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Gas Chromatography-Mass Spectrometry Based Isotopic Abundance Ratio Analysis of Biofield Energy Treated Methyl-2-napthylether (Nerolin)

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Abstract: Methyl-2-napthylether (nerolin) is an organic compound and has the applications in pharmaceutical, and perfume industry. The stable isotope ratio analysis is increasing importance in various field of scientific research. The objective of the current study was to evaluate the effect of the biofield energy treatment on the isotopic abundance ratios of P_{M+1}/P_M ($^2H/^1H$ or $^{13}C/^{12}C$ or $^{17}O/^{16}O$) and P_{M+2}/P_M ($^{18}O/^{16}O$) in nerolin using the gas chromatography-mass spectrometry (GC-MS). The compound nerolin was divided into two parts - one part was control sample (untreated), and another part was considered as biofield energy treated sample which was received the biofield energy treatment through the unique biofield energy transmission process by Mr. Mahendra Kumar Trivedi (also known as The Trivedi Effect®). The biofield energy treated nerolin was analyzed at different time intervals and were represented as T1, T2, T3, and T4 in order to understand the effect of the biofield energy treatment on isotopic abundance ratio with respect to the time. From the GC-MS spectral analysis, the presence of the molecular ion peak $C_{11}H_{10}O^+$ (*m/z* 158) along with major fragmented peaks $C_{10}H_7O^-$ (*m/z* 143), $C_{10}H_8$ (*m/z* 128), $C_9H_7^+$ (*m/z* 115), $C_7H_5^+$ (*m/z* 89), $C_5H_3^+$ (*m/z* 63), $C_4H_3^+$ (*m/z* 51), and $C_3H_3^+$ (*m/z* 39) were observed in both control and biofield treated samples. Only, the relative peak intensities of the fragmented ions in the biofield treated nerolin was notably changed as compared to the control sample with respect to the time. The isotopic abundance ratio analysis of nerolin using GC-MS revealed that the isotopic abundance ratio of P_{M+1}/P_M in the biofield energy treated nerolin at T1, T2, T3, and T4 was increased by 2.38, 138.10, 13.10, and 32.14%, as compared to the control sample. Likewise, the isotopic abundance ratio of P_{M+2}/P_M at T1, T2, T3, and T4 was increased by 2.38, 138.10, 13.10, and 32.14%, respectively in the biofield treated nerolin as compared to the control sample. Overall, the isotopic abundance ratios of P_{M+1}/P_M ($^2H/^1H$ or $^{13}C/^{12}C$ or $^{17}O/^{16}O$) and P_{M+2}/P_M ($^{18}O/^{16}O$) were significantly increased in the biofield energy treated sample as compared to the control sample with respect to the time. It is concluded that Mr. Trivedi's biofield energy treatment has the significant impact on alteration in isotopic abundance of nerolin as compared to the control sample. The biofield treated nerolin might display different altered physicochemical properties and rate of reaction and could be an important intermediate for the production of pharmaceuticals, chemicals, and perfumes in the industry.

Keywords: Biofield Energy Treatment, The Trivedi Effect®, Methyl-2-napthylether (Nerolin), Isotopic Abundance, Gas Chromatography-Mass Spectrometry

1. Introduction

Methyl-2-napthylether (nerolin) is an organic compound and derivative of naphthalene. It has the application in chemical, pharmaceutical, and perfume industry [1, 2]. Nerolin derivatives were evaluated as a potential anti-

inflammatory agents [3]. It is used as an intermediate for the synthesis of nonsteroidal anti-inflammatory drugs (NSAIDs), *i.e.* nabumetone and naproxen, which are inhibitors of the cyclooxygenase (COX) enzyme [3-5]. Neroline has many more applications, *i.e.* air care products, cleaning and furnishing care products, laundry and dishwashing products, and personal care products [2, 6]. The limitations of nerolin while handling during production are irritating to eyes, respiratory system, and skin. It also causes the oral, parenteral and dermal toxicity to human. It is toxic to the aquatic organisms, may cause long-term adverse effects in the aquatic environment [2, 3, 7-9]. The physical hazards, intrinsic human health hazards and environmental toxicity are directly linked to the chemical intrinsic physicochemical properties [10].

The alternation in the isotopic composition of nerolin to stable and heavier isotopic form might be an approach for the modification of intrinsic physicochemical properties of the chemical substance. The stable isotopic ratio analysis has widely used in the fields of scientific research [11-15]. In spite of natural mechanism, the isotopic abundance of a molecule can be altered by means of chemical reactions [11, 16]. On the other hand, Mr. Trivedi's biofield energy treatment has the remarkable capability to alter the physicochemical, structural properties, and isotopic abundance ratios of many organic and inorganic compounds [17-20]. It is an economical approach for the alteration in the intrinsic properties of substance. The electromagnetic field present in an around the human body which emits the electromagnetic waves in the form of the bio-photons, and it is commonly known as biofield [21-23]. The energy from the universe can be harnessed by the expert, and it can be applied to the living and non-living objects to achieve the alterations in the characteristic properties. Various applications of The Trivedi Effect® have achieved a milestone and recognized scientifically in the field of chemical science [17-20, 24], materials science [25-27], agricultural science [28-30], biotechnology [31, 32], genetics [33, 34], nutraceuticals [35-37], pharmaceuticals [38-40], and medical sciences [41, 42].

The mass spectrometry (MS) technique is a choice for the isotope ratio analysis [43]. The analytical technique, gas chromatography-mass spectrometry (GC-MS) can perform to analysis the relative isotopic abundance of the sample [43-46]. The previous experiment on Mr. Trivedi's biofield energy treated methyl-2-naphthyl ether shown an outstanding results in the alternation of the physicochemical and structural properties of methyl-2-naphthyl ether [24]. It is concluded that Mr. Trivedi's biofield energy treatment has the impact on physicochemical and thermal properties of treated methyl-2-naphthyl ether as compared to the normal sample. Considering all these aspects, the current study was designed to investigate the effect of biofield energy treatment on the isotopic abundance ratios of P_{M+1}/P_M ($^2H/^1H$ or $^{13}C/^{12}C$ or $^{17}O/^{16}O$), and P_{M+2}/P_M ($^{18}O/^{16}O$) in nerolin using the GC-MS technique.

2. Materials and Methods

2.1. Chemicals and Reagents

The methyl-2-napthylether (nerolin) was procured from Sisco Research Laboratories, India. All the other chemicals and reagents used in this experiment were analytical grade and purchased from the local vendors.

2.2. Biofield Energy Treatment Strategy

The nerolin sample was divided into two parts; one was kept as a control (untreated) while another part was subjected to biofield energy treatment and coded as treated sample. The sample for the treatment was handed over to Mr. Trivedi under standard laboratory conditions and the biofield energy treatment was performed by his unique energy transmission process approximately for 5 minutes without touching the sample [24]. After that, the biofield energy treated sample was returned for further GC-MS analysis.

2.3. Gas Chromatograph - Mass Spectrometry (GC-MS)

The GC-MS analysis was carried out on Perkin Elmer/Auto system XL with Turbo mass, USA. The GC-MS was accomplished in a silica capillary column. It was equipped with a quadrupole detector with pre-filter. The mass spectrometer was functioning in an electron ionization (EI) positive/negative, and chemical ionization mode at the electron ionization energy of 70 eV. Mass range: 10-650 Daltons (amu), stability: ± 0.1 m/z mass accuracy over 48 hours [11-15].

2.4. Method of GC-MS Analysis and Calculation of Isotopic Abundance Ratio

The GC-MS analysis of biofield energy treated nerolin was performed at the different time intervals and symbolised as T1, T2, T3 and T4, respectively. The natural abundance of each isotope can be predicted from the comparison of the height of the isotope peak with respect to the base peak, *i.e.* relative abundance in the mass spectra [43]. The values of the natural isotopic abundance of some elements are obtained from several literatures [43-46] and presented in Table 1.

The following method was used for calculating the isotopic abundance ratio:

P_M stands for the relative peak intensity of the parent molecular ion [M^+] expressed in percentage. In other way, it indicates the probability to have *A* elements (for *e.g.* ^{12}C, ^1H, ^{16}O, ^{14}N, etc.) contributions to the mass of the parent molecular ion [M^+].

P_{M+1} represents the relative peak intensity of the isotopic molecular ion [$(M+1)^+$] expressed in percentage

$$= (\text{no. of } ^{13}C \times 1.1\%) + (\text{no. of } ^{15}N \times 0.40\%) + (\text{no. of } ^{2}H \times 0.015\%) + (\text{no. of } ^{17}O \times 0.04\%)$$

i.e. the probability to have $A + 1$ elements (for *e.g.* ^{13}C, ^2H, ^{15}N, etc.) contributions to the mass of the isotopic molecular ion [$(M+1)^+$]

P_{M+2} represents the relative peak intensity of the isotopic molecular ion $[(M+2)^+]$ expressed in the percentage

$$= (\text{no. of } ^{18}O \times 0.20\%) + (\text{no. of } ^{37}Cl \times 32.50\%)$$

i.e. the probability to have $A + 2$ elements (for *e.g.* ^{18}O, ^{37}Cl, ^{34}S, etc.) contributions to the mass of isotopic molecular ion $[(M+2)^+]$

Isotopic abundance ratio (IAR) for $A + 1$ elements = P_{M+1}/P_M

Similarly, isotopic abundance ratio of $A + 2$ elements = P_{M+2}/P_M

Percentage (%) change in isotopic abundance ratio = $[(IAR_{Treated} - IAR_{Control})/ IAR_{Control}) \times 100]$

Where, $IAR_{Treated}$ is isotopic abundance ratio in the treated sample and $IAR_{Control}$ is isotopic abundance ratio in the control sample.

3. Results and Discussion

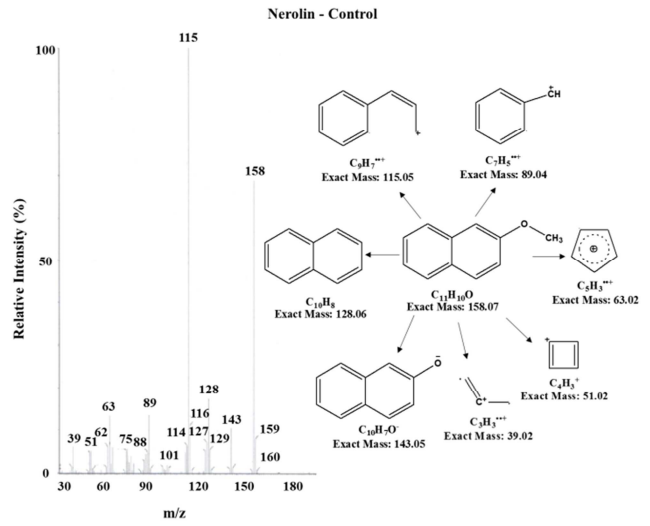

Figure 1. *The GC-MS spectrum and possible fragmentation of the control sample of nerolin.*

The spectra obtained by the GC-MS analysis for the control and biofield energy treated nerolin ($C_{11}H_{10}O$) in the +ve ion mode are shown in Figure 1 and 2, respectively. The GC-MS spectrum of control nerolin showed the presence of the parent molecular ion peak at *m/z* 158 (calculated 158.07 for $C_{11}H_{10}O^+$) and the retention time (R_t) of 15 min along with seven major fragmented peaks that were well matched with the literature [6, 47]. The biofield energy treated nerolin at T1, T2, T3, and T4 exhibited the parent molecular ion peaks ($C_{11}H_{10}O^+$) at *m/z* 158 and the R_t of 14.97, 14.97, 14.99, and 15.01 min, respectively, which were very close to the R_t of the control sample. This indicates both the control and treated sample have no change in affinity/polarity. The fragmentation ion $C_9H_7^{\cdot+}$ shown the strong base peak at *m/z* 115 (relative abundance 100%) in both the control and treated nerolin. Other fragmentations $C_{10}H_7O^-$ (*m/z* 143), $C_{10}H_8$ (*m/z* 128), $C_7H_5^+$ (*m/z* 89), $C_5H_3^+$ (*m/z* 63), $C_4H_3^+$ (*m/z* 51), and $C_3H_3^+$ (*m/z* 39) were observed in the mass spectrum of control and treated nerolin (Figure 1 and 2). Only, the relative peak intensities of the fragmented ions in the biofield treated nerolin were significantly altered as compared to the control sample.

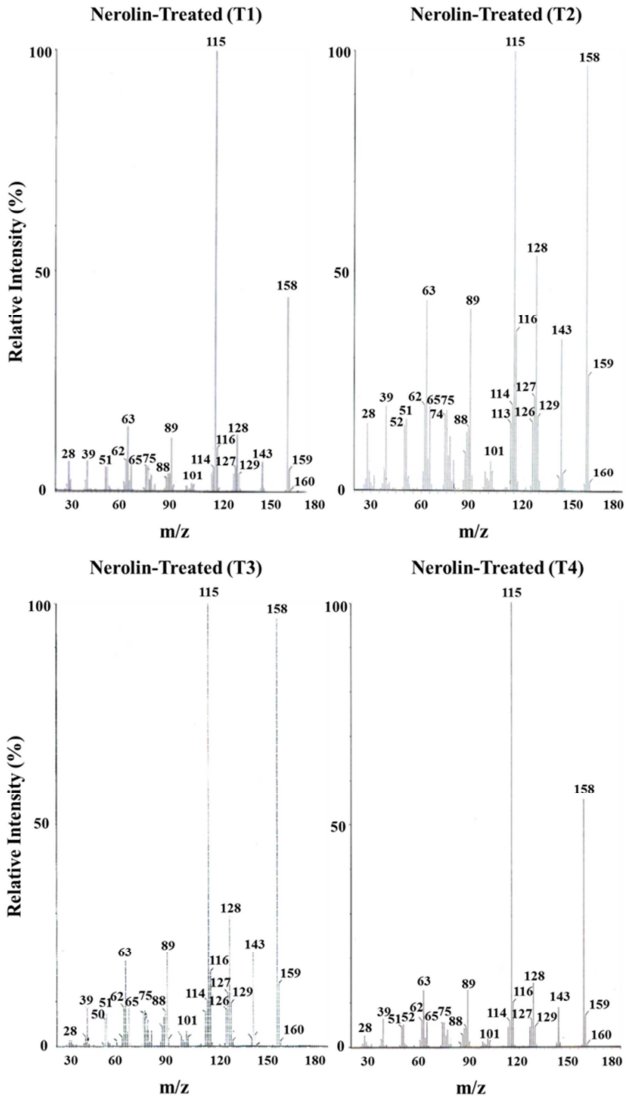

Figure 2. *The GC-MS spectra of biofield energy treated nerolin analyzed at T1, T2, T3, and T4.*

The molecule nerolin ($C_{11}H_{10}N$) comprises several atoms of H, C, and O in its skeleton. The relative abundances of an isotopic peak, is the contributions of several different isotopes to the same peak [43, 46, 48, 49]. The abundance of parent molecular ion P_M in this cluster was at *m/z* 158, and its size is determined solely by the most abundant element composition. P_{M+1} and P_{M+2} of nerolin can be calculated theoretically according to the method described in the materials and method.

$$P(^{13}C) = [(11 \times 1.1\%) \times 68.81\% \text{ (the actual size of the } M^+ \text{ peak)}] / 100\% = 8.33\%$$

$$P(^{2}H) = [(10 \times 0.015\%) \times 68.81\%] / 100\% = 0.103\%$$

$$P(^{17}O) = [(1 \times 0.04\%) \times 68.81\%] / 100\% = 0.028\%$$

Thus, P_{M+1} *i.e.* ^{13}C, ^{2}H, and ^{17}O contributions from $C_{11}H_{10}O^{+}$ to *m/z* 159 is 8.461%.

$$P(^{18}O) = [(1 \times 0.2\%) \times 68.81\%] / 100\% = 0.138\%$$

Thus, P_{M+2} *i.e.* ^{18}O contributions from $C_6H_5NO_3^{+}$ to *m/z* 160 is 0.138%

Table 1. *The isotopic composition (the natural isotopic abundance) of the elements.*

Element (A)	Symbol	Mass	% Natural Abundance	*A* + 1 Factor	*A* + 2 Factor
Hydrogen	^{1}H	1	99.9885		
	^{2}H	2	0.0115	$0.015n_H$	
Carbon	^{12}C	12	98.892		
	^{13}C	13	1.108	$1.1n_C$	
Oxygen	^{16}O	16	99.762		
	^{17}O	17	0.038	$0.04n_O$	
	^{18}O	18	0.200		$0.20n_O$
Nitrogen	^{14}N	14	99.60		
	^{15}N	15	0.40	$0.40n_N$	
Chlorine	^{35}Cl	35	75.78		
	^{37}Cl	37	24.22		$32.50n_{Cl}$

A: Element; n: no of H, C, O, Cl, etc.

The calculated abundance of P_{M+1} and P_{M+2} in nerolin closely matched to the experimental value obtained in the control sample (Table 2). In general the deuterium did not contribute much any isotopic *m/z* ratios because the natural abundance of deuterium is too small relative to the natural abundances of carbon and oxygen isotopes [50-53]. Hence, ^{13}C and ^{18}O has the major contributions from nerolin to the isotopic peak at *m/z* 159 and 160.

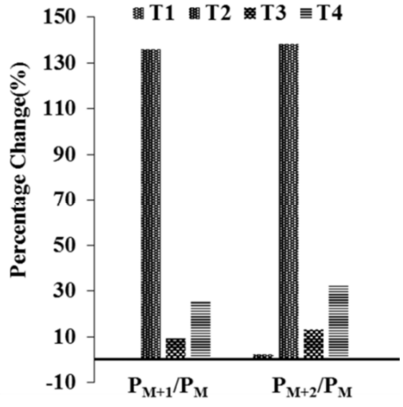

Figure 3. *Percent change in the isotopic abundance ratio of P_{M+1}/P_M and P_{M+2}/P_M in the biofield treated nerolin as compared to the control sample.*

The percentage change in isotopic abundance ratios of P_{M+1}/P_M and P_{M+2}/P_M in the biofield treated nerolin at T1, T2, T3, and T4 are presented in Table 2. The isotopic abundance ratio analysis of nerolin using GC-MS revealed that the isotopic abundance ratio of P_{M+1}/P_M in biofield energy treated nerolin at T1, T2, T3, and T4 was increased by 0.17, 135.83, 9.13, and 25.57%, respectively, as compared to the control sample (Table 2 and Figure 3). Similarly, the isotopic abundance ratio P_{M+2}/P_M in the biofield energy treated sample at T1, T2, T3, and T4 was increased by 2.38, 138.10, 13.10, and 32.14%, respectively, in comparison to the control sample (Table 2 and Figure 3). From the Figure 3, it was clearly observed that there was a different effect of biofield energy on the isotopic abundance ratios of P_{M+1}/P_M and P_{M+2}/P_M in the biofield energy treated nerolin with respect to the time. After biofield energy treatment, the isotopic abundance ratio was slowly increased from T1 and attend to maximize at T2, which further fell at T3 and finally increased at T4. This might be due to an incident of inter-conversion of mass between elements that leads to the variations of abundance with respect to time after biofield energy treatment. These results indicated that the biofield treated sample had the time dependent response for the alteration in the isotopic composition of nerolin.

Table 2. *GC-MS isotopic abundance analysis result of control and biofield energy treated nerolin.*

Parameter	Control Nerolin	Treated Nerolin			
		T1	T2	T3	T4
P_M at *m/z* 158 (%)	68.81	44.43	96.88	55.53	96.82
P_{M+1} at *m/z* 159 (%)	7.91	5.12	26.27	6.97	13.98
P_{M+1}/P_M	0.1150	0.1152	0.2712	0.1255	0.1444
% Change of isotopic abundance ratio (P_{M+1}/P_M)		0.17	135.83	9.13	25.57
P_{M+2} at *m/z* 160 (%)	0.58	0.38	1.94	0.53	1.07
P_{M+2}/P_M	0.0084	0.0086	0.0200	0.0095	0.0111
% Change of isotopic abundance ratio (P_{M+2}/P_M)		2.38	138.10	13.10	32.14

T1, T2, T3, and T4: different time intervals for the analysis of biofield energy treated sample; P_M: the relative peak intensity of the parent molecular ion $[M^{+}]$; P_{M+1}: the relative peak intensity of the isotopic molecular ion $[(M+1)^{+}]$; P_{M+2}: the relative peak intensity of the isotopic molecular ion $[(M+2)^{+}]$.

Replacement of the isotopic composition of the nerolin significantly alters the vibrational energy [54, 55]. The vibrational energy depends on the reduced mass (μ) for a diatomic molecule as shown in the below:

$$E_0 = \frac{h}{4\pi}\sqrt{\frac{f}{\mu}}$$

Where, E_0 = the vibrational energy of a harmonic oscillator at absolute zero or zero point energy; f = force constant and μ (reduced mass) = $\frac{m_a m_b}{m_a + m_b}$

The reduced mass (μ) of some probable isotopic bonds was calculated and the results showed that μ of heavier isotopes [*i.e.* ^{13}C-^{12}C (μ=6.24), ^{2}H-^{12}C (μ=1.71), ^{16}O-^{13}C (μ=7.17), ^{17}O-^{12}C (μ=7.03), and ^{18}O-^{12}C (μ=7.20)] were increased than the normal bond [*i.e.* ^{12}C-^{12}C (μ=6), ^{1}H-^{12}C (μ=0.92), and ^{16}O-^{12}C (μ=6.86)] (Table 3). The heavier isotopic molecules have lower diffusion velocity, mobility, evaporation rate, thermal decomposition and rate of reaction, but higher binding energy than the lighter molecules [54-57]. The biofield energy treated nerolin has the higher isotopic abundance ratio. Therefore,

after biofield energy treatment, the bond strength, stability, and binding energy of nerolin molecule might be improved due to the higher reduced mass (μ).

Table 3. *Possible isotopic bonds and their effect on the vibrational energy in nerolin.*

Isotope bond	Isotope type	Reduced mass (μ) $(m_A.m_B)/(m_A + m_B)$	Zero point vibrational energy (E_0)
^{12}C-^{12}C	Lighter	6.00	Higher
^{13}C-^{12}C	Heavier	6.24	Smaller
^{1}H-^{12}C	Lighter	0.92	Higher
^{2}H-^{12}C	Heavier	1.71	Smaller
^{16}O-^{12}C	Lighter	6.86	Higher
^{16}O-^{13}C	Heavier	7.17	Smaller
^{17}O-^{12}C	Heavier	7.03	Smaller
^{18}O-^{12}C	Heavier	7.20	Smaller

m_A: mass of atom A; m_B: mass of atom B, here A and B may be C or H or O.

The isotopic abundance ratios of P_{M+1}/P_M ($^2H/^1H$ or $^{13}C/^{12}C$ or $^{17}O/^{16}O$) and P_{M+2}/P_M ($^{18}O/^{16}O$) in the biofield treated nerolin were significantly increased at T2, T3, and T3 as compared to the control sample. The modern physics explained that the neutrinos change their identities, which are only possible if neutrinos possess mass and have the ability to interchange their phase internally. Because of this, the neutrinos have the ability to interact with protons and neutrons in the nucleus. Hence, there was a close relation between neutrino and the formation of the isotope [58, 59]. The biofield energy significantly altered the isotopic composition at the molecular level that might be due to changes in neutron to proton ratio in the nucleus. It can be hypothesized that the changes in isotopic abundance could be due to changes in nuclei possibly through the interference of neutrino particles *via* biofield energy. The biofield treated methyl-2-naphthyl ether, might have changed the physicochemical and thermal properties, force constant, and reaction rate and were well supported with the previous results [24]. This indicated that, the biofield treated nerolin might be more useful as an intermediate in various industrial applications for the production of pharmaceuticals, chemicals, and perfumes, etc.

4. Conclusions

The gas chromatography-mass spectrometry (GC-MS) of both the control and biofield energy treated methyl-2-napthylether (nerolin) revealed that there was a significant influence of biofield energy treatment (The Trivedi Effect®) in the alteration of isotopic abundance. The presence of the molecular ion peak $C_{11}H_{10}O^+$ (*m/z* 158) along with major fragmented peaks $C_{10}H_7O^-$ (*m/z* 143), $C_{10}H_8$ (*m/z* 128), $C_9H_7^+$ (*m/z* 115), $C_7H_5^+$ (*m/z* 89), $C_5H_3^+$ (*m/z* 63), $C_4H_3^+$ (*m/z* 51), and $C_3H_3^+$ (*m/z* 39) were observed in both control and biofield treated samples. The relative peak intensities in the biofield treated sample were altered as compared to the control sample. The GC-MS analysis of nerolin revealed that the isotopic abundance ratio of P_{M+1}/P_M in the biofield energy treated nerolin at T2, T3, and T4 was significantly increased by 135.83, 9.13, and 25.57%, respectively as compared to the control sample. Similarly, the isotopic abundance ratio P_{M+2}/P_M in the biofield energy treated sample at T2, T3, and T4 was significantly increased by 138.10, 13.10, and 32.14%, respectively as compared to the control sample. It was observed that the isotopic abundance ratios of P_{M+1}/P_M ($^2H/^1H$ or $^{13}C/^{12}C$ or $^{17}O/^{16}O$) and P_{M+2}/P_M ($^{18}O/^{16}O$) in the biofield treated sample was altered with respect to the time. Overall, it can be assumed that the biofield treated nerolin, might have altered physicochemical properties and could be more helpful as a chemical intermediate in the chemical, perfume, and pharmaceutical industries for the production of fine finished products.

Abbreviations

A: Element; GC-MS: Gas chromatography-mass spectrometry; *m/z*: Mass-to-charge ratio; M: Mass of the parent molecule; P_M: the relative peak intensity of the parent molecular ion [M^+]; P_{M+1}: the relative peak intensity of the isotopic molecular ion [$(M+1)^+$]; P_{M+2}: the relative peak intensity of the isotopic molecular ion [$(M+2)^+$].

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