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CLINICAL STUDY OF *MEDHYA RASAYANA* & ITS EVALUATION ON INTELLIGENCE QOUTIENT

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ABSTRACT

In this era of neck to neck competition, *Medha* i.e. intelligence is pretty important factor in everyone's life. It holds special importance in pediatric age group. This study has been undertaken to study the nootropic effect of *medhya rasayana* in present scenario. To evaluate IQ effect of *medhya rasayana* in pediatric age group 4-15yrs, a clinical study has been conducted on 37 apparently healthy children with due consent from their guardians. All the subjects were selected from OPD of R.G.G.A. Hospital, Paprola. This is a randomized open clinical trial. A pallatable sugar based syrup named *Medhya* has been prepared from all the four *medhya rasayana* mentioned in *Charak Samhita*. Two IQ scales i.e. Weschler Intelligence Scale for Children (Indian adaptation) and Seguin Form Board Test were used to judge IQ of the subjects. Syrup *Medhya* has highly significant results in subjects with IQ 70-51 whereas statistically significant in subjects with IQ higher than 70. So, Syrup *Medhya* can be used to treat patients with mild to moderate mental retardation.

Keywords: *medha, medhyarasayana*, intelligence, nootropics, intelligence.

INTRODUCTION

When we go through various definitions of intelligence, we can conclude that it is an individual's aggregate capacity to act purposefully, think rationally and deal effectively with the environment [1]. Intelligence is not a single mental process, but rather a combination of many mental processes directed towards effective adaptation to the environment. *Acharyas* of *Ayurveda* have also shown keen interest in the *medha* like in *Sushruta Samhita,* a complete chapter is dedicated to study about how to enhance *medha* i.e. intelligence and the factors to improve its capacity [2]. Arundutt and Hemadri have also thrown sufficient light on the concept related to *medha* [3]. As far as *rasayana* is concerned, there is conven-

tional understanding that *rasayana* therapy is a kind of geriatrics care system and should be used in old age. This is not true. *Rasayana* is not geriatrics, it is the science of nutrition and is applicable to all ages from pediatrics to geriatrics.[4] Nutrition is the primary attribute of *rasayana*. Longevity, mental competence and prevention of ageing are its secondary attributes as is obvious from *Charak's* statement," *labhopayo hi shastanamrasadinamrasyanam''*[5] .

Aim and Objectives:

1. To evaluate the clinical effect of *Medhya rasayana* i.e. *Mandukparni, Guduchi, Shankhpushpi and Yashtimadhu.*
2. To study whether drugs are effective as IQ enhancer in children.
3. To provide standard herbal formulation as brain tonic for children.

Material and method

This clinical study has selected apparently healthy subjects from Paprola irrespective to sex and socio-economic status. The age group 4-15 years was selected. After due registration, their general blood investigation was done. Then prepared research performas in context to general examination and assessment of IQ were filled up.

Assessment of IQ was done with the help of two scales depending upon the age and capability.

1. Seguin Form Board Test[6]- for 4-8 years and for the subjects between 9-15 years who cannot perform MISIC.
2. Malin's intelligence scale for Indian Children[7]- for 9-15 years.

The general formula for assessing IQ is

$$IQ = \frac{\text{Mental age}}{\text{Chronological age}} \times 100$$

After assessing IQ , subjects with 50 or higher IQ were taken under trial. Thereafter, trial drug Syrup *Medhya* was given to the subjects for 2 months and the dose of syrup was based on age i.e.

4-8 years – 5ml thrice a day after meal.

9-15 years – 10 ml thrice a day after meal.

IQ was tested before trial and after completion of the trial.

i) SEGUIN FORM BOARD TEST

It is the performance based test, in which the individual is required to insert ten blocks of different shapes into the corresponding recess as quickly as possible. These tasks shows the subjects manipulation his ability to respond to pressure for speed and his performance when faced with difficulty.

The standardization of Seguin Form Board Test for Indian children is done by J.B. Raj and S.K. Goel at Mysore and Delhi respectively.

From their standardization table, mental age of the subject is compared. After assessing the mental age, IQ can easily be calculated. For example if subject of 7yrs is performing the test with 25.1 seconds then his score will be 25.1 sec and his mental age will be 7yrs. So subjects IQ will be

7/7 x 100 = 100

Table1: Seguin form board test-table

Mental age (years)	J.B.Raj		S.K.Goel	
	Shortest time for 3 trials (sec)	Total time for 3 trials (sec)	Shortest time for 3 trials (sec)	Total time for 3 trials (sec)
3	-	-	58	220
4	-	-	48	165
5	36.1	128.9	36.3	129
6	26.8	96.5	27.2	105.8
7	25.1	86.7	25	88
8	20.7	72.7	21	74
9	18.8	66.0	18.9	67

10	17.3	60.2	17.4	60.9
11	16.1	55.8	16.2	56
12	15.5	52.7	15.7	52.8
13	14.5	48.6	14.5	48.8
14	14.6	47.4	14.2	47.2
15	13.7	46.5	13.8	46.6

ii) Malin's Intelligence Scale For Indian Children

This is an adaptation of WISC i.e. Wechsler's Intelligence Scale for Children. In this scale, two types of IQ are assessed.

i) Verbal IQ –

It depends upon verbal comprehension & expression, general awareness and calculation.

ii) Performance IQ –

Visual analysis, visual motor integration and motor speed.

iii) Global or full score –

Mean of verbal IQ and performance IQ. Full scale IQ is examined for a general placement of the person on the continuum of intellectual ability. On most scales, the mean score in any general population sample is 85-115.

a. Verbal tests consists of following subtests

1. Information test – consists of 30 questions related to general knowledge.
2. General Comprehension test – consists of 14 questions related to subject's common sense.
3. Arithmetic test –consists of 16 mathematical problems.
4. Analogies and Similarities – consists of 16 items for which subjects has to tell analogous item of first four items and similarities between rests of 12 items.
5. Vocabulary test – consists of 20 words and subject has to tell its meaning.
6. Digit span test – It's an alternate to vocabulary test. It consists of 2 parts

a) Digit span forwards.
b) Digit span backwards.

b. Performance test consist of following subjects

1. Picture completion – subject has to tell the missing part in the picture.
2. Block design – subject has to arrange blocks of different colours according to given picture on the card.
3. Object assembly – subject has to arrange them to form shape of manikin, horse, face and auto.
4. Coding – It consists of two parts. Subject has to fill empty spaces as given in example.
5. Mazes - Subject has to solve the puzzle of mazes with in limited time period and with limited no. of errors.

So there are five subtests in case of verbal test and six sub tests in case of performance test. Raw scores of each subject now compared with the standard given in the tables according to age of the subtest, from which IQ can be calculated. Then adding the scores of all the subtests of verbal test and dividing it by 5 will give the mean verbal IQ. Similarly mean performance IQ will calculate. Further we will calculate will give the overall IQ of the subject.

Results

Three groups were formed on the basis of IQ assessed by Seguin Form Board Test and Malin's Intelligence Scale for Indian Children.

1) Group I with normal intelligence i.e. IQ >90
   No. of volunteers- 10
2) Group II with borderline IQ i.e. 90-71
   No. of volunteers- 10
3) Group III with mild mental retardation i.e. IQ 70-51
   No. of volunteers- 17

This classification of IQ has been mentioned by O.P. Ghai in Ghai's Essential Pediatrics [8]. Syrup *Medhya* was given to the children of three groups and dose was according to the age of a child. Syrup *Medhya* is a sugar based syrup of all the four *medhya rasayana* mentioned by *Acharya Charaka* i.e. *Mandukparni, Yashtimadhu, Guduchi* and *Shankhpusphi*. All the

contents were taken in equal proportion. Although use of the drugs is in somewhat different ways, but it is not feasible to use these drugs in the mentioned formulation as the syrup is to be used in pediatric age group. The parts of the drug used were as follow:

1) *Mandukparni- panchaang* (whole herb)
2) *Guduchi- kaand* (stem)
3) *Shankhapuspi- panchaang* (whole herb)
4) *Mulethi- mool* (root)

Following tables show the effect of Syrup *Medhya* on otherwise healthy volunteers:

Table 2: Normal intelligence – IQ > 90 **(**No. of Volunteers – 10)

BT			AT		
Mean	S.D.	S.E.	Mean	S.D.	S.E.
95.39	4.2912	1.357	106.82	10.327	3.266

% age of Relief – 11.98% combined S.E. – 3.148 t = 3.63 P < 0.01[9]

Table 3: Borderline IQ 90 – 71 (No. of Volunteers – 10)

BT			AT		
Mean	S.D.	S.E.	Mean	S.D.	S.E.
80.32	4.202	1.329	100.46	15.582	4.928

%age relief = 25.747% combined S.E - 8.413, t = 2.39, P< 0.05

Table 4: Mildly mentally retarded IQ 70 – 51 **(**No. of volunteer -17)

BT			AT		
Mean	S.D.	S.E.	Mean	S.D.	S.E.
57.211	4.8191	1.168	67.352	11.208	2.718

%age relief – 17.73 combined S.E. – 2.198, t = 4.158, P < 0.001

From the above statistical calculation, it has been concluded that effect of syrup *medhya* are highly significant in group with IQ 70- 51 and statistically significant in groups with IQ 90–71 and IQ >90.

DISCUSSION

Pharmacological action of *medhya rasayana* can be explained by 2 modes i.e. *prabhava* and *rasaadi* properties. Acharya Priyavrat Sharma has explained that *medhya* drugs act according to *prabhava*[10]. Drugs with predominantly *tikta rasa, laghu-snigdha guna, sheet veerya* and *madhur vipaka* will exert beneficial effect on *medha*. Again effect of these *prabhava* and *rasadi* will affect *rasa*, *srotas* and *agni*.

In modern neurophysiology, action of *medhya rasayana* can be explained on the basis of neurons and neurotransmitters. Many researches have shown that *Medhya rasayana* helps in cholinergic and GABAergic modulation and thus helps in improving learning, memory and attention span[11]. By their antioxidant properties protects neurons from over-excitation and energy depletion. Research papers have shown that they maintain the proper ratio of excitatory and inhibitory neurotransmitters and help neuromodulators in their functioning. Again *medhya rasayana* maintains the sugar level in blood circulation of brain and regularize the general blood circulation in the brain which is helpful in revitalizing brain and rest of nervous system. It may inhibits enzymes involved in making stress related hormones in brain.

Medhya syrup *(*sugar based syrup of *yashtimadhu, guduchi, shankhpushpi* and *mandukparni*) with predominantly *tikta-kashaya rasa, sheet veerya, madhur vipaka, laghu-snigdha guna* and *medhya prabhava* exerted a beneficial effect on *medha*. Contents of this syrup are good antioxidants and

nootropic agents. Drug has shown highly significant result in subjects with IQ 51-70 while statistically significant results in subjects with IQ 71-90 and > 90. This highly significant result in case of mild mental retardations may be because of –

- More imbalance of *tridoshas* in subjects with IQ 51-70 as compare to subjects of normal and border line intelligence.
- More imbalances of neurotransmitters and other associated factors in subjects with IQ 51-70.
- In other two groups conditions are either normal or near to normal, thus perhaps syrup will take longer time to show result.

CONCLUSION

From above discussion, it has been concluded that *medhya rasayana* has definitely a pivotal role to play in the field of pediatrics. Its highly significant results in children with mild mental retardation have surely laid the path for further research. In normal intelligence, more time may be needed to have some significant results. Since sample size in the above study is small, so to have more clear conclusions, larger sample may be undertaken for future studies.

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