Research & Reviews

ISSN: 2319-9865

Research and Reviews: Journal of Medical and Health Sciences

Role of Smriti-Syrup-1 in Reaction Time of Children

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Article

Received: 12/01/2013
Revised: 07/02/2013
Accepted: 15/02/2013

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Keywords: Double-blind placebo controlled, Cognition, Reaction time, Smriti syrup, Vernier chronoscope

ABSTRACT

The randomized double blind placebo controlled studies was conducted with an aim to enhance the cognitive functions (mental performance) of school going children by improving their reaction time (R.T.). Reaction time simply denotes how much the child is attentive for a particular task. For the present study in Ayurvedic compound Smriti-syrup-1(SS-1) was selected to verify its efficacy in improving R.T. an instrument Vernier chronoscope (electronic) was used for assessment of R.T. The study drug was found significantly effective in improving total R.T & auditory R.T.

INTRODUCTION

Since middle of nineteenth century, reaction time has been a favorite subject of experimental psychologist. Much researches are being done now and in past on reaction time connecting it with cognitive studies. Cognitive processes are the mental processes through which the information coming from the senses is transformed, reduced, elaborated, recovered and used. Thus, cognition involved in knowing about the world by means of perception, attention, thinking, problem solving, decision making and memory.
Reaction time (RT) is the elapsed time between the presentation of sensory stimulus and the subsequent behavioural responses. Reaction time often used in experimental psychology to measure the duration of cognitive processes.

Memory disorders often have a increased reaction time and smaller attention span. To overcome these problems one must concentrate on improving reaction time with the help of various drug and non-drug therapy. For this, the most commonly used pharmacological agents are CNS stimulatnts such as Ritalin (Methyl phenidate), adderall (amphetamine) and certain tricyclic anti-depressant etc. But it has been proven that these agents produce various unacceptable side-effects which is one of their greatest demerit. To resolve the problems related with cognition and to avoid the side-effects of modern medicine, the Indian System of Medicine – Ayurveda, provides a better option in the form of Brahmi Ghrita (C.S.Chi. 25/10) with minor modifications.

Aims and Objectives of the Study

- To enhance the mental performance.
- To get relief from the problem associated with cognitive processes.
- To improve school performance by achieving positive impact on memory status of child.
- To verify the efficacy of Smriti syrup-1 on Reaction Time.

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MATERIALS AND METHODS

A randomized double blind placebo control study was conducted in a school going children.

Selection of Cases

- *Source* -Children for the present study were screened out from OPD/IPD of Balrog Deptt of National Institute of Ayurveda, Jaipur and from various schools, situated in Jaipur by survey method.
- *Age group* -Children between 6 to 16 years were considered for the study.
- *Numbers of cases- Total 44 children were* registered out of which 4 children discontinued the treatment.
- *Grouping of patients*- Selected children were randomly divided into following two groups keeping in mind that all the groups had children from various grades (classes), schools and socio-economics status.

Group A- These groups of 20 children were given only the Ayurvedic compound Smriti Syrup-1 (SS-1 study drug).

Group B- These groups of 20 children were given only the Ayurvedic compound Smriti-Syrup-2 (SS-2) which is a placebo.

Diagnostic Criteria

A. **Inclusion Criteria**

- Children aged 6-16 years of either sex satisfying, criteria.
- Children with average /normal I.Q.

B. **Exclusion Criteria**

- Children with physical disability.
- Children with psychiatric illness.
- Children with gross brain damage causing mental retardation
- Children with any genetic disorder.
- Children able to recall digit span of more than 9 digits.

C. **Discontinuation Criteria**

- Any acute or severe illness.
- Parents not willing to continue the treatment.

D. **Assessment Criteria**

1. Draw-a-man test for IQ -assessment.
2. Vernier chronoscope (Electronic) for assessment of reaction time

E. **Side Effect Evaluation Criteria**

Clinical criteria were adopted to rule out possible side effects of the study drugs. It included the documentation of information related to change in appetite, sleep, abdominal features, drowsiness, irritability etc.

Materials and Methods Adopted for Diagnosis

Vernier Chronoscope (electronic): For assessment of R.T and attention span.

Draw-A-Man Test: For Indian children, for assessment of Intelligent Quotients (IQ) of the child.

Methods

- Screened out children were assessed for their IQ. For this assessment, Draw -a -man test for Indian children was adopted which is valid for children of age group 4-16 years. Children having IQ less than 85 were almost excluded. Children with average or above

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average were considered for further screening.
Test for reaction time was performed by an instrument (electronic) "Vernier chronoscope"

The instrument is used to measure the reaction time of the subject for visual or auditory stimuli.

The instrument has three stimuli consisting of yellow, green and red lights and three (3) keys for them. Two sounds are provided for auditory stimuli with their respective keys. The instrument is also provided with a star button for presenting the stimuli and a meter for readings. For recording the visual reaction time, the yellow, green and red lights are presented to the observer, one at a time. The observer is asked to press the respective key in response to the stimuli and the time is recorded. In this way, five stimuli for each light and each sound were provided.

Thus the several trials were done and the mean was calculated and compared with before and after treatment to assess the efficacy of the Smriti Syrup-1.

- Detailed information about the selected cases (children) were recorded in proforma (case-sheet) prepared on the basis of Ayurvedic parameters as well as modern.

Administration of Tests

- The tests were done in a quite and separate room having no pictures on the wall to minimize distractions. A good rapport was established with children before starting the test and they were made completely comfortable in order to ensure the proper evaluation of their potential.
- The tests were administered individually.
- The tests were performed mostly during morning hours, so that the children were not under stress or exhausted.
- A detailed instruction was given about the tests to be solved so that the child can easily perform the test.

Study Drug

The study drug (Ayurvedic compound) containing 5 herbs (*Bacopa monnieri*, *Convulvulus pluricaulis*, *Acorus calamus*, *Saussurea lappa*) was based on classical formulation "Brahmi Ghrita" which was modified in the form of syrup and an additional drug pippali (*Piper longum*) was added in order to increase bioavailability of drugs. This modified compound was coded as "Smriti-syrup-1"

Placebo

The placebo for study was also in the form of syrup identical in colour, flavour and consistency as that of study drug, containing sugar only. The placebo was named as Smriti-syrup-2. (SS-2)

Dose and Duration

Doses were according to body weight of child (1 ml/kg/day) in 2 divided doses for 3 months. Children were called for follow up every fortnightly. Any discomfort or untoward side-effects were noticed.

Doses of placebo were similar to that of study drug. The grouping of cases was done by randomized method of selection.

Coding of study drug and placebo was done by another person not related with the study. The coded medicine (study drug/placebo) was given as per instructions. Coded document was sealed and kept under safe custody. The envelope was opened after completing the study to de-codify it for interpretation.

Observation regarding the effect of therapy on reaction time

Table No 1: Showing pattern of clinical improvement in Group A

Reaction Time	N	Mean B.T.	Mean A.T.	Diff.	%	S.D.	S.E.(±)	t	p
Visual R.T.	20	0.54	0.33	0.21	39.02	0.11	0.02	8.69	< 0.001
Auditory R.T.	20	0.58	0.31	0.27	47.52	0.14	0.03	8.79	< 0.001
Total R.T.	20	0.56	0.32	0.24	43.61	0.11	0.02	10.19	< 0.001

The results of group A cases showed highly significant improvement ($p < 0.001$) in reaction time for visual stimuli, auditory

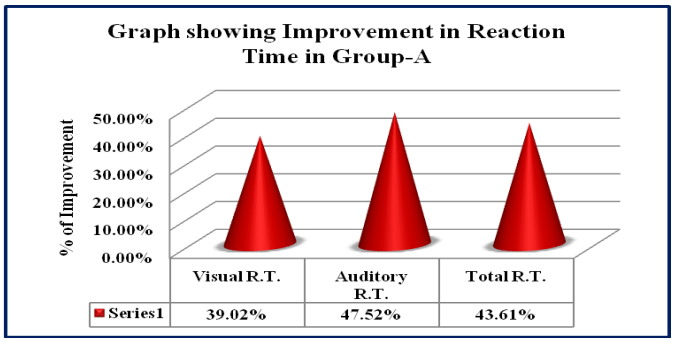
ISSN: 2319-9865

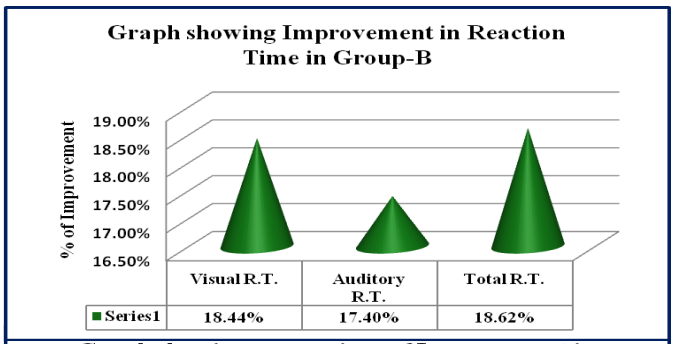
stimuli and overall total reaction time.

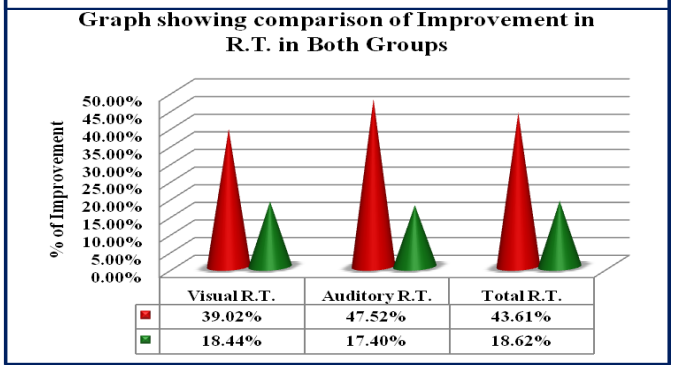
Table No 2: Showing pattern of clinical improvement in Group B

Reaction Time	N	Mean B.T.	Mean A.T.	Diff.	% of Change	S.D.	S.E. (±)	t	p
Visual R.T.	20	0.51	0.41	0.10	18.44	0.23	0.05	1.80	< 0.1
Auditory R.T.	20	0.57	0.47	0.10	17.40	0.25	0.06	1.79	< 0.1
Total R.T.	20	0.54	0.44	0.10	18.62	0.23	0.05	1.99	< 0.1

Statistically insignificant improvements (p< 0.1) were obtained in cases of Group B in both stimuli – visual and auditory and hence in total reaction time.







Graph showing the percentage of improvement in Both Groups in visual reaction time, auditory reaction time and total reaction time

DISCUSSION

In Group A reaction time for visual stimuli showed statistically highly significant improvement (p< 0.001) with 39.02% (Table No. 1) while in Group B, though 18.44% improvement were observed, showed statistically insignificancy (p< 0.1) (Table No. 2) which reflects the effectiveness of study drug over placebo.

With 47.52% of improvement, group A showed statistically highly significant results (p< 0.001) in reaction time on providing auditory stimuli. (Table No. 1). On the contrary, Group B showed statistically insignificant results (p< 0.1) though having improvement of 17.40% (Table No. 2). Again this observation reflects efficacy of SS1 over SS2.

Simple reaction time is a mean of readings of all visual stimuli and auditory stimuli, it showed statistically significant improvement (p< 0.001) in group A with 43.61% (Table No. 1) while 18.62% of improvement observed in group B, having statistically insignificant (p< 0.1) results (table no. 2)

ISSN: 2319-9865

Both Group A and Group B showed improvement in reaction time with 43.61% and 18.62% respectively. It showed that the effects observed in group B (placebo) may be because of practice with stimuli (Table No. 2).

Some studies showed similar findings regarding this opinion. Sanders cited studies showing that when subjects are new to a reaction time task, there reaction times are less consistent, when they have had an adequate amount of practice [1]. Ando et.al., found that reaction time to visual stimuli decreased with three weeks of practice [2], and the same research team reported that the effect of practice last for at least three weeks [3].

Effect attained in present study by the drug can be explained by multiple mechanisms of actions of its ingredients. The ingredients of Smriti-syrup-1 compound have predominantly *Tikta*, *Katu-Rasa*; *Laghu*, *Tiksha*, *Ushna*, *Sara-Guna*; *Rasayana*, *Dipana*, *Pachana* and *Tridosha Shamaka* property and *Medhya Prabhava*.

Out of six *rasa*, *Tikta rasa* was predominantly present (80%) in Smriti syrup-1. Being *Akasha Pradhana Tikta Rasa* has direct action on *medha* (intellect). Discrimination is the property of *Akasha- Mahabhuta*. Thus *Tikta dravyas* promote the proper processing and consolidation which is important for retrieval (memory).

Ushna, *Tikshna* and *Laghu guna* dispel the *avarana* of *Tama* and increase the *sattva guna* of *mana*. *Ushna virya* and *Tikshna guna* enhance *grahana* (perception) and *smarana* (retrieval) by harmonizing the *Pitta*, (Sharma P.V.).

By *prerana* (channelizing/ motivation) function of *sara guna*, *'Mana Prerana'* karma of *Vata* becomes normalized and inattention is improved. Inattention (*anavasthita chittata*) is also *nanatmaja vikara* of *Vata*.

Most of ingredients are *Kapha shamaka* (60%) and *Tridoshashamaka* (40%) *Vatanulomana* and *Tridosha shamaka* property of ingredients harmonize specially *Vata*, there by regularize the function of *mana* and improve an attention, working memory and procedural memory.

Some studies showed the CNS stimulant drugs, nootropics like caffeine. [Durlach et.al., found that the amount of caffeine in one cup of coffee did reduce reaction time and increase ability to resist distraction and did so within minutes after consumption] [4] and amphetamine [Kleemeier et.al., found that administering an amphetamine like drug to a group of elderly men did not make their reaction times faster, although it did make their physical responses more vigorous] [5] may reduce reaction time and improves attention span.

In a current study before treatment the reaction time task showed almost equal time for both stimuli (visual and auditory) – 0.54 sec. and 0.58 sec. respectively but after treatment it showed improvement in reduction of 47.52% for auditory stimuli and 39.02% reduction for visual stimuli (Table No. 1) showing faster reaction time for sound stimuli.

Many researchers have confirmed that reaction to sound is faster than reaction to light, with mean auditory reaction times being 140-160 msec. and visual reaction times being 180-200 msec [6,7,8]. Perhaps this is because an auditory stimulus only takes 8-10 msec. to reach the brain [9] but a visual stimulus takes 20-40 msec [10]. Differences in reaction between these types of stimuli persist whether the subject is asked to make a simple response or a complex response [1].

CONCLUSION

- Modern era not only demands better life but also an efficient and effective life. To survive in such throat-cutting competition every parent wants his child to excel in every field by using his/her super mind with super memory.
- Poor cognition is being identified as one of the important causes of Academic under achievements.
- Ayurveda holding a different view regarding cognitive processes and theories of information processing, therefore may provide new dimensions for *mana*gement of disorders of cognition.
- The present study reflects that study drug is highly effective in improving total reaction time showing more improvement in reduction of auditory reaction time.
- No adverse effects of the study drug were observed during the whole study period.
- Further extensive study is needed to authenticate the results of the current study, with larger samples and more precise assessment criteria.

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