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Research Article

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Analysis of the Siddha drug Saaranai Ver Chooranam using Scanning Electron Microscopy.

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Abstract

In the traditional Siddha system of medicines herbal products, inorganic substances and animal products are used for the medicine preparations. *Saaranai Ver Chooranam* is one of the herbal preparation which mentioned in the classical Siddha literature *Agasthiyar Mani 4000 Ennum Vaithiya Sinthamani Venba Muthalpagam* and used to treat the clinical condition like jaundice. The present study was focused to standardize the Siddha herbal preparation "*Saaranai Ver Chooranam*" by using various instrumental analysis like SEM. Result of SEM analysis shows the presence of micro particles which enhance the bio availability and better absorption of the drug (SVC). These findings will help for future clinical studies in SVC.

Keywords: *Saaranai Ver Chooranam*, Siddha medicine, SEM analysis

Introduction

Medicinal plants have achieved their therapeutic properties from their capability to produce renewable and various secondary metabolites, which are known as phytochemical constituents. Hence, numerous plants have used these phytochemicals as a protection mechanism against pathogens.[1] One of the vital potent herbal preparation was *Saaranaiver Chooranam* mentioned in the Siddha literature the solitary ingredient, root of *Trianthema decandra* Linn., (Vellai saaranai-Punarnavi)[2-7] which possess an anti-ulcerogenic activity and also easily accessible, reliable and feasible and cost effective than the conventional modern medications and also a potent alternative for their adverse effects.[3-6] Henceforth, I preferred the herbal medicine "*Saaranai Ver Chooranam*" for Anti-ulcer, Anti-secretory and Antacid activities as per authentic siddha literature named *"Agasthiyar Mani 4000 Ennum Vaithiya Sinthamani Venba Muthal pagam"*, Page No-180 indicated for Gunmam.[2]

Materials and Methods

Preparation of the drug:

Selection of the drug

According to this dissertation, the herbal formulation of "*SAARANAI VER CHOORANAM"* was taken as a trail drug for Anti-ulcer, Anti-secretory and Antacid activities has been taken from the Siddha aboriginal literature *"Agasthiyar Mani 4000 Ennum Vaithiya Sinthamani Venba Muthal Pagam"*, Page No-180 [2].

Ingredients of the drug:

*Saaranai ver (*Punarnavi) - *Trianthema decandra* Linn.,

Procurement of raw drug

The raw drug *Saaranaiver* (Trianthema decandra Linn,) was procured from outskirts of Dharmapuri, Tamilnadu, and South India.

Identification authentication

The solitary ingredient *T. decandra* roots are recognized and certified by the Professionals from Botanist at Government Siddha Medical College, Arumbakkam, and Chennai. The Voucher specimen Trianthema decandra Linn was labelled as 1014/PGG/321912104/GSMC-CH/2019-2022 and deposited to the laboratory of P.G *Gunapadam* department for prospective considerations.

Preparation and purification

The selection, preparation and purification were done as per the verses denoted in *Siddha* classical literature *"Agasthiyar Mani 4000 ennum vaithiya sinthamani venba- Muthal pagam"*, Page No-180.[2]

Purification of saaranai ver 2

Materials required

1. Cow's milk (*Bos taurus*)
2. Goat's milk (*Capra aegagrus hircus*)

The well matured *Saaranai* roots were selected cut into pieces and then boiled with cow's milk and goat's milk separately for purification. Repeat this process for about 7 times.

Preparation of the *Saaranai Ver Chooranam (SVC):*

Saaranai ver - Trianthema decandra

Procedure:

Purified *T.* roots were taken in anhydrous form pound well and grounded in stone mortar. The powder was sieved through a mesh (80- 100) particle size and kept it in a clean air tight container. It was labelled as *"Saaranai Ver Chooranam" (SVC)*. The contents were examined frequently to evade wetness and microbes.

Purification of the chooranam:

Pittaviyal murai (Steaming process):

The *Saaranai Ver Chooranam (SVC)* was purified by *Pittaviyal* method (steam cooking in milk) as per *Siddha* classical literature. A mud pot was taken and it was half filled by mixture of milk with equal quantity of water. The mouth of the pot was sealed with a cloth. This chooranam was placed over the cloth and tied firmly around the mouth of mud pot by another pot. The gap between mud pots was tied with a wet cloth to avoid evaporation. The mud pot was kept on fire and boiled until the cow's milk $^{3}/_{4}$ part reduced in the lower pot. The same drug was later dried and powdered then sieved again. It was used for the further study.

Storage of the drug:

The prepared test drug was stored in a clean, dried, air tight container. The contents were explored frequently to avoid moisture and microbes.

Administration of the drug

Form of the medicine: *Chooranam*
Route of Administration: Enteral route

SEM – Scanning Electron Microscope

Scanning Electron Microscope [SEM], also known as SEM analysis or SEM microscopy, was used very effectively in microanalysis and failure analysis of solid inorganic materials. Scanning electron microscope is performed at high magnifications, generates high-resolution images and precisely measures very small features and objects. X-rays are generated using EDX following a two-step process. First, the energy transferred to the atomic electron knocks it off, leaving behind a hole. Second, its position is filled by another electron from a higher energy shell, and the characteristic X-ray is released.

The SEM analysis procedure

Scanning Electron Microscope uses a focused beam of high-energy electrons to generate a variety of signals at the surface of solid specimens. In most SEM microscope applications, data is collected over a selected area of the surface of the sample and a two-dimensional image is generated that displays spatial variations in properties including chemical characterization, texture and orientation of materials. The SEM is also capable of performing analyses of selected point locations on the sample. This approach is especially useful in qualitatively or semi – quantitatively determining chemical compositions, crystalline structure and crystal orientations. The EDS detector separates the characteristic X-rays of different elements into an energy spectrum and EDS system software is used to analyse the energy spectrum in order to determine the abundance of specific elements.

A typical EDS spectrum is potrayed as a plot of X- ray counts Vs energy [in keV]. Energy peaks correspond to the various elements in the sample. Energy Dispersive X-ray Spectroscopy can be used to find the chemical composition of materials down to a spot size of a few microns and to create element composition maps over a much broader raster area. Together, these capabilities provide fundamental compositional information for a wide variety of materials, including polymers. In scanning electron microscope high-energy electron beam was focused through a probe towards PP. Variety of signals was produced on interaction with the surface of the sample. This results in the emission of electrons or photons and it was collected by an appropriate detector. The types of signal produced by a scanning electron microscope include: a] Secondary electrons b] Back scattered electrons c] Characteristic x-rays light d] Specimen current e] Transmitted electrons. This gives the information about the sample and it includes external morphology, texture, its crystalline structure, chemical composition and it displays the shape of the sample.

Methodology

A SEM is essentially a high magnification microscope, to which uses a focused scanned electron beam to produce images of the sample, both top- down and with the necessary sample preparation, cross sections. The test sample powder was sputter coated with gold and viewed under SEM [FEI quanta 200 FEG, Berlin, Germany] to determine themorphology at × 100,000 to magnification and the particle size at × 200,000 magnification.

Results and Discussion

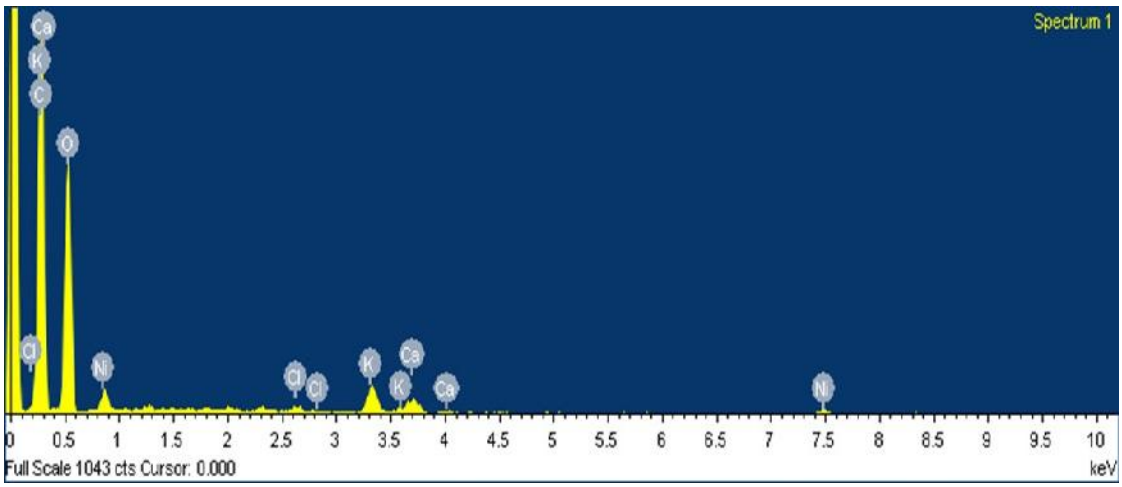

Figure 1.SEM-Energy Dispersive X-ray analysis (EDX) of the sample SVC

Table1.Elemental Peak Table

S.No	Element	App conc	Intensity Corn	Weight%	Weight % Sigma	Atomic%
1.	CK	122.14	1.2504	49.49	0.99	58.40
2.	OK	60.30	0.6801	44.91	0.97	39.79
3.	ClK	0.50	0.8249	0.31	0.08	0.12
4.	KK	4.45	1.0331	2.18	0.16	0.79
5.	CaK	2.45	0.9550	1.30	0.13	0.46
6.	NiK	2.73	0.7613	1.82	0.35	0.44
	Totals			100.00		

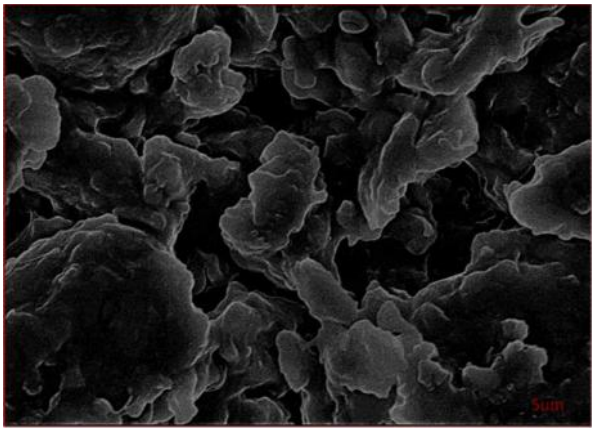

Figure 2. SEM image of SVC– Cluster View

Energy-dispersive X-ray spectroscopy (EDS, EDX, EDXS or XEDS), sometimes called energy dispersive X-ray analysis (EDXA or EDAX) or energy dispersive X-ray microanalysis (EDXMA), is an analytical technique used for the elemental analysis or chemical characterization of a sample. SEM-EDX analysis confirm the presence of Carbon, Oxygen, Chloride, Potassium, Calcium and Nickel containing compounds present in SVC.

The SEM imaging of the SVC shows that the particles are in nano size and have pores in it as shown in Fig 22 They are nano particles having a size of 5µm. The particles aggregate and individual particles are seen on the top of the clusters. As the particle is in nano size, a low dose of the drug is enough to treat diseases. Hence SVC which is prepared biologically contains nanoparticles to enhance fast pharmacological action in target site. EDAX analysis shows the elements present in the sample. The table represents the weight and atomic percentage of sample. The quantitative estimation of Carbon, Oxygen, Chloride, Potassium, Calcium and Nickel 49.49 Wt%, 44.91 Wt%, 0.31 Wt%, 2.18 Wt%, 1.30 Wt%, 1.82 Wt% respectively.

Conflict of interest

The authors declare that there is no conflict of interest.

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