.16% compared with the control sample. The latent heat of fusion and latent heat of decomposition were significantly increased by 14.44% and 23.39%, respectively in the treated sample compared with the control sample. The weight loss was decreased by 1.49%; hence the residue amount was significantly increased by 65.2% in the treated sample compared with the control sample. The maximum thermal degradation temperature was increased by 3.04% in the treated sample compared to the control sample. The Trivedi Effect[®]-Consciousness Energy Healing Treatment might have generated a new polymorphic form of metronidazole which may offer better solubility, dissolution rate, absorption, bioavailability, therapeutic efficacy, and thermal stability compared with the control sample. The Consciousness Energy Healing Treated metronidazole sample would be more efficacious pharmaceutical formulations for the treatment of the infections in the vagina, stomach, liver, skin, joints, brain, and respiratory tract, aspiration pneumonia, fungating wounds, rosacea, amoebiasis, periodontitis, etc.

Keywords: Complementary and Alternative Medicine; Consciousness Energy Healing Treatment; Metronidazole; Particle size; Surface area; The Trivedi Effect[®]; PXRD, DSC, TGA/DTG

Introduction

Metronidazole is an antibiotic and antiprotozoal medication. It is also used against the diseases caused by the anaerobic bacteria. It works selectively blocking the nucleic acid synthesis by disrupting

the DNA of microbial cells and the parasites resulting in their death [1,2]. It is used to treat bacterial vaginosis, pseudomembranous colitis, giardiasis, pelvic inflammatory disease, abscess of the ovaries and fallopian tubes, infections in brain, and respiratory tract, aspiration pneumonia, rosacea, intra-abdominal infections, fungating wounds, lung abscess, periodontitis, amoebiasis, oral infections, and the infections caused by the Bacteroides, Clostridium, *Helicobacter pylori*, Fusobacterium, Dracunculus, Peptostreptococcus, and *Prevotella species*, etc. [2-5].

It is also used to treat Giardia in domestic animals [2,6].

Some of the side effects of associated with metronidazole therapy are nausea, vomiting, hypersensitivity reactions, stomatitis, dark urine, neutropenia, vaginal dryness, peripheral neuropathy, decrease of libido, central nervous system toxicity, paraesthesia etc. [2,7]. The metronidazole is delivered in the form of liquid suspension (metronidazole benzoate), capsule, tablet, and intravenous injection [7-8]. It is hazardous when con on the contact of skin, eye, inhalation, and ingestion. It is slightly soluble in water, other organic solvents (alcohol, chloroform, dilute acid, and dimethylformamide) [9,10].

The physicochemical properties of the pharmaceutical or nutraceutical compounds play a crucial role in stability, dissolution, and bioavailability profile in the human body [11]. In this concern, the Trivedi Effect®-Consciousness Energy Healing Treatment worldwide recognized as a wonderful and scientifically proved phenomenon altered the physicochemical properties such as crystallite size, particle size, thermal properties, and bioavailability of the pharmaceutical and nutraceutical compounds [12-15]. The Trivedi Effect® is a natural and only scientifically proven phenomenon in which an expert can harness this inherently intelligent energy from the universe and transmit it anywhere in the world through the possible mediation of neutrinos [16]. A unique infinite and para-dimensional electromagnetic field energy field exists around the body of every living being called the "Biofield". The Biofield based Energy Healing Therapies have been reported significant benefit against various disease conditions [16,17].

The National Institutes of Health (NIH) and the National Center for Complementary and Alternative Medicine (NCCAM) approved and included the Energy therapy under Complementary and Alternative Medicine (CAM) category, which has been accepted by the most of the U.S. population [18,19]. Likewise, the Trivedi Effect®-Consciousness Energy Healing Treatment also has huge potential to alter the physicochemical, structural, and behavioural properties of metals, polymers, ceramics, and organic compounds, microorganisms, cancer cells [20-28], and improve the overall productivity of crops [29,30]. The current study was designed to evaluate the impact of the Trivedi Effect®-Consciousness Energy Healing Treatment on the physicochemical and thermal properties of metronidazole powder using Particle Size Analysis (PSA), Powder X-Ray Diffraction (PXRD), Differential Scanning Calorimetry (DSC), and Thermogravimetric Analysis/Differential Thermogravimetric Analysis (TGA/DTG).

Materials and Methods

Chemicals and Reagents

Metronidazole was purchased from Tokyo Chemical Industry Co., Ltd., Japan and the other chemicals were of analytical grade purchased in India.

Consciousness Energy Healing Treatment Strategies

The metronidazole taken as a test sample was further divided into two equal parts. One part of the test sample was treated with the Consciousness Energy Healing Treatment (the Trivedi Effect®) remotely under standard laboratory conditions for 3 minutes by the renowned Biofield Energy Healer, Gopal Nayak, India, and known as Biofield Energy Treated sample. However, the other part of the test sample did not receive the Biofield Energy Treatment and was termed as a control sample. Further, the control sample was treated with a "sham" healer, who did not have any knowledge about the Biofield Energy Treatment. Both the samples were kept in sealed conditions for the characterization using PSA, PXRD, DSC, and TGA analytical techniques.

Characterization

The PSA was performed using Malvern Mastersizer 2000 (UK) using the wet method [31,32]. The PXRD analysis of metronidazole powder sample was performed with the help of Rigaku MiniFlex-II Desktop X-ray diffractometer (Japan) [33,34]. The average size of crystallites was calculated from PXRD data using the Scherrer's formula (1)

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

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 [35].

Similarly, the DSC analysis of metronidazole was performed with the help of DSC Q200, TA instruments. The TGA/DTG thermograms of metronidazole were obtained with the help of TGA Q50 TA instruments [31,32].

The % change in particle size, specific surface area, peak intensity, crystallite size, latent heat, melting point, weight loss and the maximum thermal degradation temperature of the Biofield Energy Treated metronidazole 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

Particle Size Analysis (PSA)

The particle size values of the control metronidazole powder sample at d_{10} , d_{50} , d_{90} , and D (4,3) were 143.91 μm , 291.19 μm , 523.2 μm , and 313.69 μm , respectively. Similarly, the particle sizes of the Biofield Energy Treated metronidazole powder sample at d_{10} , d_{50} , d_{90} , and D (4,3) were 107.25 μm , 253.45 μm , 464.8 μm , and 271.36 μm , respectively. The particle size values at d_{10} , d_{50} , d_{90} , and D (4,3) in the Biofield Energy Treated metronidazole powder sample were significantly decreased by 25.47%, 12.96%, 11.16%, and 13.49%, respectively compared to the control sample. Thus, the Specific Surface Area (SSA) of the treated metronidazole

powder (0.0357 m²/g) was significantly increased by 33.21% compared to the control sample (0.0268 m²/g). It can be presumed that after the Trivedi Effect[®]-Consciousness Energy Healing Treatment the larger particles fractured to smaller particles of metronidazole, hence increased the surface area. Thus, it can be expected that the Biofield Energy Treated metronidazole sample might offer better solubility, dissolution rate, absorption, bioavailability, and therapeutic efficacy compared to the control sample [36,37].

Parameter	d ₁₀ (μm)	d ₅₀ (μm)	d ₉₀ (μm)	D(4,3) (μm)	SSA(m ² /g)
Control	143.91	291.19	523.20	313.69	0.0268
Biofield Energy Treated	107.25	253.45	464.80	271.36	0.0357
Percent change (%)	-25.47	-12.96	-11.16	-13.49	33.21

d₁₀, d₅₀, and d₉₀: 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.

Table 1: Particle size distribution of the control and Biofield Energy Treated metronidazole powder sample.

Powder X-Ray Diffraction (PXRD) Analysis

The PXRD diffractograms of both the samples showed sharp and intense peaks (Figure 1) indicated that both the samples were crystalline. The diffractograms of the control and Biofield Energy Treated metronidazole powder samples showed the highest peak intensity at 2θ equal to 12.54° and 12.72° (Table 2, entry 1). The peak intensities of the Biofield Energy Treated sample was significantly altered ranging from -43.4% to 396.77% compared to the control sample (Table 2). Similarly, the crystallite sizes of the Biofield Energy Treated metronidazole was significantly altered ranging from -67.47% to 187.56% compared with the control sample. Overall, the crystallite sizes of the Biofield Energy Treated metronidazole powder sample were significantly altered in the range from -63.08% to 344.35% compared to the control sample. However, the average crystallite size of the Biofield Energy Treated powder sample (333.57 nm) was significantly decreased by 13.16% compared to the control sample (384.14 nm).

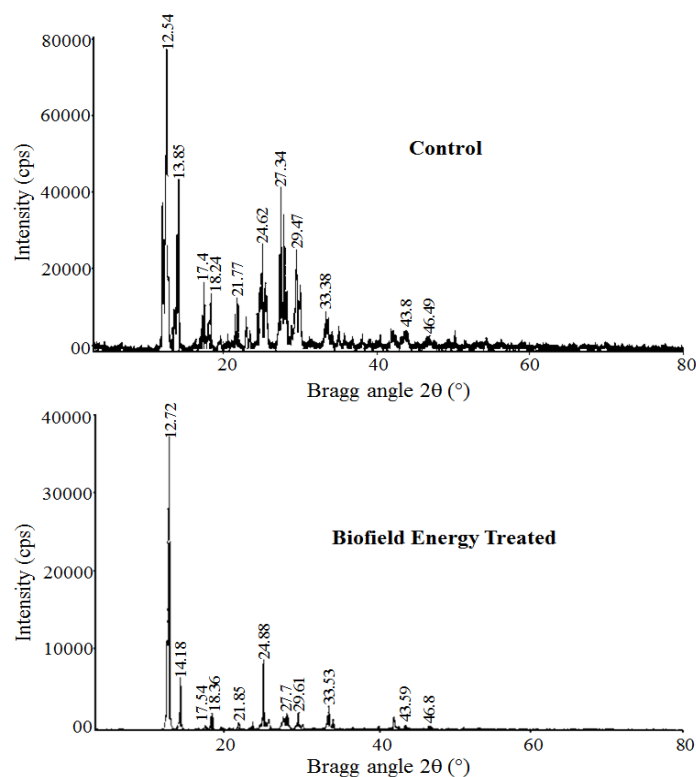


Figure 1: Powder XRD diffractograms of the control and Biofield Energy Treated metronidazole powder sample.

Entry No.	Bragg angle (2θ)		Peak Intensity (%)			Crystallite size (G, nm)		
	Control	Treated	Control	Treated	% Change	Control	Treated	% Change
1	12.54	12.72	1499.00	6830.00	355.64	283.00	336.00	18.73
2	13.85	14.18	295.00	1133.00	284.07	608.00	467.00	-23.19
3	17.40	17.54	212.00	120.00	-43.40	486.00	233.00	-52.06
4	18.24	18.36	163.00	350.00	114.72	794.00	334.00	-57.93
5	19.41	19.59	34.00	40.00	17.65	164.00	146.00	-10.98
6	21.77	21.85	110.00	182.00	65.45	959.00	312.00	-67.47
7	23.39	23.66	31.00	154.00	396.77	225.00	647.00	187.56
8	24.62	24.88	230.00	198.00	-13.91	355.00	294.00	-17.18
9	25.34	25.77	335.00	306.00	-8.66	263.00	256.00	-2.66
10	27.34	27.70	528.00	347.00	-34.28	537.00	234.00	-56.42
11	29.47	29.61	530.00	404.00	-23.77	312.00	531.00	70.19
12	33.38	33.53	276.00	559.00	102.54	156.00	435.00	178.85
13	43.80	43.59	157.00	128.00	-18.47	125.00	277.00	121.60
14	46.49	46.80	97.00	112.00	15.46	111.00	168.00	51.35
15	Average crystallite size					384.14	333.57	-13.16

Table 2: PXRD data for the control and Biofield Energy Treated metronidazole powder sample.

The alteration in the peak intensities and crystallite sizes indicated the change in the crystal morphology and production of new polymorph [38-40] of the treated metronidazole powder compared to the control sample. The Trivedi Effect[®]-Consciousness Energy Healing Treatment probably accountable for the production of the new polymorphic form of metronidazole *via* the possible mediation of neutrino oscillations [16]. Altered polymorphic forms of pharmaceutical compounds have the significant effects on the drug performance, such as bioavailability, therapeutic efficacy, and toxicity, because of their different thermodynamic and physicochemical properties from the original one [41]. Hence, the Biofield Energy Treated metronidazole would be better in designing more efficacious pharmaceutical formulation

Differential Scanning Calorimetry (DSC) Analysis

The thermograms of the control metronidazole samples showed the sharp endothermic and exothermic peak at 160.87°C and 286.43°C, respectively (Figure 2). Likewise, the control metronidazole samples showed the sharp endothermic and exothermic peak at 161.68°C and 287.83°C, respectively (Figure 2). The experimental data were very close to the literature reported data [9]. The melting point and decomposition temperature of the treated metronidazole were increased by 0.5% and 0.49%, respectively compared to the control sample (Table 3). The latent heat of fusion (ΔH_{fusion}) and latent heat of decomposition ($\Delta H_{\text{decomposition}}$) of the treated metronidazole were significantly increased by 14.44% and 23.39%, respectively compared to the control sample (Table 3). Any change in the latent heat of fusion can be attributed to the disrupted molecular chains and the crystal structure [42,43]. Thus, the Trivedi Effect[®]-Consciousness Energy Healing Treatment might have improved the molecular chains strength of the Biofield Energy Treated metronidazole molecule so that the thermal stability of the treated sample was increased compared with the control sample.

Sample	Melting Temp (°C)	Decomposition Temp (°C)	ΔH (J/g)	
			Fusion	Decomposition
Control Sample	160.87	286.43	183.50	1056.00
Biofield Energy Treated	161.68	287.83	210.00	1303.00
% Change	0.50	0.49	14.44	23.39

ΔH : Latent heat of fusion/decomposition.

Table 3: DSC data for both control and Biofield Energy Treated samples of metronidazole powder sample.

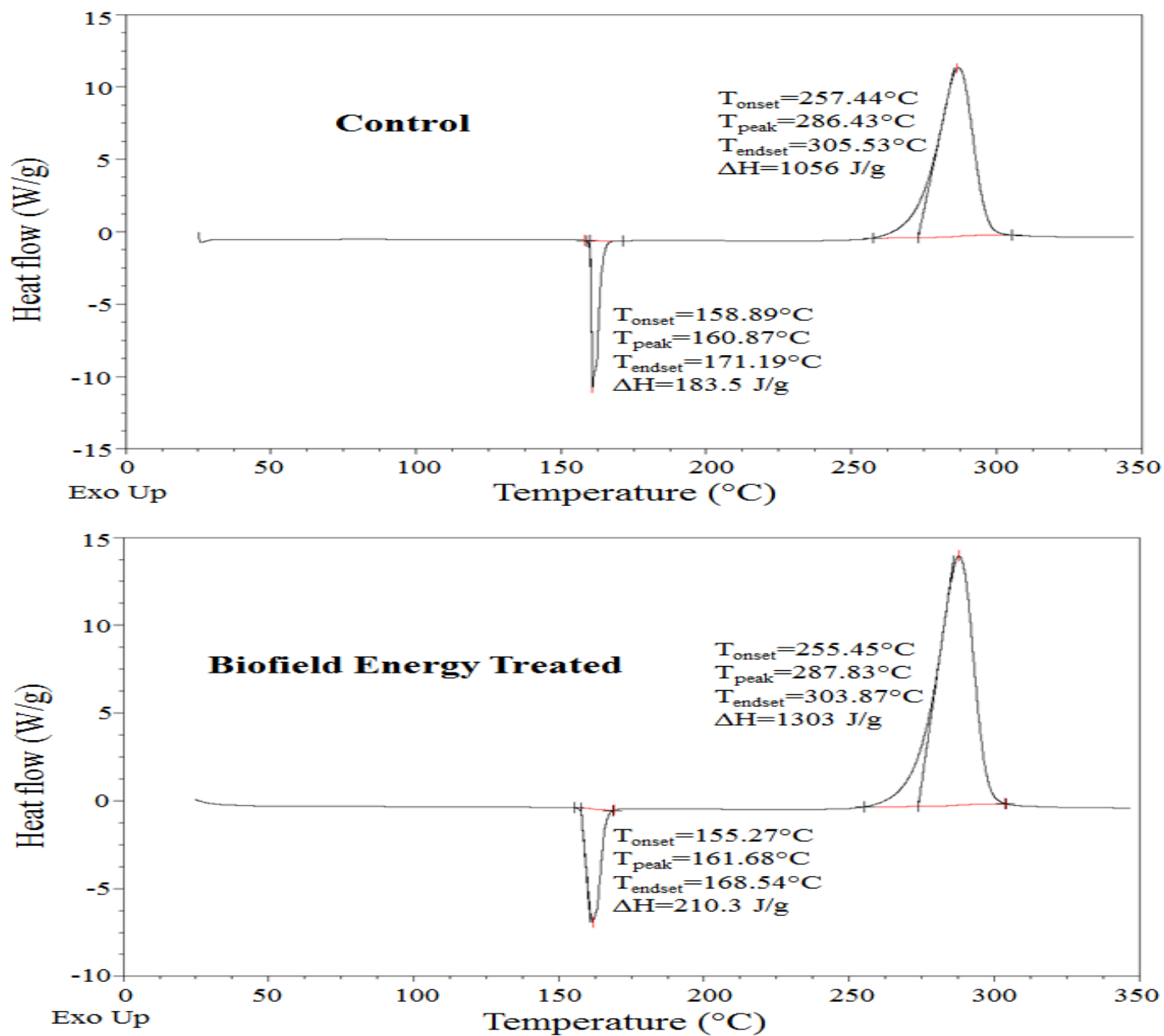


Figure 2. DSC thermograms of the control and Biofield Energy Treated metronidazole powder sample.

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

Both the metronidazole samples showed one step of thermal degradation in the TGA thermograms (Figure 3). The total weight loss of the treated metronidazole was decreased by 1.49% more compared to the control sample (Table 4). However, the residue amount was significantly increased by 65.2% in the Biofield Energy Treated metronidazole compared to the control sample (Table 4).

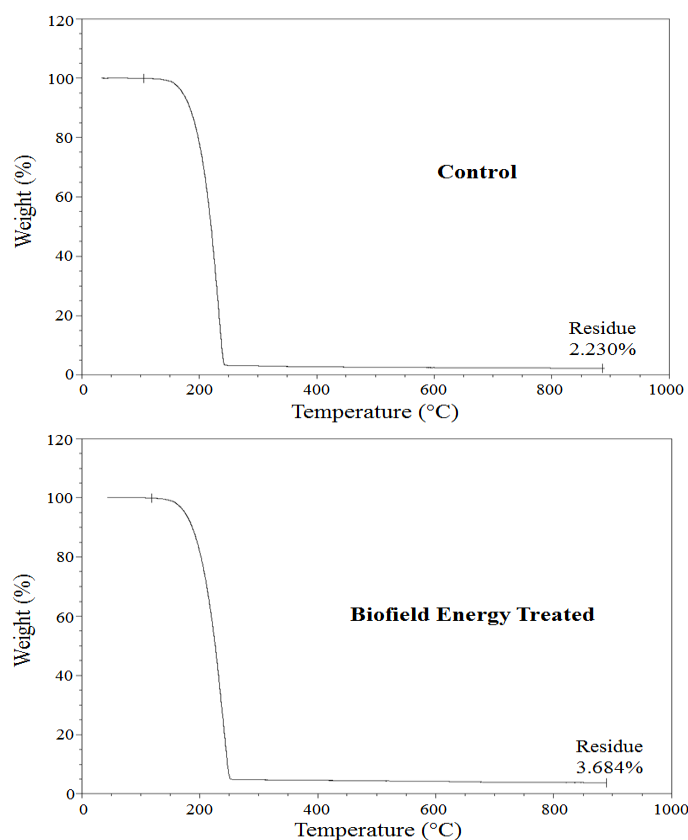


Figure 3: TGA thermograms of the control and Biofield Energy Treated metronidazole powder sample.

Sample	TGA		DTG
	Total weight loss (%)	Residue (%)	T _{max} (°C)
Control	97.77	2.23	233.96
Biofield Energy Treated	96.316	3.684	241.08
% Change*	-1.49	65.20	3.04

*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.

Table 4: TGA/DTG data of the control and Biofield Energy Treated samples of metronidazole powder sample.

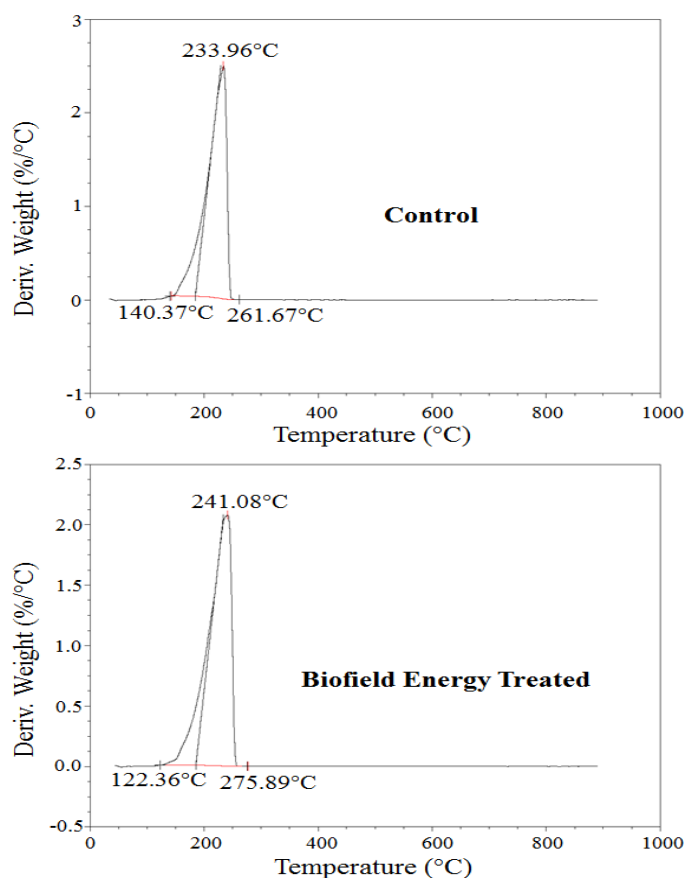


Figure 4: DTG thermograms of the control and Biofield Energy Treated metronidazole powder sample.

The DTG thermograms of both the samples showed one peak in the thermograms (Figure 4); where, the maximum thermal degradation temperature (T_{max}) of the Biofield Energy Treated metronidazole was increased by 3.04% compared to the control sample (Table 4). The overall thermal analysis of metronidazole powder samples revealed that the thermal stability of the Trivedi Effect®-Biofield Energy Treated sample was increased compared to the control sample.

Conclusions

The experimental results showed that the Trivedi Effect®-Consciousness Energy Healing Treatment has a significant effect on the thermal, and behavioral properties of metronidazole. The particle size values in the Biofield Energy Treated metronidazole powder sample were significantly decreased by 25.47% (d_{10}), 12.96% (d_{50}), 11.16% (d_{90}), and 13.49% {D (4,3)}; thus, the specific surface area was significantly increased by 33.21% compared to the control sample. The powder XRD peak intensities and crystallite sizes of the Biofield Energy Treated powder sample

were significantly altered ranging from -43.4% to 396.77% and -67.47% to 187.56%, respectively; whereas, the average crystallite size was significantly decreased by 13.16% compared with the control sample. The ΔH_{fusion} and $\Delta H_{decomposition}$ were significantly increased by 14.44% and 23.39%, respectively in the Biofield Energy Treated sample compared with the control sample. The total weight loss was decreased by 1.49%; hence the residue amount was significantly increased by 65.2% in the Biofield Energy Treated sample compared with the control sample.

The T_{max} was increased by 3.04% in the Biofield Energy Treated sample compared with the control sample. The Trivedi Effect®-Consciousness Energy Healing Treatment might have generated a new polymorphic form of metronidazole which may offer better solubility, bioavailability, therapeutic efficacy, and thermal stability compared with the control sample. The Consciousness Energy Healing Treated metronidazole sample would be more efficacious pharmaceutical formulations for the treatment of bacterial vaginosis, pseudomembranous colitis, giardiasis, pelvic inflammatory disease, abscess of the ovaries and fallopian tubes, infections in brain, and respiratory tract, aspiration pneumonia, rosacea, intra-abdominal infections, fungating wounds, lung abscess, periodontitis, amoebiasis, oral infections, and the infections caused by the Bacteroides, Clostridium, *Helicobacter pylori*, Fusobacterium, Dracunculus, Peptostreptococcus, and *Prevotella species*, etc.

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