



# Physicochemical and Thermal Analysis of the Consciousness Energy Healing Treated Ofloxacin



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## Abstract

Ofloxacin is a synthetic fluoroquinolone broad-spectrum antibiotic used for the treatment of both Gram-positive and gram-negative bacterial infections. In this study, the impact of consciousness energy healing treatment (the Trivedi Effect<sup>®</sup>) on the physicochemical and thermal properties of ofloxacin powder sample was evaluated using modern analytical techniques. The ofloxacin was divided into control and the Biofield Energy Treated sample. Only the treated ofloxacin was received the Consciousness Energy Healing Treatment remotely by a well-known Biofield Energy Healer, Dahryn Trivedi. The particle size values in the treated ofloxacin powder were significantly increased by 10.96%(d<sub>10</sub>), 29.09%(d<sub>50</sub>), 14.03%(d<sub>90</sub>), and 12.48% {D(4,3)}; thus, the surface area was significantly decreased by 8.06% compared to the control ofloxacin. The PXRD peak intensities and crystallite sizes of the treated ofloxacin were significantly altered ranging from -70.76% to 4.73% and -70.36% to 314.81%, respectively; however, the average crystallite was significantly increased by 25.22% compared with the control sample. The latent heat of fusion and decomposition was significantly altered by 13.43% and -53%, respectively in the treated ofloxacin compared with the control sample. The total weight loss was significantly decreased by 4.19%; however, the residue amount was significantly increased by 26.97% in the treated ofloxacin compared with the control sample. Thus, the Consciousness Energy Healing Treatment (the Trivedi Effect<sup>®</sup>) might lead to generate a new polymorphic form of ofloxacin with better shape, appearance, flowability, and thermally more stable compared to the control sample. The Consciousness Energy Healing Treated ofloxacin would be very useful to design novel pharmaceutical formulations for the better therapeutic response against urinary tract infections, infections of the urethra, and cervix, pneumonia, cellulitis, diarrhoea, bronchitis, plague, tuberculosis, prostatitis, and otitis media, etc.

**Keywords:** Complementary and alternative medicine; Ofloxacin; The Trivedi Effect<sup>®</sup>; Consciousness energy healing treatment; Particle size; PXRD; DSC; TGA/DTG

## Introduction

Ofloxacin is a synthetic fluoroquinolone broad-spectrum antibiotic used to treat a variety of Gram-positive and Gram-negative bacterial infections [1]. It causes the bacterial cell death by inhibiting DNA gyrase (a type II topoisomerase and topoisomerase IV) which helps in DNA replication and repair [2]. Ofloxacin mainly used for the treatment of urinary tract infections, infections of the urethra and cervix (i.e., gonorrhoea), pneumonia, infectious diarrhoea, prostatitis, cellulitis, chronic bronchitis, plague, multidrug-resistant tuberculosis, bacterial infection of the eye and ear, otitis media when there is a hole in the eardrum, etc. [1-4]. The common side effects associated with it include a headache, vomiting, diarrhoea, seizures, psychosis, tendon rupture, numbness, skin rash, etc. [1]. It may inhibit certain drug metabolizing enzymes and thereby increase blood levels of other drugs such as theophylline, warfarin, cyclosporine, etc. It may show an increase the anticoagulant, cardiotoxicity, and arrhythmias effects when co-administered with drugs such as acenocoumarol, Quinidine barbiturate, dihydroquinidine barbiturate, etc. [4,5]. It has a shorter biological half-life, and its bioavailability is mainly

dependent upon the physiological condition of the gastrointestinal tract. It is highly soluble in acidic medium and precipitates in alkaline medium thereby losing its solubility [4]. Physicochemical properties of a pharmaceutical compound play a crucial role in its dissolution, absorption, and bioavailability [6].

Many research activities are carrying out throughout the world for the improvement of these properties of the pharmaceutical or nutraceutical compounds in the formulations. In this development, the Trivedi Effect<sup>®</sup>-Biofield Energy Healing Treatment has a significant impact on the particle size, surface area, crystallite size, and thermal properties of pharmaceutical/nutraceutical compounds [7-11]. The Trivedi Effect<sup>®</sup> is a natural and lone scientifically established phenomenon in which an individual can harness this inherently intelligent energy from the "Universe" and transfer it anywhere on the planet through the possible mediation of neutrinos [12]. Every living organism possesses a unique, infinite, para-dimensional electromagnetic field surrounding the body, originate from the continuous movements of the charged particles, ions, cells, lymph/blood flow, heart and brain functions, etc. in the

body known as Biofield (Putative Energy Fields). Biofield Energy Healing Therapies have been reported with significantly beneficial outcomes against various disease conditions [13].

The National Center for Complementary and Alternative Medicine (NCCAM) and the National Institutes of Health (NIH) recommend and counted in the energy therapy under Complementary and Alternative Medicine (CAM) category along with Reiki, hypnotherapy, yoga, traditional Chinese herbs and medicines, Ayurvedic medicine, etc., that has been accepted by most of the USA people [14,15]. Similarly, the impact of the Trivedi Effect®-consciousness energy healing treatment has been studied scientifically and reported astounding results altering the characteristic properties of the living and non-living object(s), i.e., crops, microbes, live stocks, organic compounds, metals and ceramic, cancer cells, etc. [16-26]. These surprising results motivated to evaluate the impact of the Trivedi Effect®-Consciousness Energy Healing Treatment on the physicochemical, and thermal properties of ofloxacin with the help of particle size analysis, powder X-ray diffraction, differential scanning calorimetry, thermogravimetric analysis, and differential thermogravimetric analysis.

## Materials and Methods

### Chemicals and reagents

Ofloxacin was procured from Sigma Aldrich (USA) and the other chemicals used in the experiments were purchased from India.

### Consciousness energy healing treatment strategies

The test sample ofloxacin was divided into the control and the Biofield Energy Treated parts. The treated part of the ofloxacin was received the Trivedi Effect®-Consciousness Energy Healing Treatment remotely for 3 minutes by a well-known Biofield Energy Healer, Dahryn Trivedi (USA). The control sample did not receive the Consciousness Energy Healing Treatment, but, treated with a "sham" healer, who does not have any knowledge about the Biofield Energy Treatment. After the treatment, both the samples were characterized using modern analytical techniques.

### Characterization

The PSA, PXRD, DSC, and TGA analysis of ofloxacin were performed. The PSA was performed with the help of Malvern Mastersizer 2000 (the UK) using the wet method [27,28]. The powder XRD analysis of ofloxacin powder sample was performed with the help of Rigaku MiniFlex-II Desktop X-ray diffractometer

**Table 1:** Particle size distribution of the control and Biofield Energy Treated ofloxacin.

Parameter	$d_{10}$ ( $\mu\text{m}$ )	$d_{50}$ ( $\mu\text{m}$ )	$d_{90}$ ( $\mu\text{m}$ )	D(4,3) ( $\mu\text{m}$ )	SSA ( $\text{m}^2/\text{g}$ )
Control	2.3	20.32	201.35	68.76	1.03
Biofield treated	2.55	26.23	229.59	77.34	0.947
Percent change (%)	10.96	29.09	14.03	12.48	-8.06

$d_{10}$ ,  $d_{50}$ , and  $d_{90}$ : Particle diameter corresponding to 10%, 50%, and 90% of the cumulative distribution; D(4,3): the average mass-volume diameter; SSA: Specific Surface Area.

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

The diffractograms of the control and Biofield Energy Treated ofloxacin powder showed sharp and intense peaks at Bragg's

(Japan) [29,30]. 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,  $\lambda$  is the radiation wavelength,  $\beta$  is the full-width at half maximum, and  $\theta$  is the Bragg angle [31].

Likewise, the DSC analysis of ofloxacin was performed with the help of DSC Q200, TA instruments. The TGA/DTG thermograms of ofloxacin were obtained with the help of TGA Q50 TA Instruments [27,28].

The % change in particle size, surface area, peak intensity, crystallite size, melting point, latent heat, weight loss, and the maximum thermal degradation temperature ( $T_{max}$ ) of the Biofield Energy Treated ofloxacin was calculated compared with the control ofloxacin using the following equation 2:

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

## Results and Discussion

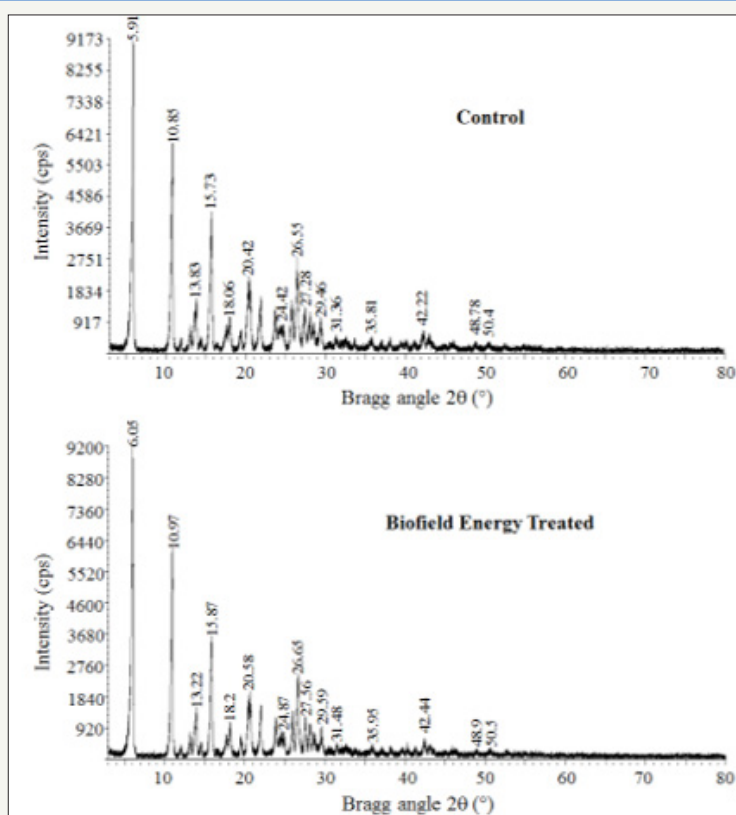
### Particle size analysis (PSA)

The PSD analysis data of both the control and Biofield Energy Treated ofloxacin are presented in Table 1. The particle size values of the control ofloxacin powder sample at  $d_{10}$ ,  $d_{50}$ ,  $d_{90}$ , and D (4,3) were 2.3 $\mu\text{m}$ , 20.32 $\mu\text{m}$ , 201.35 $\mu\text{m}$ , and 68.76 $\mu\text{m}$ , respectively. Similarly, the particle sizes of the treated ofloxacin powder sample at  $d_{10}$ ,  $d_{50}$ ,  $d_{90}$ , and D (4,3) were 2.55 $\mu\text{m}$ , 26.23 $\mu\text{m}$ , 229.59 $\mu\text{m}$ , and 77.34 $\mu\text{m}$ , respectively. In comparison to the control sample, the particle size values in Dahryn's Biofield Energy Treated ofloxacin powder were significantly increased by 10.96%, 29.09%, 14.03%, and 12.48% at  $d_{10}$ ,  $d_{50}$ ,  $d_{90}$ , and D (4,3), respectively. Therefore, the specific surface area of Biofield Energy Treated ofloxacin powder (0.947 $\text{m}^2/\text{g}$ ) was significantly decreased by 8.06% compared with the control sample (1.03 $\text{m}^2/\text{g}$ ). This improved particle size and decreased surface area might be the impact of the Trivedi Effect®-Consciousness Energy Healing Treatment. The increased particle size of a may help in enhancing the shape, appearance, and flowability of that compound [32,33]. Thus, it is expected that the Biofield Energy Treated ofloxacin powder sample might offer better shape, appearance, and flowability compared to the untreated sample, which is very important for the pharmaceutical formulations.

angle ( $2\theta$ ) (Figure 1), which indicated that both the samples were crystalline. The control and the treated samples showed the highest peak intensity at  $2\theta$  equal to 6.1° (Table 2). The peak intensities of the treated ofloxacin powder were significantly

altered from -70.76% to 4.73% compared to the control sample. Overall, the crystallite sizes of the Biofield Energy Treated ofloxacin powder sample was significantly altered ranging from -70.36% to 314.81% compared to the control sample. The average crystallite

size of the Biofield Energy Treated ofloxacin powder (300nm) was significantly increased by 25.22% compared with the control sample (239.58nm).



**Figure 1:** PXRD diffractograms of the control and Biofield Energy Treated ofloxacin.

**Table 2:** PXRD data for the control and Biofield Energy Treated ofloxacin.

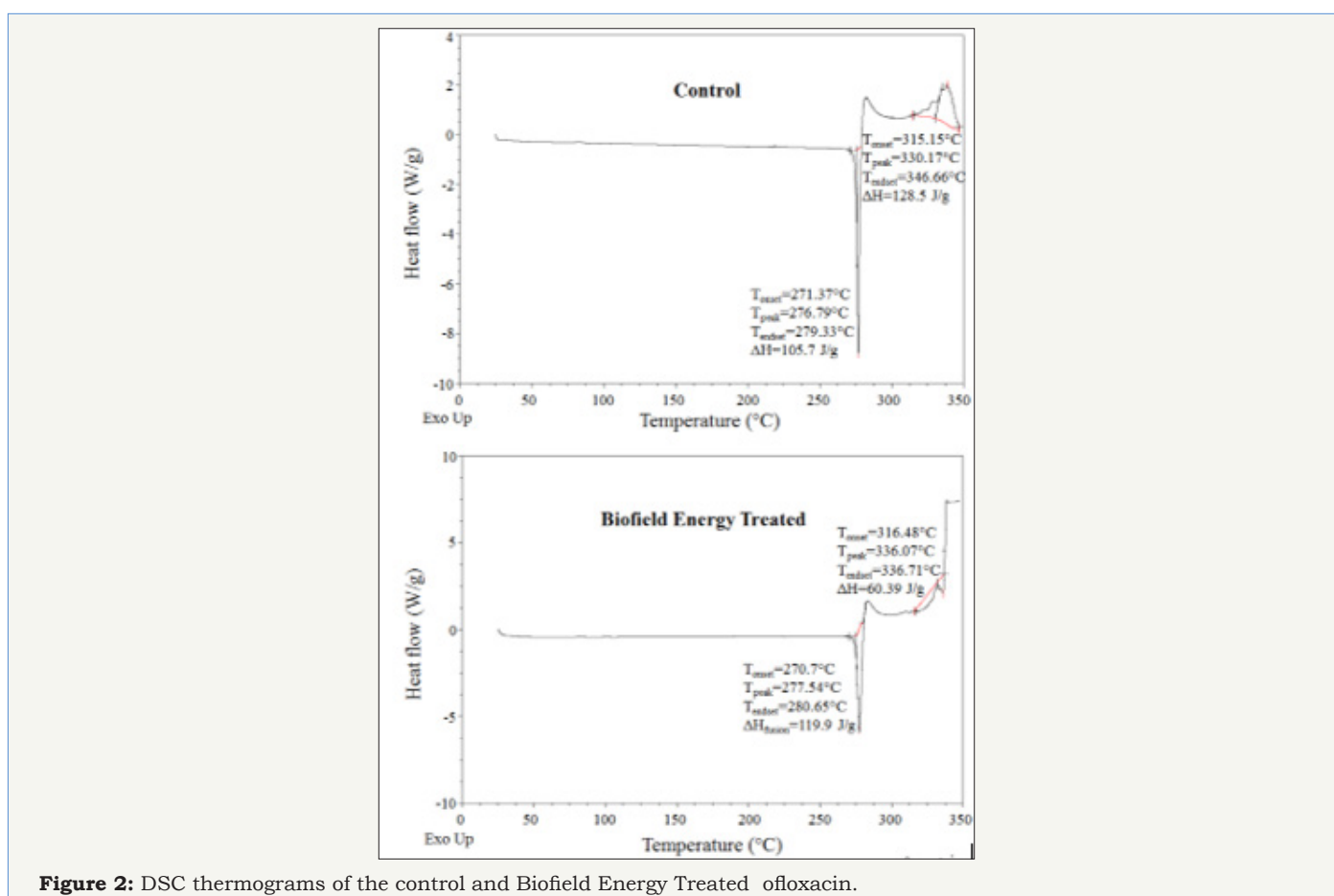
Entry No.	Bragg Angle ( $^{\circ}2\theta$ )		Peak Intensity (%)			Crystallite Size (G,nm)		
	Control	Treated	Control	Treated	% change	Control	Treated	% change
1	5.91	6.05	1943	2035	4.73	375	318	-15.2
2	10.85	10.97	1226	1189	-3.02	282	296	4.96
3	13.83	13.22	374	242	-35.29	253	75	-70.36
4	14.44	14.61	71	23	-67.61	258	532	106.2
5	15.73	15.87	877	683	-22.12	244	276	13.11
6	18.06	18.2	318	274	-13.84	127	253	99.21
7	19.43	19.58	103	63	-38.83	279	409	46.59
8	20.42	20.58	717	535	-25.38	166	187	12.65
9	24.42	24.87	571	250	-56.22	91	93	2.2
10	26.55	26.65	614	569	-7.33	278	273	-1.8
11	27.28	27.56	602	176	-70.76	146	368	152.05
12	29.46	29.59	164	165	0.61	284	246	-13.38
13	31.36	31.48	42	38	-9.52	377	431	14.32
14	32.58	32.72	94	80	-14.89	107	90	-15.89
15	35.81	35.95	59	34	-42.37	192	255	32.81
16	41.17	41.36	26	17	-34.62	473	449	-5.07
17	42.22	42.44	189	72	-61.9	81	336	314.81

18	48.78	48.9	26	16	-38.46	330	616	86.67
19	50.4	50.5	44	33	-25	209	197	-5.74
20	Average crystallite size					239.58	300	25.22

The significant alterations in the intensities and crystallite sizes indicated a new polymorphic form ofloxacin might have formed due to the Biofield Energy Treatment via neutrino oscillations [12]. The peak intensity of each diffraction face on the crystalline compound changes according to the crystal morphology [34] and alterations in the PXRD pattern provide the proof of polymorphic transitions [35,36]. Different polymorphic forms of pharmaceuticals have the significant effects on the drug performance, such as bioavailability, therapeutic efficacy, and toxicity, because of their thermodynamic and physicochemical properties (i.e., melting point, stability and solubility) are different from the original form [37,38]. The Trivedi Effect®-Consciousness Energy Healing Treated ofloxacin would be better in designing more efficacious novel pharmaceutical formulations.

### Differential scanning calorimetry (DSC) analysis

The DSC data of the control and Biofield Energy Treated ofloxacin are presented in (Table 3). The thermograms of the control and Biofield Energy Treated ofloxacin showed the sharp endothermic peak at 276.79 °C and 277.54 °C, respectively (Figure 2), which was closely matched to the reported data [39]. The melting point of the Biofield Energy Treated ofloxacin was slightly increased by 0.27% compared with the control sample (Table 3). Similarly, the control and Biofield Energy Treated samples showed exothermic peaks at 330.17 °C and 336.07 °C, respectively (Figure 2). The decomposition temperature of the Biofield Energy Treated ofloxacin was also increased by 1.79% compared with the control sample (Table 3).



**Figure 2:** DSC thermograms of the control and Biofield Energy Treated ofloxacin.

**Table 3:** DSC data for both control and Biofield Energy Treated samples of ofloxacin.

Sample	Melting Temp (°C)	Decomposition Temp (°C)	ΔH (J/g)	
			Melting	Decomposition
Control Sample	276.79	330.17	105.7	128.5
Biofield Energy Treated	277.54	336.07	119.9	60.39
% Change	0.27	1.79	13.43	-53

ΔH: Latent heat of fusion/decomposition.

The latent heat of fusion ( $\Delta H_{\text{fusion}}$ ) of the Biofield Energy Treated ofloxacin (119.9J/g) was significantly increased by 13.43% compared with the control sample (105.7J/g) (Table 3). But, the latent heat of decomposition ( $\Delta H_{\text{decomposition}}$ ) of the Biofield Energy Treated ofloxacin (60.39J/g) was significantly decreased by 53% compared with the control sample (128.50J/g) (Table 3). The change in the latent heat of fusion can be attributed to the disrupted molecule chains and the crystal structure [40]. The Trivedi Effect® assumed for the disruption of the molecular chains and crystal structure of ofloxacin, which improved the overall thermal stability of the Biofield Energy Treated sample compared with the control sample.

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

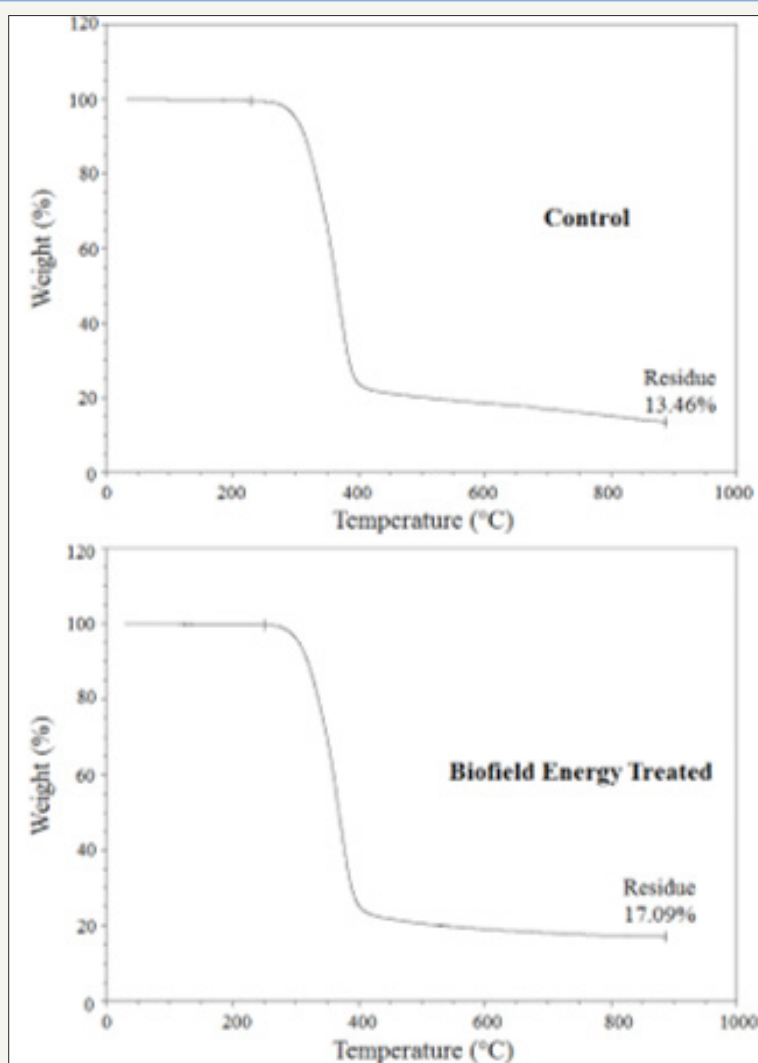
The control and Biofield Energy Treated ofloxacin samples displayed one step of thermal degradation (Figure 3). The total weight loss in the Biofield Energy Treated ofloxacin was decreased by 4.19% compared with the control sample (Table 4). Hence, the residue amount was significantly increased by 26.97% in the

Biofield Energy Treated ofloxacin compared to the control sample (Table 4). The DTG thermograms of the control and Biofield Energy Treated ofloxacin similarly exhibited only one maximum thermal degradation temperature ( $T_{\text{max}}$ ) peak (Figure 4). The  $T_{\text{max}}$  of the Biofield Energy Treated sample was increased by 0.99% compared to the control sample (Table 4). Overall, TGA/DTG revealed that the thermal stability of the Biofield Energy Treated ofloxacin was improved significantly compared with the control sample.

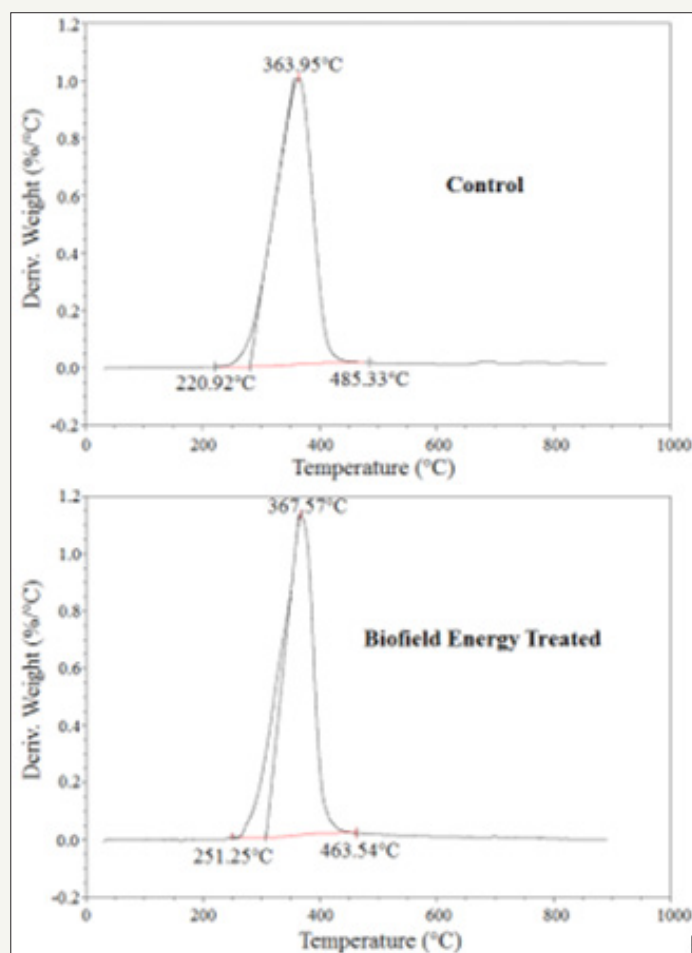
**Table 4:** TGA/DTG data of the control and Biofield Energy Treated samples of ofloxacin.

Sample	TGA		DTG
	Total weight loss (%)	Residue %	$T_{\text{max}}$ (°C)
Control	86.54	13.46	363.95
Biofield Energy Treated	82.91	17.09	367.57
% Change	-4.19	26.97	0.99

$T_{\text{max}}$  = The temperature at which maximum thermal degradation temperature.



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



**Figure 4:** DTG thermograms of the control and Biofield Energy Treated ofloxacin.

## Conclusion

The Consciousness Energy Healing Treatment (the Trivedi Effect®) has shown a significant effect on the crystal properties, particle size, surface area, and thermal properties of ofloxacin powder sample. The size of the particles in the Biofield Energy Treated ofloxacin powder were significantly increased by 10.96%, 29.09%, 14.03%, and 12.48% at  $d_{10}$ ,  $d_{50}$ ,  $d_{90}$ , and  $D(4,3)$ , respectively compared to the control sample. The specific surface area of Biofield Energy Treated ofloxacin powder sample was significantly decreased by 8.06% compared to the control sample. The PXRD peak intensities of the Biofield Energy Treated ofloxacin were significantly altered from -70.76% to 4.73% compared to the control sample. Similarly, the crystallite sizes of the treated sample were significantly altered ranging from -70.36% to 314.81% compared to the control sample. The average crystallite size of the treated ofloxacin powder sample was significantly increased by 25.22% compared with the control sample. The melting and decomposition temperature of the treated ofloxacin was increased compared to the control sample. The latent heat of fusion and decomposition was significantly altered by 13.43% and -53%, respectively in the treated ofloxacin compared with the control sample. The total weight loss was decreased significantly by 4.19%; however, the residue amount was significantly increased by 26.97% in the treated ofloxacin compared with the control sample. Thus,

the Trivedi Effect®-Consciousness Energy Healing Treatment might lead to generate a new polymorphic form of ofloxacin with better shape, appearance, flowability, and thermally stable compared to the control sample. The Consciousness Energy Healing Treated ofloxacin would be very useful to design novel pharmaceutical formulations for the better therapeutic response against urinary tract infections, infections of the urethra and cervix (i.e., gonorrhea), pneumonia, cellulitis, infectious diarrhoea, chronic bronchitis, plague, multidrug-resistant tuberculosis, prostatitis, bacterial infection of the eye and ear, otitis media when there is a hole in the eardrum, etc.

## References

1. Ofloxacin (2018) The American society of health-system pharmacists, USA.
2. Drlica K, Zhao X (1997) DNA gyrase, topoisomerase IV, and the 4-quinolones. *Microbiol Mol Biol Rev* 61(3): 377-392.
3. BMA (2015) British national formulary, (69<sup>th</sup> edn), British Medical Association, USA, pp. 409,757,782.
4. <https://en.wikipedia.org/wiki/Ofloxacin>
5. Linden PDV, Sturkenboom MC, Herings RM, Leufkens HM, Rowlands S, et al. (2003) Increased risk of achilles tendon rupture with quinolone antibacterial use, especially in elderly patients taking oral corticosteroids. *Arch Intern Med* 163(15): 1801-1807.

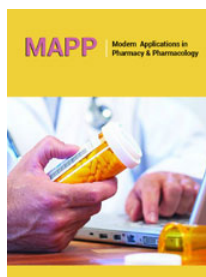
6. Chereson R (2009) Bioavailability, bioequivalence, and drug selection. In: Makoid CM, Vuchetich PJ, Banakar UV (Eds.), Basic pharmacokinetics, (1<sup>st</sup> edn), Pharmaceutical Press, London, UK.
7. Trivedi MK, Branton A, Trivedi D, Nayak G, Bairwa K, et al. (2015) Spectroscopic characterization of disulfiram and nicotinic acid after biofield treatment. *J Anal Bioanal Tech* 6(5): 265.
8. Trivedi MK, Patil S, Shettigar H, Bairwa K, Jana S (2015) Effect of biofield treatment on spectral properties of paracetamol and piroxicam. *Chem Sci J* 6: p. 98.
9. Trivedi MK, Branton A, Trivedi D, Nayak G, Wellborn BD, et al. (2017) Characterization of physicochemical, thermal, structural, and behavioral properties of magnesium gluconate after treatment with the energy of consciousness. *International Journal of Pharmacy and Chemistry* 3(1): 1-12.
10. Trivedi MK, Branton A, Trivedi D, Nayak G, Nykvist CD, et al. (2017) Evaluation of the physicochemical, spectral, and thermal properties of sodium selenate treated with the energy of consciousness (the Trivedi Effect®). *Advances in Bioscience and Bioengineering* 5(1): 12-21.
11. Branton A, Jana S (2017) Effect of the biofield energy healing treatment on the pharmacokinetics of 25-hydroxyvitamin D<sub>3</sub> [25(OH)D<sub>3</sub>] in rats after a single oral dose of vitamin D<sub>3</sub>. *American Journal of Pharmacology and Phytotherapy* 2(1): 11-18.
12. Trivedi MK, Mohan TRR (2016) Biofield energy signals, energy transmission and neutrinos. *American Journal of Modern Physics* 5(6): 172-176.
13. Rubik B, Muehsam D, Hammerschlag R, Jain S (2015) Biofield science and healing: history, terminology, and concepts. *Glob Adv Health Med* 4(Suppl): 8-14.
14. Barnes PM, Bloom B, Nahin RL (2008) Complementary and alternative medicine use among adults and children: United States, 2007. *Natl Health Stat Report* 12: 1-23.
15. Koithan M (2009) Introducing complementary and alternative therapies. *J Nurse Pract* 5(1): 18-20.
16. Trivedi MK, Branton A, Trivedi D, Nayak G, Mondal SC, et al. (2015) Evaluation of biochemical marker-glutathione and DNA fingerprinting of biofield energy treated *Oryza sativa*. *American Journal of Bio Science* 3: 243-248.
17. Trivedi MK, Branton A, Trivedi D, Nayak G, Mondal SC, et al. (2015) Evaluation of plant growth, yield and yield attributes of biofield energy treated mustard (*Brassica juncea*) and chick pea (*Cicer arietinum*) seeds. *Agriculture, Forestry and Fisheries* 4(6): 291-295.
18. Trivedi MK, Branton A, Trivedi D, Nayak G, Gangwar M, et al. (2015) Use of energy healing medicine against *Escherichia coli* for antimicrobial susceptibility, biochemical reaction and biotyping. *American Journal of Bioscience and Bioengineering* 3(5): 99-105.
19. Trivedi MK, Branton A, Trivedi D, Nayak G, Gangwar M, et al. (2015) Assessment of antibiogram of biofield energy treated *Serratia marcescens*. *European Journal of Preventive Medicine* 3(6): 201-208.
20. Trivedi MK, Branton A, Trivedi D, Nayak G, Mondal SC, et al. (2015) Effect of biofield treated energized water on the growth and health status in chicken (*Gallus gallus domesticus*). *Poultry, Fisheries & Wildlife Sciences* 3(2): 140.
21. Trivedi MK, Branton A, Trivedi D, Nayak G, Sethi KK, et al. (2016) Gas chromatography-mass spectrometry based isotopic abundance ratio analysis of biofield energy treated methyl-2-naphthylether (Nerolin). *American Journal of Physical Chemistry* 5(4): 80-86.
22. Trivedi MK, Branton A, Trivedi D, Nayak G, Panda P, et al. (2016) Isotopic abundance ratio analysis of 1,2,3-trimethoxybenzene (TMB) after biofield energy treatment (the Trivedi Effect®) using gas chromatography-mass spectrometry. *American Journal of Applied Chemistry* 4(4): 132-140.
23. Trivedi MK, Tallapragada RM (2008) A transcendental to changing metal powder characteristics. *Metal Powder Report* 63(9): 22-28.
24. Trivedi MK, Nayak G, Patil S, Tallapragada RM, Latiyal O (2015) Studies of the atomic and crystalline characteristics of ceramic oxide nano powders after bio field treatment. *Ind Eng Manage* 4(3): 161.
25. Trivedi MK, Patil S, Shettigar H, Mondal SC, Jana S (2015) The potential impact of biofield treatment on human brain tumor cells: A time-lapse video microscopy. *J Integr Oncol* 4(3): 141.
26. Trivedi MK, Patil S, Shettigar H, Gangwar M, Jana S (2015) *In vitro* evaluation of biofield treatment on cancer biomarkers involved in endometrial and prostate cancer cell lines. *J Cancer Sci Ther* 7(7): 253-257.
27. Trivedi MK, Sethi KK, Panda P, Jana S (2017) Physicochemical, thermal and spectroscopic characterization of sodium selenate using XRD, PSD, DSC, TGA/DTG, UV-vis, and FT-IR. *Marmara Pharmaceutical Journal* 21(2): 311-318.
28. Trivedi MK, Sethi KK, Panda P, Jana S (2017) A comprehensive physicochemical, thermal, and spectroscopic characterization of zinc (II) chloride using X-ray diffraction, particle size distribution, differential scanning calorimetry, thermogravimetric analysis/differential thermogravimetric analysis, ultraviolet-visible and Fourier transform-infrared spectroscopy. *Int J Pharm Investig* 7(1): 33-40.
29. (1997) Desktop X-ray diffractometer "MiniFlex+". *The Rigaku Journal* 14: 29-36.
30. Zhang T, Paluch K, Scalabrino G, Frankish N, Healy AM, et al. (2015) Molecular structure studies of (1S,2S)-2-benzyl-2,3-dihydro-2-(1Hinden-2-yl)-1H-inden-1-ol. *J Mol Struct* 1083: 286-299.
31. Langford JI, Wilson AJC (1978) Scherrer after sixty years: A survey and some new results in the determination of crystallite size. *J Appl Cryst* 11(2): 102-113.
32. Mosharrof M, Nystrom C (1995) The effect of particle size and shape on the surface specific dissolution rate of micro-sized practically insoluble drugs. *Int J Pharm* 122(1-2): 35-47.
33. Buckton G, Beezer AE (1992) The relationship between particle size and solubility. *Int J Pharmaceutics* 82(3): R7-R10.
34. Inoue M, Hirasawa I (2013) The relationship between crystal morphology and XRD peak intensity on CaSO<sub>4</sub>·2H<sub>2</sub>O. *J Crystal Growth* 380: 169-175.
35. Raza K, Kumar P, Ratan S, Malik R, Arora S (2014) Polymorphism: The phenomenon affecting the performance of drugs. *SOJ Pharm Pharm Sci* 1(2): 10.
36. Brittain HG (2009) Polymorphism in pharmaceutical solids in drugs and pharmaceutical sciences, (2<sup>nd</sup> edn), vol. 192, Informa Healthcare, New York, USA.
37. Censi R, Martino PD (2015) Polymorph impact on the bioavailability and stability of poorly soluble drugs. *Molecules* 20(10): 18759-18776.
38. Blagden N, Matas MD, Gavan PT, York P (2007) Crystal engineering of active pharmaceutical ingredients to improve solubility and dissolution rates. *Adv Drug Deliv Rev* 59(7): 617-630.
39. Gulkari VD, Bakhle SS, Yelane LS (2016) Development and evaluation of ofloxacin floating tablets using natural polymer: *Sterculia foetida* linn. Gum. *Int J Pharm Pharm Sci* 8(5): 356-360.
40. Zhao Z, Xie M, Li Y, Chen A, Li G, et al. (2015) Formation of curcumin nanoparticles via solution-enhanced dispersion by supercritical CO<sub>2</sub>. *Int J Nanomedicine* 10: 3171-3181.



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