

CLINICAL EVALUATION OF MEDHYA RASAYANA EFFECT OF MANDUKAPARNI (CENTELLA ASIATICA) A SCIENTIFIC STUDY

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The Comparative study of the administration of mandukaparni Syrup with placebo in 100 subjects of minor disturbance in cerebral higher functions revealed that the drug Mandukaparni (Centella asiatica) produced significant improvement in all the factors of Medhya Rasayana viz Dhee, Dhriti, Smriti, Prabha, Varna, Swara, Dehabala, Indriyabala, Arogya and cerebral higher functions viz attention, memory, calculation, abstract thought, spatial appreciation and visual & body perception. No statistically significant changes / improvement were observed in most of the parameters of assessment in the subjects treated with placebo (Glucose).

It was observed that most of the patients treated with Mandukaparni reported growing feeling of well-being, better sleep pattern, more mental and physical fitness with considerable improvement in biochemical and physiological make up after the therapy, clearly confirming Medhya Rasayana Prabhava of Mandukaparni (Centella asiatica).

Introduction

The psychological aspect of Ayurveda is probably the most important part of the system and the least understood. Ayurveda has a group of certain drugs highly appreciated for their effect to promote various faculties of human body. In this respect *Rasayana* is one of the important branches of *Astanga Ayurveda*, which deals with the promotion of physical and mental health. All *Rasayana* drugs are supposed to improve mental faculties, in addition to their beneficial effects on the body. However, the *Medhya Rasayana* has specific effect on mental functions.

Rasayana drugs used with the objective of promotion of intellect, memory and other mental capabilities, are called *Medhya Rasayana*. These drugs are supposed to provide nutrition and other essential elements to the cells and tissues of the brain and possess tranquilizing effect, which in turn increases the functional capacity of brain and promote mental health.

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Medhya encompasses the processes like *grahana*, *dharana* and *smarana* which are similar to encoding, storage and retrieval respectively. Thus *Medhya* can be appropriately correlated with the process of memory and other higher functions of the brain.

In Ayurvedic literature the term '*Medhya*' seems to represent higher functions of brain, as it involves (i) *Dhee* which incorporates thinking, reasoning, analysing, learning, understanding (perception capacity) etc. (ii) *Dhriti*, which encompasses power of retention, regulation, and self-conted and (iii) *Smriti* which includes reproduction, auto suggestion, remembering past experiences (Long term memory) etc. Thus it appears logical to correlate the term '*Medhya*' with cerebral higher functions.

The present study has been conducted with the objective to evaluate clinically the *Medhya* effect of *Mandukaparni* (*Centella asiatica*) in 100 cases with minor disturbances of cerebral higher functions on scientific parameters.

Materials & Methods

For clinical studies 100 clinically diagnosed patients of minor disturbances of cerebral higher functions were selected and registered for the present trial on the basics of specially designed proforma for the purpose. As already stated, these 100 patients were randomly divided in to following two groups of 50 patients each.

1. Group A (*Mandukaparni* group)
These patients were treated with *Mandukaparni* syrup in the dose of 20ml b.d. for three months.
2. Group B (Placebo/Control group) -
These patients were treated with placebo "Glucose powder" in the dose of 250mg b.d. in capsule form for three months.

The subjects were selected on the basis of complaints and features of minor disturbances of cerebral higher functions in the form of poor memory, disturbances of concentration and orientation, poor intellectual performance, poor retention power, disturbed sleep pattern, and anxiety leading to disturbed mental functions etc.

Patients having major mental or neurological disorders like psychosis, psychoneurosis, dementia, epilepsy, hysteria, delirium etc. were excluded.

Method of preparation of *Mandukaparni* syrup

The drug *Mandukaparni* (with its *panchanga*) was taken in dry form and its *Kwatha* (decoction) was made. For making *kwatha* the crude drug was boiled in eight times of water till 1/4 part was left behind. Then it was filtered and collected in an open vessel and the sugar was added in it in double quantity of the filtered *Kwatha*.

The mixture was heated and stirred till sugar dissolves. After that the liquid was kept open till it comes to the normal

temperature. Then sodium Benzoate, as a preservative was added in this mixture in the proportion of 0.1 percent. This syrup was stored in air tight containers and then bottled for convenient dispensing. Calculations of the ingredients of the syrup revealed that each 10ml. of syrup contained 2.21 gm. *Mandukaparni* and each 10ml. of *Mandukaparani* syrup contained 4.5 ml. liquid extract of *Mandukaparani*. Detailed calculations for the purpose are given in the table:

Quantity of crude dry drug	= 60 kg.
Quantity of <i>kwatha</i> obtained	= 120 Ltr.
Quantity of syrup formed	= 266 Ltr.
Quantity of <i>Mandukaparni</i> in 10ml. Syrup (in gm.)	= <u>Quantity of Crude drug (gm)</u> No. of doses (each of 10 ml) in total quantity of syrup = <u>60,000</u> 266.00 = 2.21 gm. <u>Quantity of kwatha (liquid extract) ml</u> No. of doses (each of 10 ml.) in total quantity of syrup = <u>120,00</u> 266,00 = 4.5 ml.
Quantity of liquid extract <i>Mandukaparni</i> in 10 ml syrup (ml)	

(1) Subjective Improvement

It was assessed in terms of increase in the growing feeling of well being with physical and mental fitness, if any produced after the treatment. In terms of various *Rasayana* and *Medhya Rasayana* effects produced in their body on the basis of the characteristics described in *Charaka Samhita* (Ch. Sh 1/99-101).

(2) Clinical Improvement

Criteria of Assessment

The follow up studies of the patients were made at the interval of one month. During the trial and follow up studies the parameters of assessment were as described below.

- (i) Attention
- (ii) Memory
- (iii) Calculation

- (iv) Abstract thought
- (v) Spatial appreciation
- (vi) Visual & body perception

Scoring for Cerebral Higher Function Tests

The complete clinical test for each higher function was divided into three major groups. Each group was given maximum 10 marks. The scoring was done on the basis of the performance of the patient out of 10 marks. The better performance was marked towards increasing number and worst performance towards decreasing number. Thus collectively, each function was assessed in terms of maximum 30 marks.

Other Tests

1. Mini Mental State Test : Mini mental state test is a scale used in neurology for the gross assessment of cerebral higher functions. It was used to assess the improvement in terms of score achieved by the patient out of 30.

2. Mental Fatigue Rate : Mental fatigue rate was assessed by asking the patient to cut a particular digit in the sheet prescribed. Same process was adopted during follow ups and after treatment. It was decided to assess mental fatigue rate on the following two parameters -

- (i) The time consumed, before and after the treatment
- (ii) Number of mistakes done, before and after the treatment

3. Anxiety Level : For assessment of Anxiety level, Sinha Anxiety Scale, (Sinha W.A. Self Analysis form) constructed and standardized by D. Sinha, Prof.& Head, Department of Psychology, University of Allahabad, U.P., India was used. It is a self-administered evaluating scale. The scale contains 100 questions to which patient has to answer in 'Yes' or 'No' after reading them carefully. The positive score gives directly the percentage of anxiety level. Statistical difference before and after the therapy was worked out.

(3) Laboratory Profile

- (i) Hematological changes in terms of TLC, DLC, E.S.R. and Hbgm%.
- (ii) Lipid profile in terms of Total Lipids, L.D.L., V.L.D.L., H.D.L., Serum Cholesterol, S. Triglycerides.

Observations made and results obtained after clinical trial were computed statistically to draw various conclusions.

Observations and Results

It was observed that most of the patients treated with the trial drug *Mandukaparni*, reported a growing feeling of well being, more mental and physical fitness and considerable improvement in their psychological make up after the therapy, which supports the *Medhya* effect of *Mandukaparni*.

Medhya prabhava of *Mandukaparni* was also worked out in terms of *Dhee*,

Dhriti, Smriti, Prabha, Varna, Swara, Dehabala, Indriyabala and *Arogya*. All the subjects of group A (*Mandukaparni*) showed statistically highly significant improvement in these factors, except in *Varna* and *Swara* where less significant improvement was noticed after the course of the therapy. On the other hand the subjects of group B (Placebo) witnessed a trend of slight clinical improvement in all factors but it was statistically insignificant. Probably the improvement was noticed in these subjects due to the psychological effect of placebo therapy.

The assessment of *Medhya Prabhava* of *Mandukaparni* in comparison to control group was observed in all the subjects in terms of cerebral higher functions namely 1. Attention, 2. Memory, 3. Calculation, 4. Abstract thought, 5. Spatial appreciation and 6. Visual and body perception. It was observed that there was statistically significant improvement in the level of all the six cerebral higher functions in group A treated with *Mandukaparni* as in comparison to the group B treated with placebo. It was noticed that in two cerebral higher functions attention and perception improvement in their level after the therapy in group A (*Mandukaparni*) was statistically less significant.

The gross improvement in cerebral higher functions was also observed in all the subjects with applying the Mini Mental State Test. The observations made before

and after the treatment show that the subjects treated with *Mandukaparni* (group A) scored much higher as in comparison to their initial scoring rate. These results were found statistically highly significant. On the other hand the subjects of group B (placebo) although showed slight improvement in Mini Mental State Test, but it was found statistically insignificant. Since, it was observed that there was highly significant improvement in Mini Mental State Test Scoring in group A (*Mandukaparni*) after the therapy, it suggests collectively marked improvement in cerebral higher functions produced by *Mandukaparni* which is possible only due to *Medhya* effects of *Mandukaparni*.

Improvement in mental functions was also observed in all the subjects in terms of two parameters namely 1. Anxiety level and 2. Mental fatigue rate. It was observed that there was significant reduction in the level of anxiety in group A (*Mandukaparni*) in comparison to group B (placebo), which suggests the marked tranquilizing and psychotropic effect produced by the *Mandukaparni*. The improvement observed in the level of anxiety in group B (placebo) was found to be statistically insignificant.

Mental fatigue rate was worked out with the help of a self administered scale. It was observed on two factors - (i) Time consumed to complete a specific task and (ii) Mistakes committed during completion

of the task. Statistical data show that the time consumed for completion of a specific task was reduced insignificantly in group B (placebo), whereas it was markedly reduced in the subjects of group A (*Mandukaparni*). Similarly the subjects of group B (placebo) showed insignificant reduction in number of mistakes committed for completion of a task, while in the subjects of group A (*Mandukaparni*), there was highly significant reduction in the number of mistakes committed after the therapy.

The *Mandukaparni* has been found effective in improving the feeling of well being and in improving the quality of sleep in the subjects after the therapy. Out of 50 patients of group A (*Mandukaparni*) 30 (60%) patients were reported to have developed growing feeling of well being, whereas the number of patients noticed in this respect was very small 8 (16%) in group B (placebo). The quality of sleep was improved in 33 (66%) patients in group A (*Mandukaparni*) in comparison to subjects of group B (placebo), in which 16 (32%) patients were reported to have improved their sleep pattern towards better side after the therapy, showing better *Medhya Prabhava* of the drug *Mandukaparni*.

It was observed that there were significant changes in the pattern of lipid profile in the subjects of group A treated with *Mandukaparni*. The level of S. Cholesterol decreased significantly. There

was a trend of decrease in S. Triglycerides which was insignificant statistically. Similarly higher density Lipoprotein have shown statistically significant increase in its level while low density Lipoprotein & very low density Lipoprotein registered significant decline after the therapy with *Mandukaparni*. These observations confirm the Cardio-protective effects of drug *Mandukaparni* which is probably due to its *Rasayana* effects.

Studies show statistically significant decrease in the level ESR after the therapy with *Mandukaparni*. Similarly there was significant improvement in Hb gm% after *Mandukaparni* therapy which is possible because of its *Rasayana Prabhava*. It is observed that *Mandukaparni* helps in producing good quality *Rasa*, *Rakta* etc. *dhatus* which is the *Rasayana* of *Mandukaparni*. No significant changes were observed on hematological parameters in the subjects treated with placebo.

While reviewing the pattern of physiological changes in subjects of *Mandukaparni* treated group it is evident that there was considerable gain in body weight in subjects of group A after the course of therapy which is possible due to its *Rasayana Prabhava*. No significant changes were observed in other parameters, that in the subjects of group B i.e. placebo treated group. No significant changes were observed in any of the physiological parameters after the therapy.

Table 1

Showing the Response of *Mandukaparni* (group A) in comparison to Placebo (group B) in respect of its *Rasayana* Effects (Subjective Improvement)

<i>Rasayana</i> effects		Dhee	Dhriti	Smriti	Prabha	Varna	Swara	Dehabala	Indriya bala	Arogya
Percent Improvement	group A	56.94 P<0.001	96.92 P<0.001	72.37 P<0.001	.73.33 P<0.001	31.03 P<0.001	40.70 P<0.001	58.97 P<0.001	77.46 P<0.001	80.86 P<0.001
	group B	16.87 P<0.10	13.65 P<0.10	15.38 P<0.10	18.39 P<0.10	14.61 P<0.10	13.65 P<0.10	13.95 P<0.10	15.56 P<0.10	16.85 P<0.10

Table 2

Showing the Response of *Mandukaparni* (group A) in comparison to Placebo (group B) in respect of Cerebral Higher Functions (Clinical Improvement)

Cerebral Higher Functions		Attention	Memory	Calculation	Abstract Thought	Spatial	Perception
Percent Improvement	group A	9.16 P<0.01	27.40 P<0.01	20.42 P<0.01	16.21 P<0.01	18.72 P<0.01	3.28 P<0.01
	group B	3.17 P<0.10	3.54 P<0.10	3.73 P<0.10	3.04 P<0.10	3.35 P<0.10	1.87 P<0.10

Table 3

Showing the level of Improvement in certain Mental Faculties in subjects of *Group A (Mandukaparni)* and Group B (Placebo)

Tests for Mental Faculties		Mini Mental State Test	Anxiety Level	Mental Fatigue Rate (P)	Mental Fatigue Rate (E)
Percent Improvement	group A	19.62 P<0.001	33.08 P<0.001	22.46 P<0.001	68.29 P<0.001
	group B	3.26 P<0.10	7.57 P<0.10	5.16 P<0.10	19.11 P<0.10

Table 4

Showing the comparison of the Pattern of changes in Lipid Profile amongst the subjects of *Group A (Mandukaparni)* and Group B (Placebo)

Biochemical Parameters of Lipid Profile		S. Cholesterol	S. Triglyceride	HDL	LDL	VLDL
Percent Improvement	group A	6.10 P<0.025	5.48 P<0.020	6.52 P<0.025	12.24 P<0.01	5.48 P<0.20
	group B	4.80 P<0.40	9.64 P<0.10	3.11 P<0.10	8.09 P<0.20	9.64 P<0.10

Table 5
**Showing the comparison of the Pattern of Haematological changes in the subjects of
Group A (Mandukaparni) and *Group B (Placebo)***

Haematological Parameters		ESR	Hb	TLC	P	L	E	B	M
Percent Improvement	group A	32.61 P<0.001	6.31 P<0.001	3.45 P<0.40	19.48 P<0.010	26.54 P<0.010	66.67 P<0.40	00 P<0.10	2.27 P<0.50
	group B	7.87 P<0.20	1.56 P<0.50	1.68 P<0.40	7.33 P<0.10	11.13 P<0.05	66.67 P<0.10	00 P<0.05	5.17 P<0.50

Table 6
**Showing the comparison of the Pattern of Physiological changes in the subjects of
Group A (Mandukaparni) and *Group B (Placebo)***

Physiological Parameters		Body weight	Systolic B.P.	Diastolic B.P.	Pulse Rate	Respiration
Percent Improvement	group A	1.88 P<0.05	0.79 P<0.025	0.52 P<0.40	0.97 P<0.10	3.43 P<0.025
	group B	1.41 P<0.20	0.68 P<0.10	0.05 P<0.50	0.71 P<0.10	1.94 P<0.10

Table 7
Showing the Response of *Mandukaparni* (*group A*) /Placebo (*Group B*) on Feeling of Well being after the Therapy

S.No.	Group	Feeling of Well being after the therapy		
		Present (++)	Present (+)	Unchanged
1.	A (50) <i>Mandukaparni</i>	9(18%)	21(42%)	20(40%)
2.	B(50) Placebo	0	8(16%)	42(84%)

Table 8
Showing the Response of *Mandukaparni* (*Group A*) /Placebo (*Group B*) on Quality of Sleep after the Therapy

S.No.	Group	Quality of Sleep		
		Unchanged	Better	Worse
1.	A(50) <i>Mandukaparni</i>	17(34%)	33(66%)	—
2.	B(50) Placebo	30(60%)	16(32%)	4(8%)

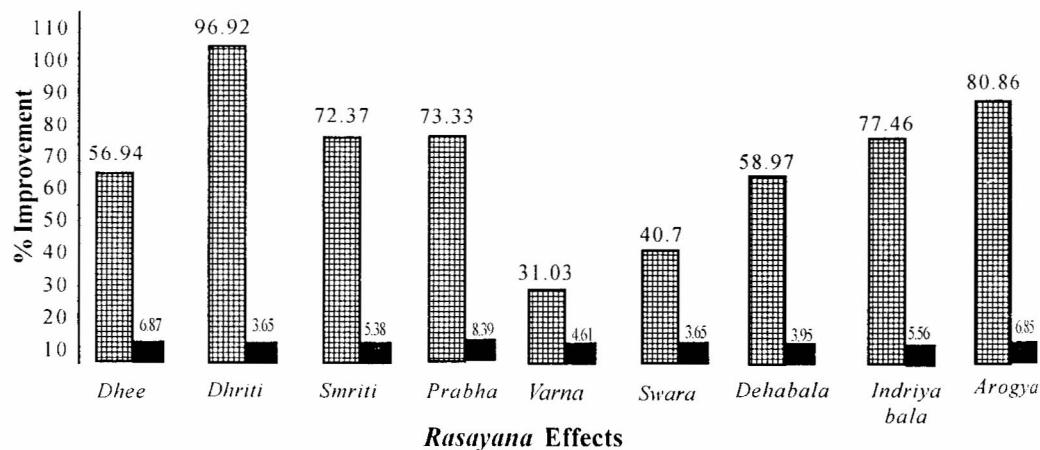


fig. No. 1 Showing the Response of *Mandukaparni* (Group A) in Comparison to Placebo (Group B) in respect of its *Rasayana Effects* (Subjective Improvement)

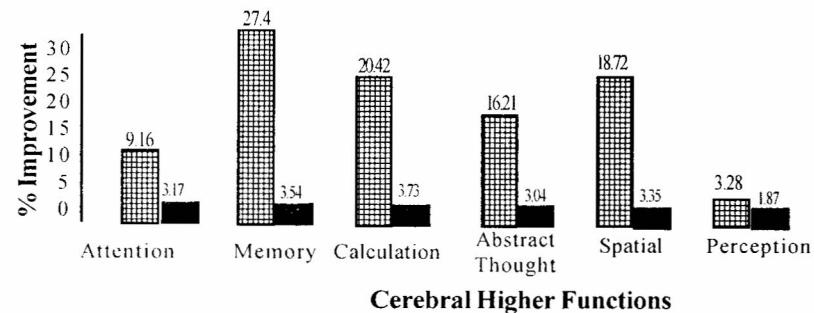


fig. No. 2 Showing the Response of *Mandukaparni* (Group A) in Comparison to Placebo (Group B) in respect of Cerebral Higher Functions (Clinical Improvement)

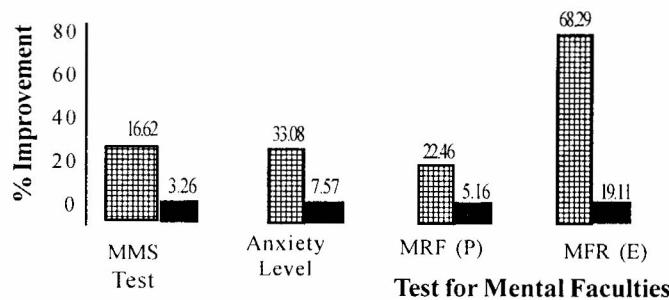


fig. No. 3 Showing the level of Improvement in Certain Mental Faculties in subjects of Group A (*Mandukaparni*) and Group B (Placebo)



Discussion

Mandukaparni (*Centella asiatica*) possesses various effects on central nervous system such as stimulatory nervine tonic, rejuvenant, sedative, tranquilizer and intelligence promoting properties. It is reported to have the capacity to produce improvement in learning and memory. It has cognitive enhancing effects which involves antioxidant mechanism. *Mandukaparni* (*Centella asiatica*) has potent anxiolytic effect. It has been reported that long term treatment with *Mandukaparni* decrease locomotor activity and enhances mental performance. *Mandukaparni* is known to possess good wound healing activity by induction of antioxidant levels at initial stage of healing. It has been reported that *Mandukaparni* increases learning ability significantly, enhances concentration ability and promotes overall mental growth.

Probable Modes of Action of *Mandukaparni* (*Centella asiatica*)

Like other *Medhya Rasayana* Drug *Mandukaparni* is likely to act at various levels.

1. In Ayurveda *Mandukaparni* (*Centella asiatica*) is described as “*Medhya Rasayana* or “Brain Tonic” with the ability to promote mental functions alongwith providing general rejuvenating effects.
2. *Medhya Rasayana Prabhava* : At one or all the following levels viz. at the level of *Guna* (Properties), at the level of *Panchabhautic* composition, at the
- level of *Rasa*, at the level of *Agni*, at the level of *Shrotas*.

Mandukaparni may act

- (i) at the level of *poshaka Rasa* i.e. by improving the quality of *Rasa dhatu* produced in the body.
- (ii) at the level of *Agni* i.e. by improving the digestion, metabolism and assimilation of food in the body.
- (iii) at the level of *Shrotas* i.e. by improving the circulation in micro circulatory channels in the body leading to better bio availability of the nutrients to the tissues and improved tissue perfusion which may in turn help in promotion of nutritional status of nervous system and brain.

Mandukaparni has *sheeta veerya*, *tikta-madhura rasa* and *snigdha-laghu guna* which may produce *kaphaja prabhava* (anabolic response) and similar effects in the subjects. It is expected that due to its properties, *Mandukaparni* may produce improvement in the physique and exert soothing effect over the mind (*Manasa*) and ultimately improving *Dhee*, *Dhriti*, *Smriti*.

3. Tranquilizing action: *Mandukaparni* may have anxiolytic (anti anxiety) activity by virtue of its comprehensive *Rasayana* and adaptogenic effects, producing non specifically increased resistant against stressful conditions.
4. Regulating Neurotransmitters.

(i) Electrophysiological-mechanism of action: *Mandukaparni* is likely to increase the CNS α wave activity and simultaneously may decrease the CNS β wave activity. Increase in α wave activity in the EEG has been shown to be associated with a state of relaxation of the body and mind and thereby decreased fluctuation of attention/minute and increased concentration ability, leading to improved learning powers and overall positive mental health. High β wave activity, on the other hand, cause distractibility, low concentration powers and is not conducive to learning.

(ii) Biochemical Mechanism of Action :*Mandukaparni* may regulate the altered levels of brain biogenic amines (glutamate, gama, aminobutyric acid (GABA)) and thereby improve the process of learning.

5. Antioxidant action: One of the contributing factors to the decline of cognitive function is the damaging effect of free radicals exposure. The mechanism of action of *Mandukaparni* and other *Medhya Rasayana* drug could be through chelation of free radicals (ferrous ions) and also as a chain breaker. It has been reported by scientific studies that *Mandukaparni* (*Centella asiatica*) is a

potent antioxidant drug.

6. By improving the Nutritional status of Brain cells : It has been reported that *Medhya Rasayana* drugs like *Mandukaparni* (*Centella asiatica*) and *Brahmi* (*Bacopa monnieri*) possess properties similar to nootropic agents which are supposed to improve oxygen supply and glucose utilization of the braincells with undue alteration in blood circulation or any psycho stimulation, producing positive effects on the cerebral higher function like, memory, intelligence, and learning etc. Similary *Medhya Rasayana* drug do not produce undue psychostimulation or sedation and produce positive effect on *Medhya* along with improved physiological status of the body.

Conclusion

It can be concluded from the current research project that *Mandukaparni* (*Centella asiatica*) is potent psychoprotective, anxiolytic, mood elevating, rejuvenating, intellect and mental health promoting immunomodulator drug with specific properties of enhancing Cerbral Higher Functions due to its *Medhya* effects.

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हिन्दी सारांश

मण्डूकपर्णी (सेन्टेल्ला एशियाटिका) के मेध्य रसायन प्रभाव
का चिकित्सात्मक विश्लेषण—

एक वैज्ञानिक अध्ययन

अजय कुमार शर्मा, सी.एम. शर्मा एवं उत्तम कुमार शर्मा

आयुर्वेदीय ग्रंथों में वर्णित मेध्य रसायन प्रभाव एवं सेरिब्रल हायर क्रियान्वयन के संदर्भ में मण्डूकपर्णी (सेन्टेल्ला एशियाटिका) के मेध्य रसायन प्रभाव के अध्ययन हेतु मेधा संबंधी अल्प विकृति यथा—स्मृति दौर्बल्य, एकाग्रता का ह्रास एवं चिन्तन, मनन, संवेदन विश्लेषण आदि क्षमताओं में कमी, मानसिक तनाव जन्य मानस विकृतियों आदि के सौ रोगियों को दो वर्गों में (पचास रोगी प्रत्येक वर्ग में) वर्गीकृत करके एक वर्ग को मण्डूकपर्णी एवं दूसरे वर्ग को प्लेसिबो (ग्लूकोज) दिया गया।

प्राप्त परिणामों का आकलन एवं विश्लेषण करने पर यह निष्कर्ष प्राप्त हुआ कि मण्डूकपर्णी द्वारा उपचारित रोगियों में मेधा एवं रसायन से सम्बन्धित सभी लक्षणों में महत्वपूर्ण विकास पाया गया जो कि प्लेसिबो द्वारा उपचारित रोगियों में प्राप्त नगण्य विकास (लाभ) की तुलना में बहुत अधिक था।

अतः प्रस्तुत अध्ययन से यह सिद्ध होता है कि मण्डूकपर्णी एक मानसिक स्वास्थ्यवर्धक एवं संरक्षक, तनावहर, चित्तप्रसादक, रसायन, मेधा, एवं स्मृतिवर्धक मेध्य रसायन है।