R SOFTWARE UTILIZED FOR STATISTICAL ANALYSIS OF DIETARY FIBER DETERMINATION OF NANOCRYSTALS AND ANALYTICAL SIGNIFICANCE OF SHAPIRO-WILK TEST

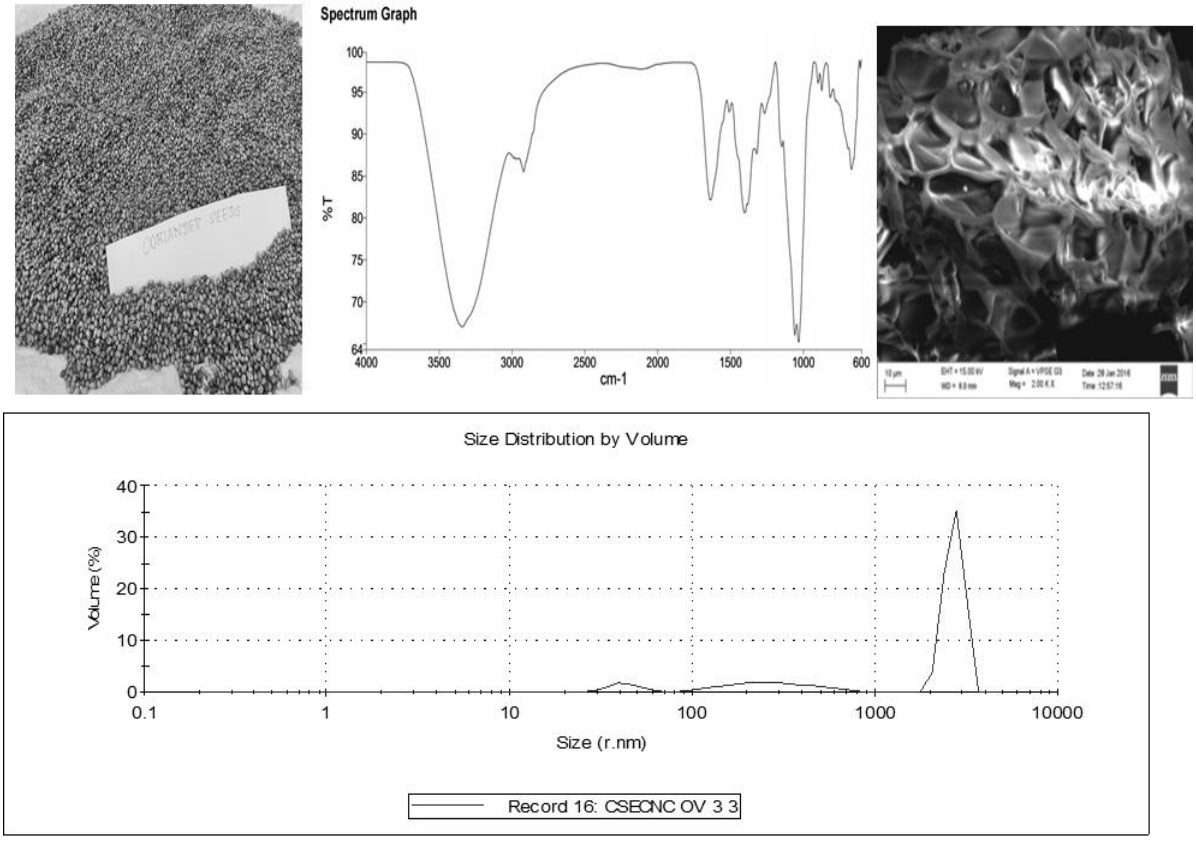
Abstract

The potential use of agro based nutraceuticals of Coriander sativum seed synthesised enzymatically to obtained a nanocrystals. The potential use of agro based nutraceuticals nanomaterials for drug delivery, nanofillers, as agro-foods and biomedical applications. The raw materials of agro based nutraceutical principal active component of coriander seed fabrication of amorphous nanocrystal powder obtained by processing under optimized condition. Statistical data done by using ‘R software Packages CRAN. R software is an integrated suite for calculation, data analysis, graphical display functions of input and output operators ;user -defined functions with simple and effective programming language. The normality distribution done using Shapiro-wilk test.

Keywords: R software, nanocrystals, nutraceuticals, shapiro-wilk test.

Author

Chaya G
Department of Chemistry
Bharathi College Post Graduate & Research Centre, Mandya
University of Mysore
Karnataka, India
chayaguruswamy97@gmail.com



Graphical Abstract

I. INTRODUCTION

New Statistical Procedure for testing a complete sample for Normality. (**Shapiro and wilk 1965**) test statistic obtained by dividing the square of an appropriate linear combination of the sample order statistics by the usual symmetric estimate of variance. The W test for normality indication of Probability plots. In a Probability plot the regression of the observations on the expected values of order statistics from a Standardized of the hypothesized distribution plot tending to be linear if the hypothesis is true (**Shapiro and wilk 1965**).

To perform a shapiro-wilk test on a dataset with sample size n=100 in which the Poisson distribution values were obtained. Shapiro – Wilk's test is a normality test. Suppose a sample attained a_1, a_2, a_3…..a_n from normally distributed population. the p value ranges indicate equal to P or below 0.05 rejected in the hypothesis for the normality.

Shapio –wilk's test null hypothesis test equations 1 & 2 **(Baris Guner et.al Vol.X,No.X, Month XXXX)** :

$$W= (\sum_{i=1}^{N} ai\ yi\ )2\ /\ \sum_{i=1}^{N} yi - m1)2\ldots \qquad (1)$$

$$m_1= 1/N \sum_{i=1}^{N} y(i) \ldots\ldots\ldots\ldots\ldots\ldots\ldots \qquad (2)$$

II. STATISTICAL METHOD FOR ANALYSING THE DATA

Syntax: **Sample t-test/ Welch test:**
R code for t-test
t.test(x, y=NULL, alternative= c(" two.sided", "less","greater"), mu=0, paired=FALSE, var.equal=FALSE, conf.level = 0.95,…..)
Running t-test for the data set:
t.test(nano_data, y=NULL, alternative=c("greater"),mu=4.1,paired=FALSE, var.equal=FALSE,conf.level=0.95)

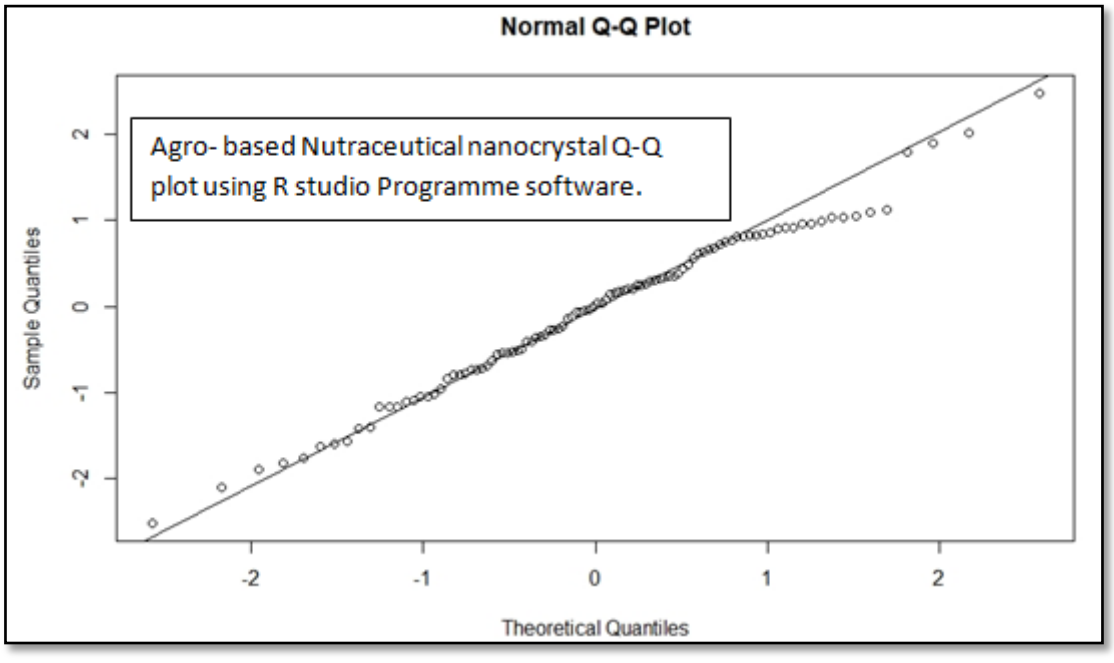
Kruskal.test(): used to perform Kruskal- Wallis test as alternative to ANOVA.

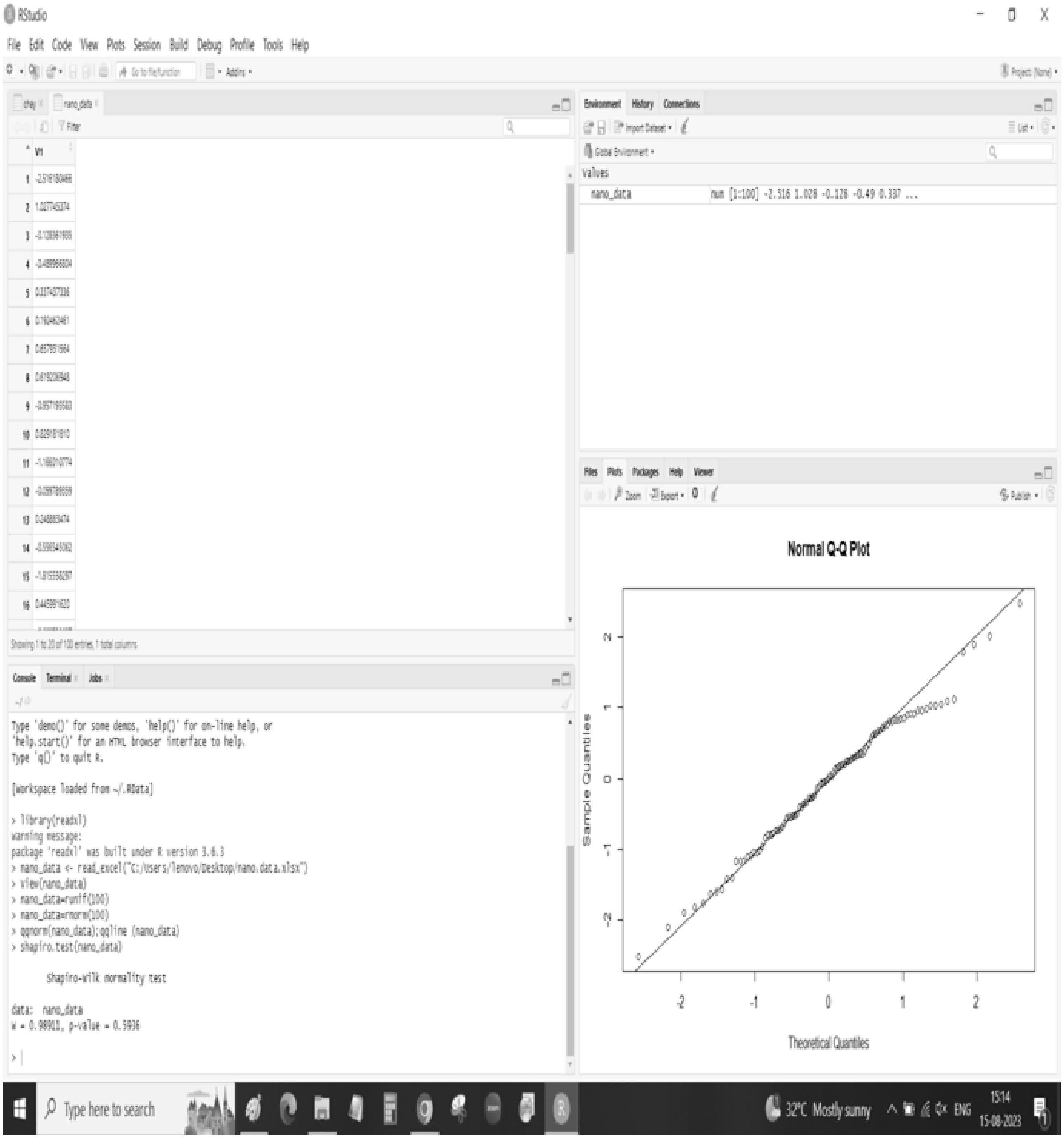
Similarly, the same function can be used to test other hypotheses. As per the standard procedure, one has to check the assumption of normality before using t-test. The following code is used to test the assumption of normality. We use Shapiro-wilk test for normality. Here the null hypothesis we test the variable follows normal distribution.
library(readxl)

> nano_data <- read_excel("C:/Users/lenovo/Desktop/nano.data.xlsx")
> View(nano_data)
> nano_data=runif(100)
> nano_data=rnorm(100)
> qqnorm(nano_data);qqline (nano_data)
> shapiro.test(nano_data)

Shapiro-Wilk normality test

data: nano_data
W = 0.98911, p-value = 0.5936





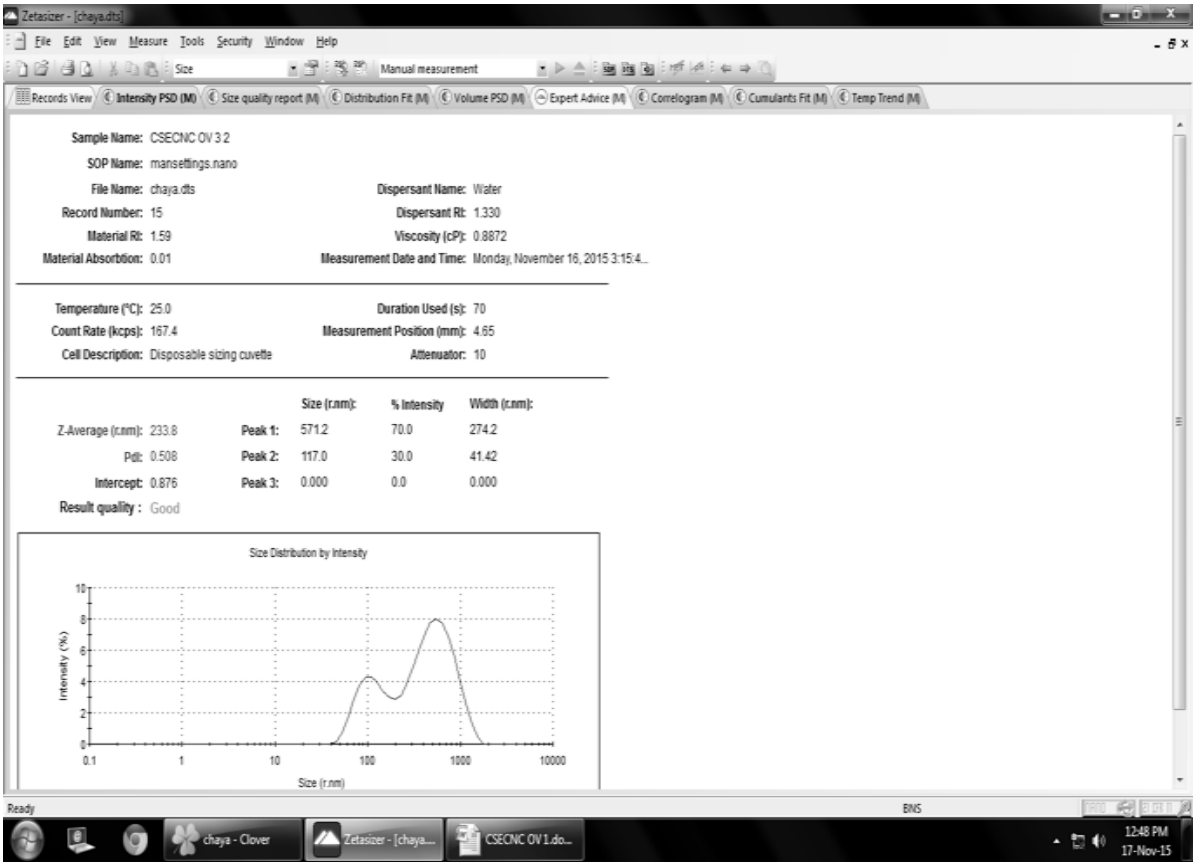
Based on the F-test, we conclude that the equality of variances is satisfied by the data.

III. RESULTS AND DISCUSSION

Mathematical Operation: equation 2 A polynomial equation in coded term (**Mitali et.al 2021);**

$$Y = f(X_1, X_2, X_3, \ldots\ldots X_n) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$Y = \beta_o + \sum_{i=1} \beta_i X_i + \sum_{i=1} \sum_{j=1} \beta_{ij} X_i X_j + \sum_{i=1} \beta_{ii} X_i^2 + \varepsilon \ldots\ldots\ldots (2)$$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Records View Intensity PSD (M) Size quality report (M) Distribution Fit (M) Volume PSD (M) Expert Advice (M) Correlogram (M) Cumulants Fit (M) Temp Trend (M)
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SOP Name: mansettings.nano
File Name: chaya.dts
Record Number: 15
Material RI: 1.59
Material Absorbtion: 0.01
Dispersant Name: Water
Dispersant RI: 1.330
Viscosity (cP): 0.8872
Measurement Date and Time: Monday, November 16, 2015 3:15:4...
Temperature (°C): 25.0
Count Rate (kcps): 167.4
Cell Description: Disposable sizing cuvette
Duration Used (s): 70
Measurement Position (mm): 4.65
Attenuator: 10
Size (r.nm): % Intensity Width (r.nm):
Z-Average (r.nm): 233.8 Peak 1: 571.2 70.0 274.2
PdI: 0.508 Peak 2: 117.0 30.0 41.42
Intercept: 0.876 Peak 3: 0.000 0.0 0.000
Result quality : Good
Size Distribution by Intensity
Intensity (%)
Size (r.nm)
Ready
chaya - Clover
Zetasizer - [chaya...
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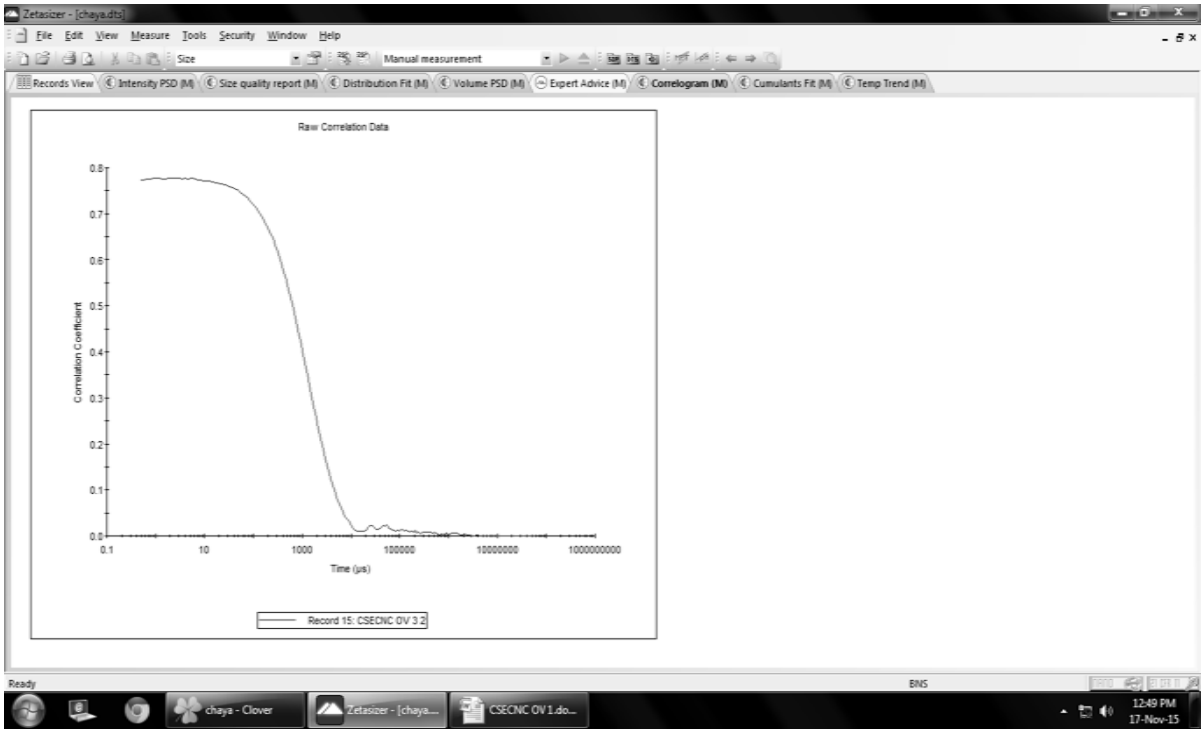
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Records View Intensity PSD (M) Size quality report (M) Distribution Fit (M) Volume PSD (M) Expert Advice (M) Correlogram (M) Cumulants Fit (M) Temp Trend (M)
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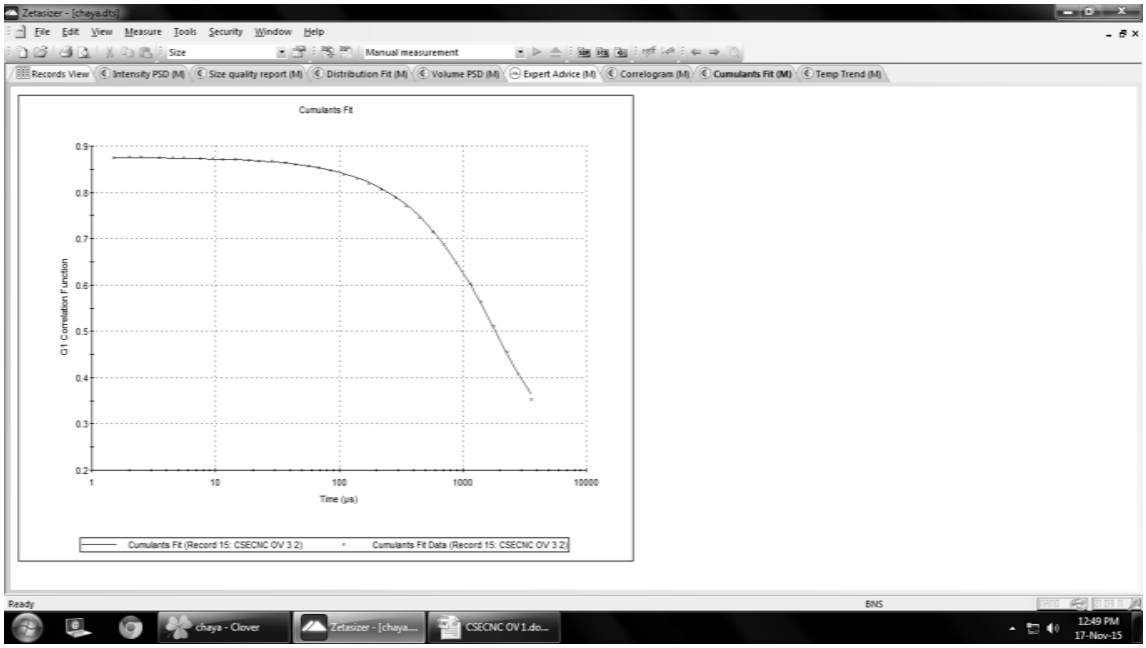
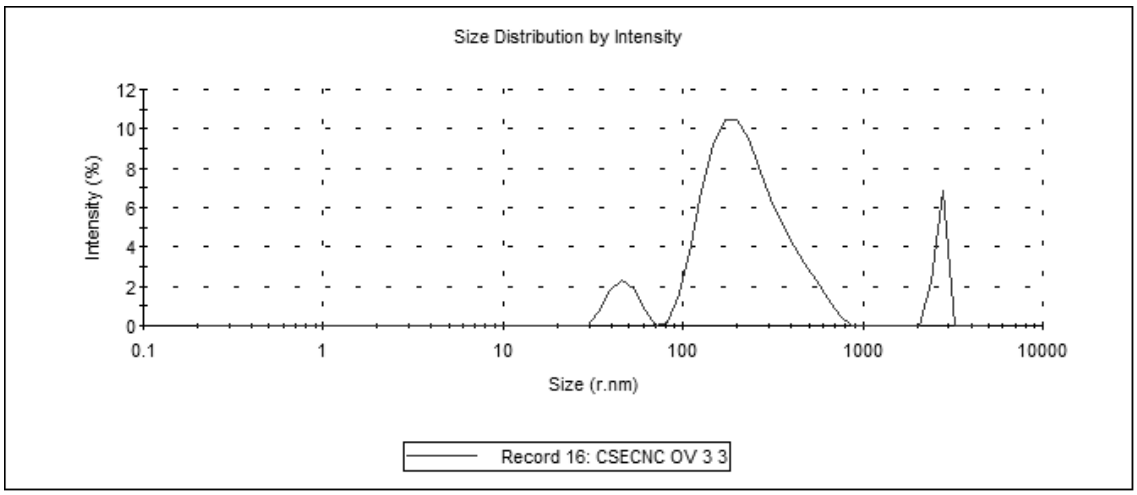
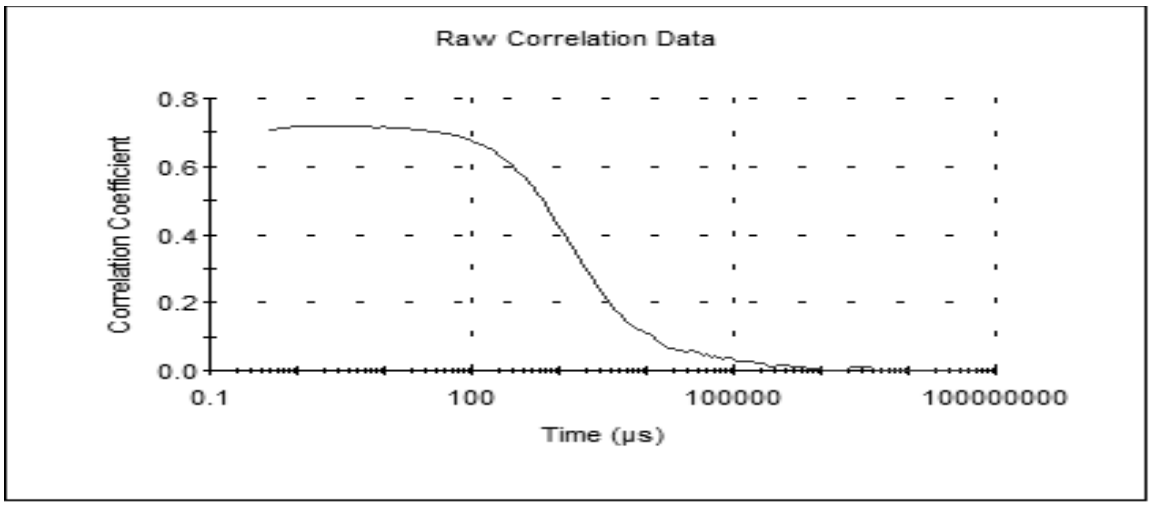
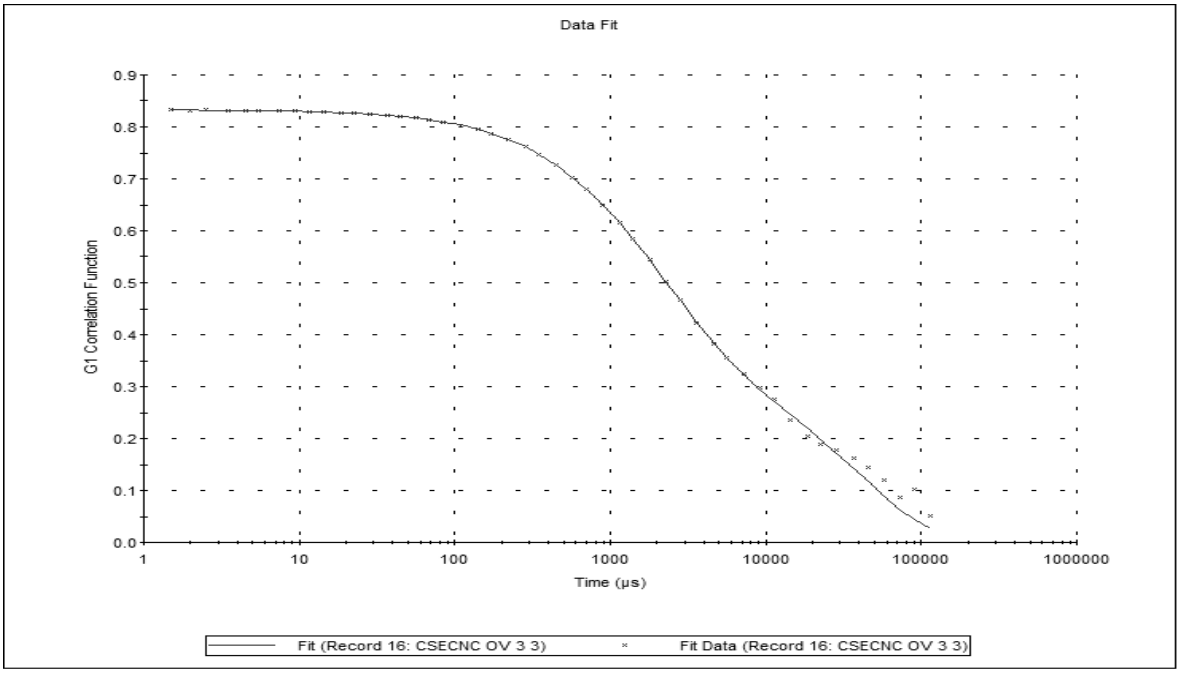


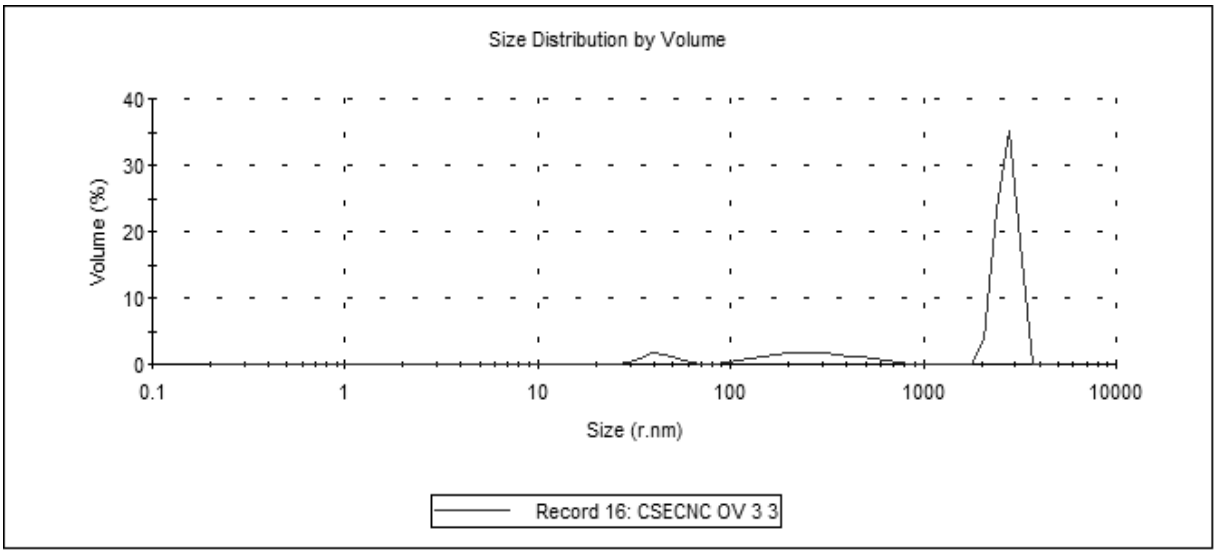


Intensity PSD [M]

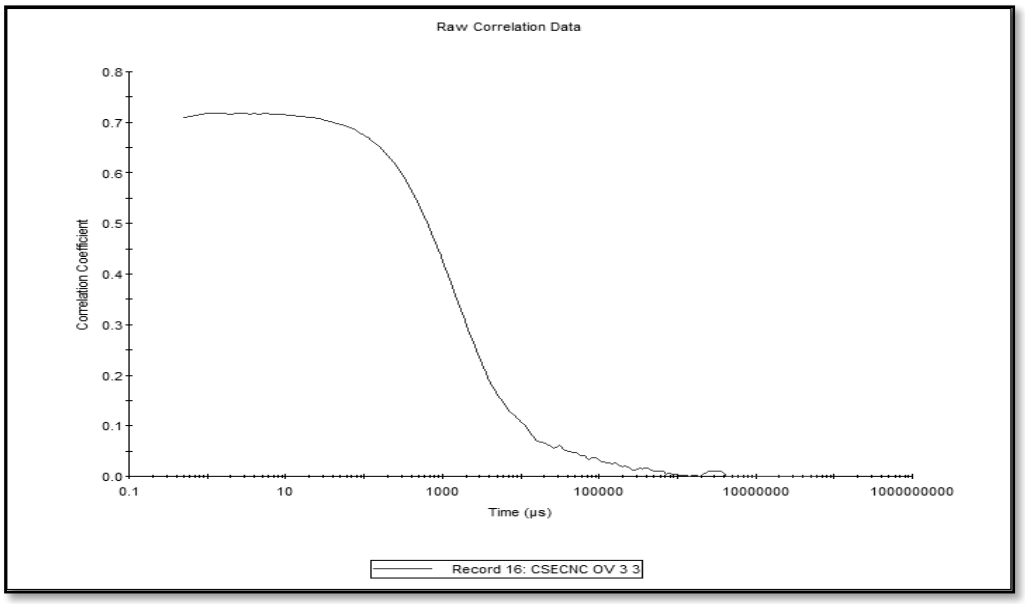




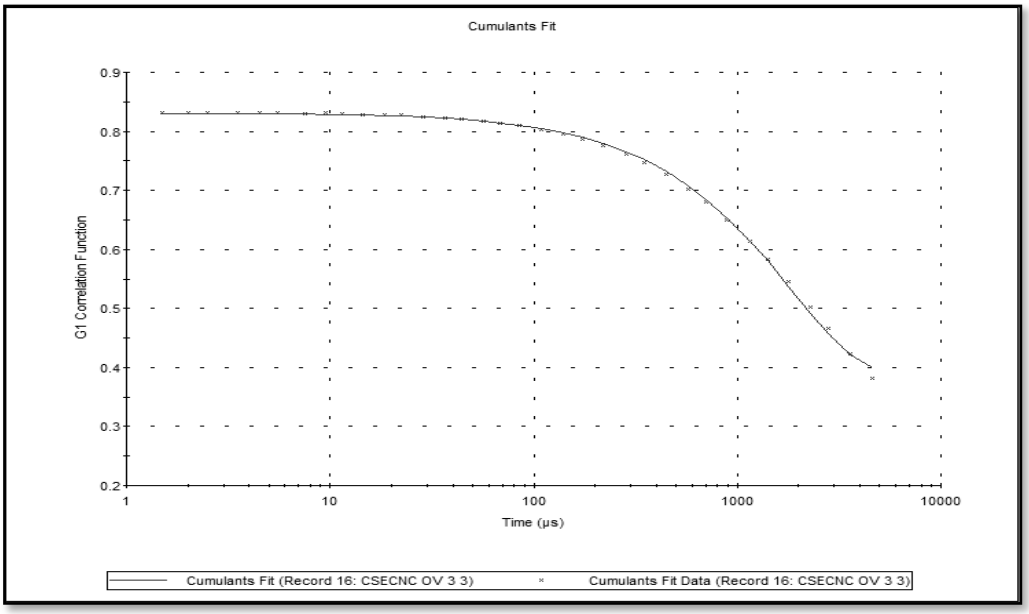
Distribution Fit [M]



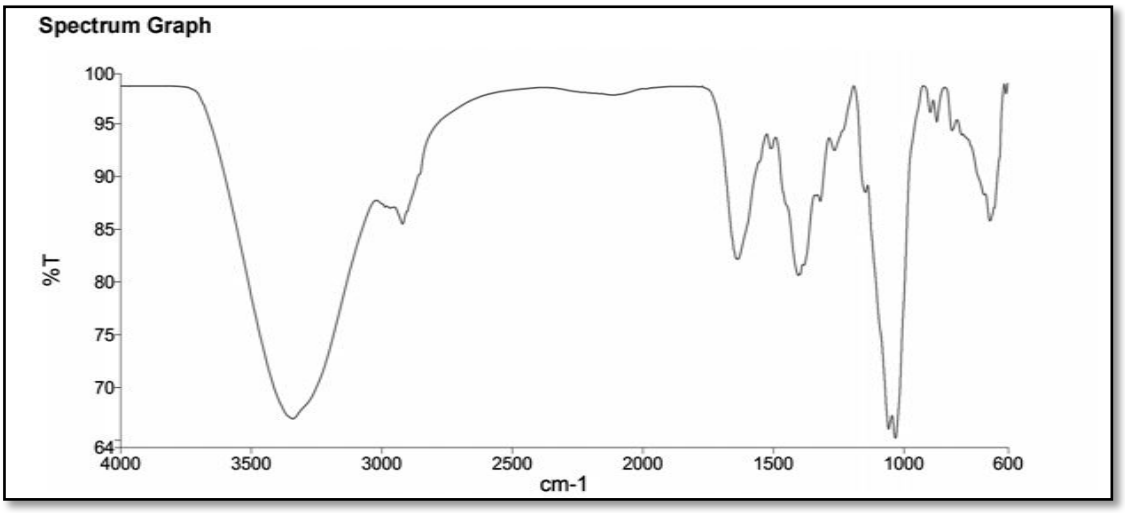
Volume PSD [M]



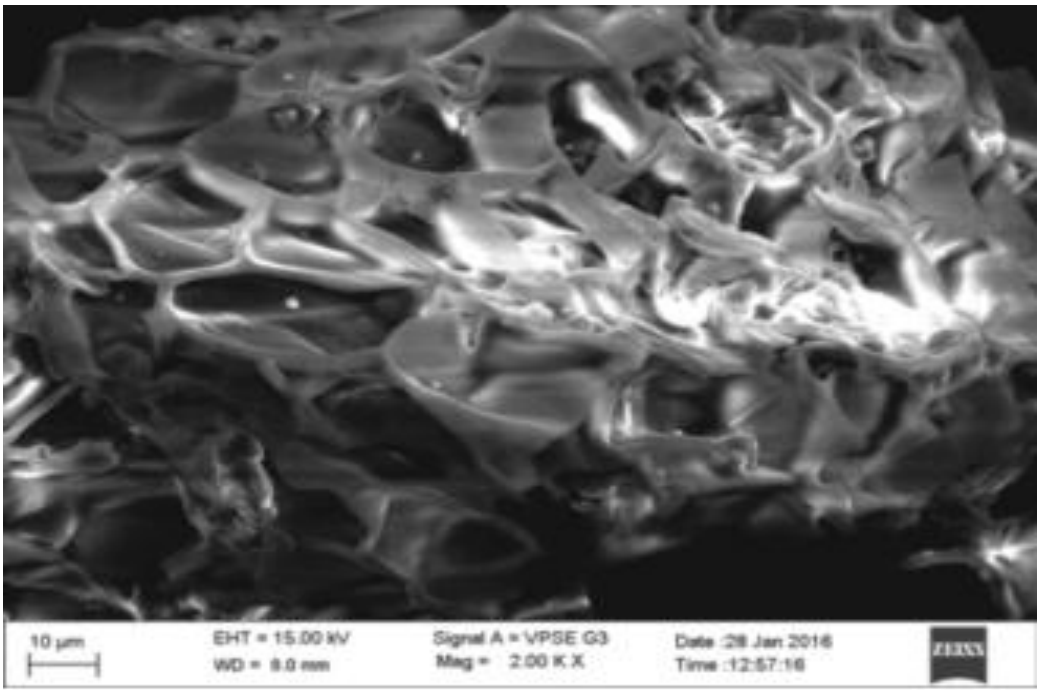
Correlogram [M]



Cumulant Fit [M]



ATR-FTIR Agro-based Nutraceutical Nanocrystal FTIR Spectrum



SEM image of Agro-based Nutraceutical Nanocrystal

IV. CONCLUSION

The R built in function used various test for normality using Shapiro-Wilk test , F-test conclude equality of variances, used t-test followed by Welch -test; further like to conclude that in statistical data analysis if variable normality not satisfied then Mann-Whitney U test had been useful. The non-parametric test by Wilcoxon-signed rank sum test.

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