An Investigation of the Physicochemical and Thermal Characteristics of Consciousness Energy Healing Treated L-Cysteine

Gopal Nayak¹, Mahendra Kumar Trivedi¹, Alice Branton¹, Dahryn Trivedi¹ and Snehasis Jana²*

¹Trivedi Global, Inc., USA
²Trivedi Science Research Laboratory Pvt Ltd, Bhopal, India

Submission: September 14, 2018; Published: November 30, 2018

*Corresponding author: Snehasis Jana, Trivedi Science Research Laboratory Pvt. Ltd., Bhopal, India

Abstract

L-cysteine is an essential amino acid that helps in improving the overall health status of humans. The objective of the study was to determine the impact on the physicochemical and thermal properties of L-cysteine after the Trivedi Effect®-Consciousness Energy Healing Treatment using modern analytical techniques. The control sample was kept without any treatment, while the Biofield Treatment was given to the treated sample remotely by a renowned Biofield Energy Healer, Gopal Nayak. The particle size values were significantly reduced by 11.96% (d₁₀), 9.01% (d₅₀), 4.92% (d₉₀), and 7.66% [D (4, 3)] compared to the control sample. The specific surface area of the treated L-cysteine was significantly increased by 14.28% compared to the control sample. The peak intensities and crystallite sizes were altered ranging from -86.73% to 456.65% and -4.91% to 451.22% respectively, however, the average crystallite size was significantly increased by 87.58% in the treated sample compared to the control sample. The latent heat of decomposition for the 1st and 2nd peak of the treated sample was increased by 12.77% and 5.42% respectively, compared with the control sample. The weight loss was increased by 9.35%; however, the residual weight was significantly reduced by 85.32% in the treated sample compared to the control sample. The maximum thermal degradation temperature of the treated sample was increased by 2.87% compared to the control sample. Hence, the Biofield Energy Treated L-cysteine might show better solubility, dissolution, bioavailability, and be more thermal stable in the pharmaceutical formulations, which would be more efficacious in the treatment of diabetes, cancer, psychosis, and seizures compared to the control sample.

Keyword: L-cysteine; The Trivedi Effect®; Energy of consciousness healing treatment; Complementary and alternative medicine; PSA; PXRD; DSC; TGA

Introduction

Cysteine is an essential amino acid that contains sulphur, which allows it to get bonded and maintain its structure within the body [1]. Cysteine is considered an essential as it is the basic building block of the glutathione formation (mother antioxidant) and used by the body to produce taurine, i.e., also an amino acid [2]. L-cysteine had several other uses that help in improving the overall health status of humans. One of its supplements, N-acetyl-L-cysteine (NAC), is used for improving the level of glutathione within the body, as the right glutathione level supports the functioning of brain, lungs, and immunity, and helps in liver detoxification [3]. L-cysteine also acts as a scavenger that fights with the free radicals of the body. Such radicals cause cellular damage in the body by the process of oxidative stress; therefore, L-cysteine preserves the glutathione in the body and improves the antioxidant capacity [4,5]. The supplements containing L-cysteine are also used to improve the immunity in postmenopausal women; prevent the side effects from toxic chemicals and drug reactions; treat infertility in men having the poor quality of semen; improve the digestive capacity; slow the aging process [6-9]. Other functions of L-cysteine in the body includes balancing the blood sugar levels, relieving the symptoms of bronchitis or chronic obstructive pulmonary disease (COPD), and treating some psychiatric disorders [10-12]. The physicochemical properties of amino acids, such as L-cysteine, play important role in its biological activities, such as improving the solubility and absorption by reducing the particle size, increasing the surface area, or modifying the crystal morphology [13,14]. In this scenario, the Biofield Energy Treatment is known for its significant impact on various properties of living and non-living objects [15,16].

The Biofield energy is a unique phenomenon that involves the traditional as well as the contemporary models of energy medicine and is used as the Complementary and Alternative
The particle size analysis of L-cysteine was conducted on Malvern Mastersizer 2000, from the UK with a detection range between 0.01 µm to 3000 µm using wet method [37,38]. The sample unit (Hydro MV) was filled with a dispersant medium (sunflower oil), and the stirrer operated at 2500rpm. PSA of L-cysteine was performed to obtain the average particle size distribution. Where \( d \) (0.1) µm, \( d \) (0.5) µm, \( d \) (0.9) µm represent particle diameter corresponding to 10%, 50%, and 90% of the cumulative distribution. \( D \) (4,3) represents the average mass-volume diameter, and SSA is the specific surface area (m²/g). The calculations were done by using software Mastersizer Ver. 5.54.

The percent change in particle size (d) for at below 10% level \((d_{0.1})\), 50% level \((d_{0.5})\), 90% level \((d_{0.9})\), and \( D \) (4,3) was calculated using the following equation 1:

\[
\text{% change in particle size } = \frac{(d_{\text{treated}} - d_{\text{control}})}{d_{\text{control}}} \times 100
\]  

Where \( d_{\text{control}} \) and \( d_{\text{treated}} \) are the particle sizes (µm) at below 10% level \((d_{0.1})\), 50% level \((d_{0.5})\), 90% level \((d_{0.9})\), and 90% level \((d_{0.9})\) of the control and the Biofield Energy Treated samples, respectively. The percent change in surface area (S) was calculated using the following equation 2:

\[
\text{% change in surface area } = \frac{(S_{\text{treated}} - S_{\text{control}})}{S_{\text{control}}} \times 100
\]  

Where \( S_{\text{control}} \) and \( S_{\text{treated}} \) are the surface area of the control and the Biofield Energy Treated L-cysteine, respectively.

**Powder X-ray Diffraction (PXRD) Analysis:** The PXRD analysis of L-cysteine was performed with the help of RigakuMiniFlex-II Desktop X-ray diffractometer (Japan) [39,40]. The Cu Kα radiation source tube output voltage used was 30 kV and tube output current was 15 mA. Scans were performed at room temperature. The average size of individual crystallites was calculated from XRD data using the Scherrer’s formula (3):

\[
G = \frac{k\lambda}{\beta\cos\theta}
\]  

Where \( k \) is the equipment constant (0.94), \( G \) is the crystallite size in nm, \( \lambda \) is the radiation wavelength (0.154056 nm for Kα1 emission), \( \beta \) is the full-width at half maximum (FWHM), and \( \theta \) is the Bragg angle [41]. The percent change in crystallite size (G) of L-cysteine was calculated using the following equation 4:


\[
\% \text{ change in crystallite size} = \frac{(G_{\text{Treated}} - G_{\text{Control}})}{G_{\text{Control}}} \times 100
\]  

(4)

Where \(G_{\text{Control}}\) and \(G_{\text{Treated}}\) are the crystallite size of the control and the Biofield Energy Treated samples, respectively.

**Differential Scanning Calorimetry (DSC):** The DSC analysis of L-cysteine was performed with the help of DSC Q200, TA instruments. Sample of 1-5 mg was loaded to the aluminium sample pan at a heating rate of 10°C/min from 30°C to 350°C [37, 38]. The % change in melting point (T) was calculated using the following equation 5:

\[
\% \text{ change in melting point} = \frac{T_{\text{Treated}} - T_{\text{Control}}}{T_{\text{Control}}} \times 100
\]  

(5)

Where \(T_{\text{Control}}\) and \(T_{\text{Treated}}\) are the melting point of the control and treated samples, respectively.

The percent change in the latent heat of fusion (\(\Delta H\)) was calculated using the following equation 6:

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

(6)

Where \(\Delta H_{\text{Control}}\) and \(\Delta H_{\text{Treated}}\) are the latent heat of fusion of the control and treated L-cysteine, respectively.

**Thermal Gravimetric Analysis (TGA)/ Differential Thermogravimetric Analysis (DTG):** TGA/DTG thermograms of L-cysteine were obtained with the help of TGA Q50 TA instruments. A sample of 5 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 [37, 38]. The % change in weight loss (W) was calculated using the following equation 7:

\[
\% \text{ change in weight loss} = \frac{W_{\text{Treated}} - W_{\text{Control}}}{W_{\text{Control}}} \times 100
\]  

(7)

Where \(W_{\text{Control}}\) and \(W_{\text{Treated}}\) are the weight loss of the control and the Biofield Energy Treated L-cysteine, respectively.

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

\[
\% \text{ change in } T_{\text{max}} = \frac{M_{\text{Treated}} - M_{\text{Control}}}{M_{\text{Control}}} \times 100
\]  

(8)

Where \(M_{\text{Control}}\) and \(M_{\text{Treated}}\) are the \(T_{\text{max}}\) values of the control and the Biofield Energy Treated L-cysteine, respectively.

**Results and Discussion**

**Particle size analysis (PSA)**

The particle size analysis of the control and the Biofield Energy Treated L-cysteine samples corresponding to \(d_{50}\), \(d_{90}\), \(d_{95}\), and \(D_{4,3}\) was done (Table 1) to determine the impact of the Biofield Energy Treatment on the particle size distribution of L-cysteine. It revealed that the particle size distribution of the Biofield Energy Treated sample at \(d_{50}\), \(d_{90}\), \(d_{95}\), and \(D_{4,3}\) was significantly reduced by 11.96%, 9.01%, 4.92%, and 7.66%, respectively compared to the control sample.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>(d_{50}) (µm)</th>
<th>(d_{90}) (µm)</th>
<th>(d_{95}) (µm)</th>
<th>(D_{4,3}) (µm)</th>
<th>SSA (m²/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>236.64</td>
<td>465.93</td>
<td>806.63</td>
<td>504.52</td>
<td>0.014</td>
</tr>
<tr>
<td>Biofield Treated</td>
<td>232.1</td>
<td>423.97</td>
<td>766.95</td>
<td>465.87</td>
<td>0.016</td>
</tr>
<tr>
<td>Percent change* (%)</td>
<td>-11.96</td>
<td>-9.01</td>
<td>-4.92</td>
<td>-7.66</td>
<td>14.28</td>
</tr>
</tbody>
</table>

\(d_{50}, d_{90}, \text{ and } d_{95}\) 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.

Such reduction in the particle sizes of the Biofield Energy Treated sample after the Biofield Energy Treatment resulted in 14.28% increase in the specific surface area of the Biofield Energy Treated sample (0.016 m²/g), in comparison to the untreated L-cysteine sample (0.014 m²/g). Several types of research were conducted nowadays that correlate the particle size and surface area of the compound with its solubility and dissolution profile [42,43]. Moreover, the reduced particle size and increased surface area of the compound are known for improving the solubility, absorption, and bioavailability performance in the body [44]. Thus, it is assumed that the Biofield Energy Treated L-cysteine might show better solubility and dissolution rate within the body that ultimately enhances its bioavailability in comparison to the untreated sample.

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

Figure 1 shows the diffractograms of the control and the Biofield Energy Treated L-cysteine samples; and both contains sharp and intense peaks, thereby indicating their crystalline nature. The analysis regarding the changes in the peak intensities and the crystallite sizes of the Biofield Energy Treated sample in comparison to the control sample was done and presented in Table 2. The analysis of the diffractograms revealed alterations in the Bragg’s angle of the characteristic peaks of the Biofield Energy Treated sample as compared to the control sample. Also, the highest peak intensity (100%) was observed at 2θ equal to 37.13° in the control sample; while in the Biofield Energy Treated sample at 2θ equal to 24.91°. The significant alterations were observed in the peak intensities and the crystallite sizes of the Biofield Energy Treated L-cysteine sample as compared to the control sample. The Biofield Energy Treated sample showed changes in the peak intensities ranging from -86.73% to 456.65%; while the crystallite sizes were altered ranging from -74.91% to 451.22%, compared to the control sample. Such changes corresponding to the characteristic diffraction peaks of the Biofield Energy Treated sample showed that the crystallinity and crystalline structure of L-cysteine sample might get altered after the Biofield Energy Treatment as compared to the untreated sample.
Table 2: PXRD data for the control and the Biofield Energy Treated L-cysteine.

<table>
<thead>
<tr>
<th>Entry No.</th>
<th>Bragg angle (°2θ)</th>
<th>Intensity (cps)</th>
<th>Crystallite size (G, nm)</th>
<th>% change a</th>
<th>% change b</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Treated</td>
<td>Control</td>
<td>Treated</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>13.35</td>
<td>13.27</td>
<td>55</td>
<td>7.3</td>
<td>-86.73</td>
</tr>
<tr>
<td>2</td>
<td>18.64</td>
<td>18.34</td>
<td>71</td>
<td>198</td>
<td>178.87</td>
</tr>
<tr>
<td>3</td>
<td>23.46</td>
<td>23.48</td>
<td>20.3</td>
<td>113</td>
<td>456.65</td>
</tr>
<tr>
<td>4</td>
<td>24.91</td>
<td>24.79</td>
<td>176</td>
<td>664</td>
<td>277.27</td>
</tr>
<tr>
<td>5</td>
<td>28.48</td>
<td>28.54</td>
<td>12.9</td>
<td>20.4</td>
<td>58.14</td>
</tr>
<tr>
<td>6</td>
<td>31.58</td>
<td>31.6</td>
<td>106</td>
<td>51.6</td>
<td>-51.32</td>
</tr>
<tr>
<td>7</td>
<td>34.36</td>
<td>34.23</td>
<td>31</td>
<td>44</td>
<td>41.94</td>
</tr>
<tr>
<td>8</td>
<td>37.22</td>
<td>36.85</td>
<td>41</td>
<td>63</td>
<td>53.66</td>
</tr>
<tr>
<td>9</td>
<td>38.74</td>
<td>37.13</td>
<td>185</td>
<td>448</td>
<td>142.16</td>
</tr>
</tbody>
</table>

*a* denotes the percentage change in the peak intensity of the Biofield Energy Treated sample with respect to the control sample; *b* denotes the percentage change in the crystallite size of the Biofield Energy Treated sample with respect to the control sample.

The average crystallite size of the Biofield Energy Treated sample was 1252.22 nm, which was increased by 87.58% compared to the control sample (667.56 nm). The significant alterations in the crystal morphology and the crystallinity of the compounds after the Biofield Energy Treatment were reported previously in various studies. They reported the occurrence of such changes based on the alterations in their peak intensities and crystallite sizes of the Biofield Energy Treated compounds that might indicate the formation of a novel polymorph of the compound [45,46]. Thus, the Biofield Energy Treated L-cysteine showed significant changes in the peak intensities and crystallite size corresponding to the characteristic peaks that might take place as a result of the new polymorph formation of L-cysteine. The literature reported the improved bioavailability profile of drug as a result of the physical modifications, i.e., alteration in the crystal habit of the drug [47]. Hence, the Biofield Energy Treated L-cysteine might show improved bioavailability as compared to the untreated sample.

### Differential scanning calorimetry (DSC) analysis

The DSC thermograms of the control and the Biofield Energy Treated sample are shown in Figure 2, that are further analysed to determine the melting and other thermal behaviours of both the sample [48]. The literature reported that L-cysteine got decomposed instead of sublimation during its thermal
heating. It was mentioned that the peak in DSC thermogram was present at the same temperature as the drop in the TGA thermogram. Thus, the DSC peak temperature coincides with the TGA drop thereby, indicated the process of decomposition in place of melting during the heating of L-cysteine [48,49].

There were two peaks present in the thermograms of the control and the Biofield Energy Treated sample. The results revealed the alterations in the decomposition temperature of the 1st and 2nd peak of the Biofield Energy Treated sample by -2.51% and 0.46%, respectively in compared to the control sample. The latent heat of decomposition ($\Delta H_{\text{decomposition}}$) for 1st and 2nd peak of the Biofield Energy Treated L-cysteine sample was significantly increased by 12.77% and 5.42%, respectively, compared to the control sample (Table 3).

<table>
<thead>
<tr>
<th>Table 3: Comparison of DSC data between the control and the Biofield Energy Treated L-cysteine.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Peak 1</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Peak 2</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

$\Delta H$: Latent heat of decomposition; *denotes the percentage change of the Biofield Energy Treated sample with respect to the control sample.

The results indicated that the Biofield Energy Treated sample started decomposing 4.6° earlier temperature as compared to the control sample, which might be due to some changes in the particle size and crystallization structure of the L-cysteine [48,50] after the Biofield Energy Treatment. Thus, the Biofield Energy Treated sample showed an increase in thermal degradation in comparison to the untreated L-cysteine sample.

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

The weight loss of the L-cysteine samples during the thermal degradation was analysed from the TGA thermograms (Figure 3) of the control and the Biofield Energy Treated sample. Also, the degradation profile of both the samples were observed like the reported literature [49]. The analysis of both the thermograms showed that the total weight loss of the control sample was 90.12%; whereas it was observed as 98.55% for the Biofield Energy Treated L-cysteine sample. Thus, the total weight loss during the thermal degradation of the Biofield Energy Treated sample was increased significantly by 9.35% that resulted in 85.32% decrease in the residual mass compared with the control sample (Table 4). Hence, the thermal degradation of the Biofield Energy Treated sample was increased after the Biofield Energy Treatment in comparison to the untreated sample.

<table>
<thead>
<tr>
<th>Table 4: TGA/DTG data of the control and the Biofield Energy Treated samples of L-cysteine.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td>Biofield Energy Treated</td>
</tr>
<tr>
<td>% Change*</td>
</tr>
</tbody>
</table>

*denotes the percentage change of the Biofield Energy Treated sample with respect to the control sample, $T_{\text{max}}$ = the temperature at which maximum weight loss takes place in TG or peak temperature in DTG.
Treated sample showed two peaks in their thermograms that are related to the decomposition of L-cysteine sample during heating. However, the corresponding to 1st and 2nd peak were also observed to be significantly increased by 12.77% and 5.42%, respectively, compared to the control L-cysteine sample. The TGA/DTG data indicating that the Biofield Energy Treated sample showed 9.35% increase in total weight loss of the L-cysteine sample that causes a significant 85.32% reduction in the residue amount compared to the untreated sample. However, the of the Biofield Energy Treated sample was increased by 2.87% compared to the control sample. Thus, the overall data showed the reduced particle sizes and increased surface area of the Biofield Energy Treated sample with alterations in the crystal structure, which might increase the solubility, absorption, and bioavailability of L-cysteine within the body. Also, the results indicating significant changes in the thermal degradation and stability profile of the Biofield Energy Treated L-cysteine sample compared to the untreated sample. Therefore, the Trivedi Effect®-Consciousness Energy Healing Treated L-cysteine might improve the properties that might ensure its better performance and therapeutic response against various diseases, i.e., diabetes, cancer, psychosis, and seizures.

Conclusion

The study results suggested that there was a significant impact of the Trivedi Effect®-Consciousness Energy Healing Treatment on various properties of the Biofield Energy Treated L-cysteine sample related to their physicochemical and thermal profile. The PSD data showed that the particle size values of the Biofield Energy Treated sample were significantly reduced at d_{10}, d_{50}, and D (4, 3) by 11.96%, 9.01%, 4.92%, and 7.66%, respectively, compared to the untreated sample. The specific surface area of the Biofield Energy Treated L-cysteine was significantly increased by 14.28% in comparison to the untreated sample. The average crystallite size of the Biofield Energy Treated sample was increased by 87.58%, as compared to the control L-cysteine sample. The DSC thermograms of the control and the Biofield Energy Treated sample showed two peaks in their thermograms that are related to the decomposition of L-cysteine sample during heating. However, the corresponding to 1st and 2nd peak were also observed to be significantly increased by 12.77% and 5.42%, respectively, compared to the control L-cysteine sample. The TGA/DTG data indicating that the Biofield Energy Treated sample showed 9.35% increase in total weight loss of the L-cysteine sample that causes a significant 85.32% reduction in the residue amount compared to the untreated sample. However, the of the Biofield Energy Treated sample was increased by 2.87% compared to the control sample. Thus, the overall data showed the reduced particle sizes and increased surface area of the Biofield Energy Treated sample with alterations in the crystal structure, which might increase the solubility, absorption, and bioavailability of L-cysteine within the body. Also, the results indicating significant changes in the thermal degradation and stability profile of the Biofield Energy Treated L-cysteine sample compared to the untreated sample. Therefore, the Trivedi Effect®-Consciousness Energy Healing Treated L-cysteine might improve the properties that might ensure its better performance and therapeutic response against various diseases, i.e., diabetes, cancer, psychosis, and seizures.

Acknowledgement

The authors are grateful to Central Leather Research Institute, SIPRA Lab. Ltd., Trivedi Science, Trivedi Global, Inc., Trivedi Testimonials, and Trivedi Master Wellness for their assistance and support during this work.

References


How to cite this article: Gopal N, Mahendra K T, Alice B, Dahryn T, Snehasis J. An Investigation of the Physicochemical and Thermal Characteristics of Consciousness Energy Healing Treated L-Cysteine. Nutri Food Sci Int J. 2018; 8(1): 555726. DOI: 10.19080/NFSIJ.2018.08.555726


Your next submission with Juniper Publishers will reach you the below assets

- Quality Editorial service
- Swift Peer Review
- Reprints availability
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats (Pdf, E-pub, Full Text, Audio)
- Unceasing customer service

Track the below URL for one-step submission
https://juniperpublishers.com/online-submission.php

This work is licensed under Creative Commons Attribution 4.0 License
DOI: 10.19080/NFSIJ.2018.08.555726

How to cite this article: Gopal N, Mahendra K T, Alice B, Dahryn T, Snehasis J. An Investigation of the Physicochemical and Thermal Characteristics of Consciousness Energy Healing Treated L-Cysteine. Nutri Food Sci Int J. 2018; 8(1): 555726. DOI: 10.19080/NFSIJ.2018.08.555726