PHARMACEUTICAL AND CLINICAL STUDIES ON COMPOUND AYURVEDIC FORMULATION, SARASWATA CHURNA

Tiwari Radheyshyam*1, Tripathi J.S.1, Gupta Sanjay2, & Reddy K.R.C.3

1Division of Manas chikitsa (Psychosomatic Medicine & Psychiatry), Department of Kayachikitsa, IMS, BHU, Varanasi, India
2Department of Psychiatry, IMS, BHU, Varanasi, India
3Department of Rasa Shastra, IMS, BHU, Varanasi, India

Article Received on: 10/04/2011 Revised on: 23/05/2011 Approved for publication: 09/06/2011

*Resident M.D(Ayu) final year, IMS, BHU, Varanasi Email: drradheims@gmail.com

ABSTRACT
Saraswata Churna is a unique combination of Ayurvedic herbal drugs, containing mainly Medhya Rasayana drugs, like Vacha, Shankpushpi, Aswagandha, Bramhi, etc. For the first time Saraswata churna is mentioned in Bhavapraakash Unmadadhikar and formula given in the same, selected for present study. The drug is prepared in the Ayurvedic Pharmacy, Institute of Medical Sciences, Banaras Hindu University and was selected for the management of Geriatric Depression. In the clinical study a series of 50 patients of Geriatric Depression were recruited randomly, based on the DSM-IV-TR diagnostic criteria of depression along with their screening for the level of depression using Geriatric Depression Scale (GDS-30). Out of 50, 30 patients were put on Saraswata Churna (Group-A), and 20 patients were on control group, Citalopram (Group-B). The total duration of therapeutic trial was three months. Hamilton Depression Rating Scale (HDRS) has been used to evaluate the response of the drugs. Certain basic biochemical and hematological investigations were also measured before and after the trial. The results have been found to be encouraging with significant relief in the patients belonging to ‘group A’ with no side effects.

KEY WORDS: Saraswata Churna, Medhya Rasayana, Depression, Geriatric.

INTRODUCTION
Ayurvedic system of medicine is probably the first which efforts to protect life from disease and aging. Ayurveda describe much about the science of gerontology and Rasayana Therapy. Rasayana Tantra is one of the eight major clinical disciplines of Ashtanga Ayurveda, which exclusively devoted to the study of aging and prevention of diseases occurs during old age. These are still developing specialty in today’s world but a fully grown, viable & clinical specialty practiced for several thousand years in Ayurveda. Thus, it is the potential area to be explored for its larger benefits to the mankind & it is an area of strength from Ayurvedic point of view. Rasayana therapy mean Rejuvenation therapy, affords a comprehensive physiological and metabolic restoration as it evident from fundamental statement of Charaka1. Ayurveda has two main objectives first to maintain the healthy state and second to cure the disease of individuals2 Charaka also mentioned two type of drugs first type of drugs are those which maintain the healthy state as Rasayana and Vajikarana and second are those by which we can treat different diseases. So the Rasayana Chikitsa or therapy is mainly used for maintaining the health of healthy individuals although it can be used to treat disease.3 Among Rasayana, Medhya Rasayana are the peculiar class of drugs described for prevention & treatment of mental disorders of all the age groups.

The demographic changes during last 50 years have led to the increased importance to the geriatric care all over the world. The control of the infectious diseases because of discovery of newer antibiotics, the improved emergency care & coming up of ICUs & CCUs have led to the increased mean life span leading to the growth in the elderly population & at the same time decrease into the children’s and young population because of improved birth control and family welfare measures. Thus the phenomenon of population reversal is clearly obvious in western and developed countries while it is slowly happening into the Indian scenario. At the same time it is generally accepted that the incidence of psychiatric disorders are higher in elderly.

In addition to physical changes, the social and psychological changes are more disabling to the elderly population. Biologically speaking, there is no perceptible change in an individual immediately after the retirement from a job but the consequent social and psychological changes are drastic and traumatic. Most of the time...
elderly are disengaging from social activities and are lonely neglected and becomes victim of several mental disorders. Further due to industrialization, children move to faraway places leaving old parents alone, or uprooting them to newer environment, both causing significant psychological distress. Financial dependence also adds to the distress in elderly. These persons are unable to cope-up with these varieties of changes & become the victim of many psychological & chronic diseases, the most significant of which is depression.

In this scenario there has been need of such medications which are helpful in elevating the mood of these patients producing symptomatic relief and simultaneously improving cognitive abilities. Looking into the overall requirements one is naturally tempted towards Ayurvedic Medhya Rasayana drugs which are not only promote the Intellect (Dhi), Retention power (Dhriti), Memory (Smriti) and also produce Neuronutrient effect by improving cerebral metabolism thereby helpful in reverting the mental dysfunction and relieving the symptoms. These effects have also been substantiated by many scientific studies. Now it is better to discus in details about Medhya Rasayana drugs.

Medhya Rasayana Drugs

While all the Rasayana drugs improve the mental faculties in addition to exerting a beneficial effect on the body, Medhya Rasayana are those drugs that have specific effect on mental performance. They are claimed to promote cognitive functions of the brain as related to brain aging. Medhya-Rasayana drugs promote the functions of "Buddhi" and "Manas" by correcting the disturbance of "Rajas" and "Tamas". These drugs relieve stress, anxiety and depression. Herbs of Medhya Rasayana formulations are of two types:

- Shita Virya and Madhura Vipaka,
- Ushna Virya and Tikta Rasa.

Shitavirya and Madhura Vipaka Medhya Rasayana herbs promotes kapha & it enhances "Dharaṇa Kārma" (i.e. retention of cognition) ex. Yastimadhu, Bramhi, Shankpushpi etc. Ushna Virya and Tikta Rasa pradhana Medhya Rasayana herbs promotes pitta & it enhances Grahana and Smarana (i.e. Grasping power and Memory) ex. Guduchi, Vacha, Jyotishmati etc. However in Samhita granthas, the action of the Medhya drugs are considered as due to their Prabhava and these actions can’t explain by their properties (gunas, rasa, virya, vipaka). Acharya Charaka mentioned the four special drugs under the Medhya Rasayana, namely Mandukparni, Shankhpushpi, Guduchi, And Yastimadhuk. Among these the Shankhpushpi was considered as best Medhya Rasayana. Besides textual and experience-based evidence for their efficacy now several new scientific studies have been conducted showing interesting results.

Some examples of scientific validation of Medhya Rasayanas in dementia, depression, memory impairment and neurodegeneration are mentioned here. Kuboyama et al. (2005) reported neuritic regeneration and synaptic reconstruction induced by Withanolide-A (WL-A) isolated from root of Ashwagandha (Withania somnifera) in mice. It was also shown to prevent the formation of Beta Amyloid plaques. WL-A is therefore an important candidate for the therapeutic treatment of neurodegenerative diseases, as it is able to reconstruct neuronal networks. Brahmi (Bacopa monnieri Linn.), is a famous Medhya Rasayana drug which has been studied extensively for its memory enhancing effect. Study conducted by Stough et al. (2001) for the chronic effects of an extract of B. monnieri (Keenmind) on cognitive function in healthy human subjects and reported that B. monnieri may improve higher order cognitive processes that are critically dependent on the input of information from our environment such as learning and memory. Holcomb et al. (2006) reported that this drug reduces amyloid levels in PSAPP mice. Sankhpushpi (Convolvulus pluricaulis), is reported to possess anxiolytic and memory enhancing and mood elevating effect and is claimed to retard brain aging. Agrawal and Singh (1998) conducted an open trial of Mandukaparni (Centella asiatica) in cases of educable mental retardation indicating significant improvement in performance IQ, Social Quotient, immediate memory span and reaction time. The psychomotor and cognitive functions were measured using (1) Bhatia Battery for performance test of intelligence and memory, (2) Vineland Social Maturity Scale for behavioral and social adaptability. The drug was administered in the form of whole plant fine powder in the dose of 2.5 gm twice a day orally for six months. Kapikacchu (Mucuna pruriens) is a Rasayana-Bajikarana plant drug. It is frequently used for the treatment of Parkinson’s disease and depressive illness in elderly persons. On Phytochemical studies Mucuna pruriens seeds have been shown to contain significant quantity of L-Dopa which could be the basis for its anti-Parkinsonism effect. Bhattacharyya et al. (1997) reported anxiolytic activity in the Glycowithanolides from Withania somnifera. Thus, the Medhya Rasayana drugs such as Ashwagandha, Brahmi, Mandukaparni, Shankhpushpi, Kapikacchhu and several other such herbal and herbomineral drugs are very useful in the management of depression, dementia and other mental disorders of elderly. Conceptually it is held that all Rasayana drugs produce their effect by acting through nutrition dynamics.
(Rasa, Agni, Srotas) at molecular level. They may not possess sharp pharmaceutical activities if used in holistic form and hence as such they may be treated as soft and safe medications which are the popular professional demand in present times.\footnote{12}

**SELECTED TRIAL DRUG**

The Saraswata Churna is selected for the pharmaceutical and clinical study. It is a unique combination of Ayurvedic herbal drugs, containing mainly Medhya Rasayana drugs, mentioned in Bhavprakash Unnadadhi. Later Bhaisajya Ratnavali also mentioned about Saraswata Churna\footnote{13}. This combination of medhya drugs has high content of Vacha, which is the drug of choice for central nervous system stimulation in Ayurveda. It containing mainly three category of drugs namely (a) Medhya Rasayana, viz. Vacha, Shankhpushpi, Aswagandha, Brahmi, (b) Rasayana that acts at the level of Agni viz, Pipali, Ajmoda, Jiraka, Mahabhaishajya, Maricha, and (c) drugs that spread the active principles of all other drugs all over the body viz. Saindhava lavana along with Raktshodhak dravyas viz, Kushtha & Patha. Here the Brahmi is used as decoction for trituration in order to mix the powder of all other drugs.

**AIMS AND OBJECTIVE**

1. To prepare the compound herbal drug by classical methods.
2. Scanning electron microscopy for particle size.
3. Clinical evaluation of the therapeutic efficacy of Ayurvedic drug Saraswata Churna for their antidepressant effect and also compare their antidepressant activity clinically with the established modern antidepressant Citalopram.

**MATERIAL AND METHOD**

In present pharmaceutical study, Saraswata Churna is prepared in the Ayurvedic Pharmacy, Institute of Medical Sciences, Banaras Hindu University, on the basis of Bhaishajya Ratnavali.\footnote{13}

**Ingredients**

The list of ingredients with their parts used is shown in table no. 1.

**Method of Preparation**

Above mentioned drugs Kustha, Aswagandha, Ajmmoda, Sweta and Krisna Jiraka, Sonthi, Marich, Pipali, Patha, Shankhpuspi, and Vacha, were collected together and mixed uniformly and powdered in a pulverizer, thereafter Saindhava lavana was powdered in ballmill. After that both were mixed together and filtered in a sieve shaker (particle size no.100). This filtered and homogeneously mixed powder was triturated with decoction of Brahmi and dried. Here the decoction of Brahmi was prepared by using one part green Brahmi whole plant and four part water. After that it was boiled in a wide open mouth iron container till 3/4\textsuperscript{th} of it was evaporated. The remaining part was filtered and used as a decoction for trituration. Here the decoction of Brahmi was used because the yield of Swarasa was very less and also it was found practically difficult. The obtained powder was put in wide mouth plastic containers of 90 gram each. Further the containers were labeled with all necessary information.

**Dose**

The dose of Saraswata Churna used for patients of different groups was 1.5 gm twice daily along with one tea spoon full (5 ml) ghrita & half tea spoon full (2.5 ml) honey, after meals.

**Scanning Electron Microscopy**

In this microscope a beam of electrons is emitted from the electron gun and focused on the surface of specimen, with the help of a series of magnetic lenses. The interaction between the electron and specimen surface atoms leads to the emission of secondary electrons and X-rays from the surface. These characteristic rays are detected and amplified to form an image on a cathode ray tube.

For the present study SEM, JSM 840 A (JEOL – Japan electronics optical limited) was used for taking micrographs. It is a state of the art high resolution SEM. Its maximum limit of magnification is 3 lacks. In this study the dried powder was placed over the specimen holder and observed under the microscope at 500, 1000 x. Micrographs was taken with the inbuilt camera. The particle size of the prepared powder was found to be \(207\text{nm}\), approximately which is very good for absorption from gastrointestinal tract.

The photographs of prepared powder, packing, & microscopic photographs of the prepared drug are shown in figure no.1, 2, & 3 respectively.

**Clinical Study**

A total number of 60 patients Of Geriatric Depression were selected for the study, after carefully examining their clinical presentation and fulfilling the inclusion criteria that were registered for this study were randomly allocated into two groups. Among these fifty patients who turned up for complete follow-ups from different groups are as follows -

1. The group A (S.C.) comprised of 30 patients who were put on the trial drug Saraswata churna.
2. The group B (Cit.) consisted of 20 patients who were put on Citalopram 20mg once a day.

**Inclusion Criteria**

The elderly patients (\(\geq 60\) yrs.) who have Geriatric Depression Scale (GDS -30, First Developed In 1982 By J.A. Yesavage And Others) score \(>11\) were included in this study. Patients who fulfilled the DSM-IV-TR
diagnostic criteria for depressive disorder were also included in this study.

**Exclusion Criteria**
1. Mood incongruent delusions or hallucinations, incoherence or marked loosening of associations.
2. Patients superimposed with schizophrenia, schizophreniform disorders, mania or bipolar disorders or psychotic disorder not otherwise specified.
4. Chronic Drug abuse, e.g.-barbiturates, etc.
5. Toxic abuse like alcohol ingestion and withdrawal.
6. Organic diseases like some diseases of gastrointestinal system (irritable bowel syndrome, colitis), myocardial infarction, neurodegenerative CNS diseases (e.g. Alzheimer’s disease), Hypothyroidism & hyperthyroidism and systemic diseases like Rheumatoid arthritis and other connective tissue disorders etc.

**Parameters for Assessment of the Drug Response**

**Clinical Assessment**
The symptomatic relief produced by the trial treatment was assessed on initial visit and on successive follow ups at 1month intervals for entire period of therapeutic trial i.e. for three months.

**Psychological Assessment**
Hamilton Depression Rating Scale (HDRS) ( Hamilton M ,A 1960)\(^4\) has been used to quantify the psychological parameters. Hamilton depression rating scale is an objective method for clinical assessment of depressive states in patients of depression. Being one of the most reliable scales for measuring level of depression comprising the rating of diverse clinical signs and symptoms of disease, it was used for the objective assessment of clinical condition in patients of depression in present study. This scale consists of 17 items, each of which is rated 0 to 2 or 0 to 4 with total scoring ranging from 0-50. Rating was done over this scale before treatment and at each follow up and total score was calculated. At the end of the study, the difference was obtained between initial and final score. Certain basic biochemical and hematological investigations, like total leukocyte count, hemoglobin, serum urea & creatinine, SGPT, SGOT, and fasting blood sugar were measured before and after the trial.

**RESULTS & DISCUSSION**

After many years of continuous observation, it has been found that the Ayurvedic therapeutic intervention in geriatric population produced the very good result and Ayurveda has a full branch since its origin regarding the management of diseases in old age known as Rasayana Chikitsa. Rasayana effect is not a specific pharmacological action but is a complex phenomenon operating through a comprehensive mechanism involving the fundamental factors like Rasa-samvahana (circulation), Dhatus (tissues), Agni (metabolism) and srotamsi (micro channels). A number of drugs as well as dietary constituents perform this role by enriching the Rasadhatu in exemplary manner. The example of such drugs is Shatavari, Madhujasthi, Bala, Dugdha and Ghrita etc. Rasayana drugs acting at the level of Agni, vitalizing the organic metabolism leading to an improved structural and functional pattern of Dhatu and of drug are available that help in stimulating Agni as Pippali.

Many Rasayana drug may help in the performing the Srotoshodhana and help in the performance of Rasayana effect in body. Micro channel are primarily responsible for carriage of nutrients, any obstruction in these channel will hamper the process of nourishments. Thus Srotoshodhaka Rasayana Act by a cleaning up the minute channels leading to better perfusion of tissue. Guggulu is the classical example of this type of Rasayana.

Saraswata Churna is a unique combination of ayurvedic herbal drugs, containing mainly three category of drugs namely (a) Medhya Rasayana, viz. Vacha, Shankpushpi, Aswagandha, Bramhi, (b) Rasayana that acts at the level of Agni viz, Pipali, Ajmoda, Jiraka, Mahabhaishajya, Maricha, and (c) drugs that spread the active principles of all other drugs all over the body viz. Saindhava lavana along with Raktshodhak dravyas viz, Kushtha & Patha. Here the Bramhi is used as decoction for trituration in order to mix the powder of all other drugs. As it is shita in virya, madhura in vipaka and medhya in prabhava, it potentiates the effect of drug and reduces the tikshna property of Vacha. Further the anupana ghrita itself have medhya property, also it detoxify the toxic effect of Vacha. Based upon above description the mechanism of action on Geriatric Depression can be proposed as-

I. Vacha- it elevate the mood, increase the cognitive ability\(^5\).
II. Aswagandha – reduces the stress and anxiety, decreases the neurodegeneration & promotes regeneration.
III. Shankpushpi & Bramhi – These are best among Medhya drugs, so it potentiates the effect of Vacha, and Aswagandha and ensure the better nourishment of brain tissues. They may also be responsible for promotion of good sleep and decrease in the forgetfulness.
IV. Pippali, Ajmoda, Jiraka, Mahabhaishajya, & Maricha are Agnivardhaka dravya,they might be
promotes the metabolism by increasing the biofire thereby effecting the improvement in the gastrointestinal symptoms in particular and overall nourishment of body tissues including the Mastulunga (Brain) & Hridaya (Heart) etc.

V. Kushtha, and Patha, purify the blood (Rakt shodhan) and pacify tridoshas, thereby improving the other vegetative functions.

Like other Ayurvedic drugs the Saraswata Churna also is a combination of many potentially effective drugs that acts at various level in a holistic way to improve the mental ability, cognition and acts as a good antidepressant. In the clinical study the Saraswata Churna has been selected as a trial drug for the management of Geriatric Depression. The patients were selected based on the DSM-IV-TR diagnostic criteria of depression along with their screening for the level of depression using Geriatric depression scale (GDS-30). Hamilton Depression Rating Scale (HDRS) has been used to evaluate the clinical condition of the patients of Geriatric Depression and the results have been presented after necessary statistical analysis.

The response of the therapeutic trial in various trial groups are shown in the graphs 1 & 2, respectively. There was no significant difference was found in response of treatments between both groups in the terms of decrease in total HDRS score. On comparing means of these groups before and after treatment, it was found that there was no significant deference found in the response of both the groups (group A- t=17.059 p= <.001, mean difference=12.27; group B- t=15.245 p= <.001, mean difference=11.85) (table 2).

Patients of group A demonstrated statistically highly significant changes over HDRS scores in case of depressed mood (t=12.042, p< .01), guilt (t=4.264, p< .01), suicide (t=6.496, p< .01), insomnia initial (t=9.327, p< .01), insomnia middle (t=3.525, p< .01), work interest (t=13.310, p< .01), retardation, (t=3.071, p< .01), agitation (t=6.227, p< .01), anxiety psychic (t=7.761, p< .01), anxiety somatic (t=9.633, p< .01), somatic gastrointestinal (t=7.712, p< .01), somatic general (t=4.785, p< .01), genitol (t=4.000, p< .01), and Hypochondriasis (t=4.474, p< .01).

Trial drug, Saraswata churna with ghrita and honey, used in this group of patients specially works at four different levels viz., at the level of Agni, at the level of Doshas, at the level of Manas (psyche), & at the level of Manovaha srotas (tracts of the Brain) which finally are able to degrade the samprapti (pathogenesis) of Vriddhawasada (Geriatric Depression) and responsible for effect obtained. In the patients of group B, statistically highly significant changes were found in the areas of depressed mood (t=12.337, p< .01), guilt (t=3.943, p< .01), suicide (t=6.164, p< .01), insomnia initial (t=6.474, p< .01), work interest (t=8.718, p< .01), retardation (t=2.939, p< .01), agitation (t=5.107, p< .01), anxiety (psychic) (t=8.718, p< .01), anxiety (somatic) (t=7.025, p< .01), somatic gastrointestinal (t=5.480, p< .01), somatic general (t=5.339, p< .01) weight loss (t=3.199, p< .01), while significant change was noted in insomnia delayed (t=2.517, p< .05).

Observations regarding the overall result of therapeutic trial were done on the basis of observed changes into the HDRS score & changes into the clinical condition of the patients and converting them into the percentage change. The observation revealed that patients of both A & B groups have got maximum percentage of improvement in the moderate category (both 50%), however in group B more number of patients have got excellent improvement (20%) than group-A patients (16.70%) (table 3). Therefore it may be considered that Saraswata Churna (applied in group-A) were equally effective as Citalopram, a stabilized antidepressant, in the management of geriatric depression. Certain basic biochemical and hematological investigations, like total leucocyte count, hemoglobin, serum urea & creatinine, SGPT, SGOT, and fasting blood sugar were measured before and after the trial. The observations reveal that there is no any statistically significant change in any of the above parameters (table 4).

CONCLUSION

Saraswata Churna is an unique classical Ayurvedic formulation which has been claimed to posses the Nootropic and cognitive enhancing property. It contains many such ingredients like Vacha (Acorus calamus Linn.), Brahmi (Bacopa monnieri Linn.), Shankpushpi (Convolvulus pluricaulis Choisy Lin.), Ashwagandha (Withania somnifera Dunal.), Kustha (Saussurea Lappa) etc, which belongs to the group of Medhya Rasayana drugs. This class of drugs are known to produce two fold effect viz. improvement in the nutritional status of the neural tissues (Brain etc.) & thereby producing cognitive enhancing effect and also amelioration of various mental diseases like anxiety, depression, dementia etc.. The two effects may be interrelated. The scientific studies conducted in recent years with this class of drugs have given evidence of neuronutrient effect, neural metabolic modification and improved blood perfusion to the Brain, which mostly responsible for their clinical effects.

The present clinical study was conducted with Saraswata Churna has revealed that it is equally effective in the management of Geriatric Depression as Citalopram. The authentic preparations of Ayurvedic drugs are very important for their specific claimed effect, and for each
drug a specific technique should be followed as given in the classics. Though several studies have been conducted on the role of Medhya drugs in the management of Chittawasada (Depressive Disorder) and other mental disorders at various centers of the country but the present study is probably the pioneering work, evaluating the role of the potent medhya drug Saraswata Churna specifically in the Vriddhawasada (Geriatric Depression). The patients have been selected and evaluated using standard parameters like Geriatric Depression Scale (GDS-30), and Hamilton Depression Rating Scale (HDRS). Based on the findings, it can be concluded that the Saraswata Churna is an effective therapy for the management of the geriatric depression without any side effects, instead promoting a greater degree of relief in the symptoms. Thus, the present study has shown potential of its wide application in the management of geriatric depression.

REFERENCES

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S.N.</strong></td>
</tr>
<tr>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
</tr>
<tr>
<td>5.</td>
</tr>
<tr>
<td>6.</td>
</tr>
<tr>
<td>7.</td>
</tr>
<tr>
<td>8.</td>
</tr>
<tr>
<td>9.</td>
</tr>
<tr>
<td>10.</td>
</tr>
<tr>
<td>11.</td>
</tr>
<tr>
<td>12.</td>
</tr>
<tr>
<td>13.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
</tr>
<tr>
<td><strong>HDRS Score</strong></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Result</strong></td>
</tr>
<tr>
<td><strong>No.</strong></td>
</tr>
<tr>
<td>Mild improvement</td>
</tr>
<tr>
<td>Moderate improvement</td>
</tr>
<tr>
<td>Excellent improvement</td>
</tr>
<tr>
<td>No/insignificant improvement</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parameters</strong></td>
</tr>
<tr>
<td><strong>Mean</strong></td>
</tr>
<tr>
<td>TLC(cumm)</td>
</tr>
<tr>
<td>Hb (gm%)</td>
</tr>
<tr>
<td>E.S.R. (in mm in 1hr)</td>
</tr>
<tr>
<td>Sr. urea (mg/dl)</td>
</tr>
<tr>
<td>Sr. creatinine (mg/dl)</td>
</tr>
<tr>
<td>SGPT (IU/L)</td>
</tr>
<tr>
<td>SGOT (IU/L)</td>
</tr>
<tr>
<td>Blood sugar(f) (mg/dl in non dm patients)</td>
</tr>
</tbody>
</table>
(500) Grain Size ~207nm

Photo 3. SEM Pictures of Saraswata Churna in different configurations Higher Magnification

Graph 1: Graph showing effect of therapeutic trial over HDRS score in the patients of Group A
Graph 2. Showing effect of treatment over HDRS score in the patients of Group B

Source of support: Nil, Conflict of interest: None Declared