

Effectiveness of Combined approach of Craniosacral Therapy (CST) and Sensory-Integration Therapy (SIT) on reducing features in Children with Autism

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Abstract

Objectives. This study was undertaken to investigate the effectiveness of combined approach of Craniosacral Therapy (CST) and Sensory-Integration Therapy (SIT) on reducing features in Children with Autism.

Methods. 20 children with autism were selected according to selection criteria and then allotted into 2 groups (experimental & control), 10 in each conveniently. Baseline scores were established by using ATEC. Combined approach of CST & SI given to experiment group while only SI therapy given to control group. Subjects of both the groups were given intervention for 2 months, 5 days a week & 1 hour per session. Post test scores of both the groups were analysed by same ATEC for results.

Results. Overall improvement of children occur in both the groups. However, the experiment group had shown better improvement as compared to control.

Conclusion. From the above experiment it has been concluded that combined approach of CST and SI therapy (SIT) is more effective than SIT alone. Thus CST can be incorporated in the usual practice to get better improvement in autism.

Introduction

Autism is a neuro developmental disorder with characteristics of impaired reciprocal social interaction, impaired verbal and nonverbal communication, and appearance of repetitive stereotypic activities, behaviors, and interests which can range from mild to disabling.

Autism thought to be due to disorder of sensory-motor integration and problems with modulation of sensory input and motor output (sensory processing deficit) & this occur due to neurological impairment. Most researchers agree that autism is caused by either abnormal brain structure, abnormal "organization" within the CNS or both.

Thus it is assumed that by graded sensory input through SIT, we can get better result as it has been claimed that when children with sensory integrative dysfunction are given the opportunity to receive appropriate input within the context of meaningful activity, the ability of the CNS to process and integrate sensory input can often be improved - and learning, movement, and "behavior" have the opportunity to be enhanced (Ayres 1972). Along with this if CST is implemented which works directly on the nervous system to improve neurological functioning, results can be enhanced further.

It may be effective if combined with SIT as therapists see profound changes in the children receiving combined CST and SI therapy. CST can be powerful paired with SI therapy because CST works directly on the nervous system to improve neurological functioning, processing and integration of sensory information. SI therapy often allows a child to better tolerate the gentle, steady touch of CST and to facilitate and further the changes that result from treatment.

The aim of this study was to investigate the effect of Cranio-Sacral Therapy on controlling features in Children with autism & to establish the influence of CST combined with SI therapy on reducing features in children with autism.

Need for the study. As in recent times incident of autism grow rapidly & it is evident from many research that both brain structure, organization & resultant functioning affected in autism & due to this neurological impairment there occur SI dysfunction in children with autism, So if we combine both approach; i.e. CST (works directly on the nervous system to improve neurological

functioning) & SIT(Helps in processing and integration of sensory information to evoke appropriate response & also allows a child to better tolerate the gentle, steady touch of CST and to facilitate and further the changes that result from treatment) ; we can get better result & in manyways prevent further neuroanatomical & physiological deterioration occurs in due course of developmental periods.

Methods

Place of study:

The study was conducted between January 2012 and June 2012 at S.V.N.I.R.T.A.R., Cuttack.

Sample Size & Sampling Methods:

The sample taken for study consisted of 20 children with autism who are attending the department of occupational therapy in SVNIRTAR. Convenient sampling was used with assigning the child to alternate groups as they arrived for treatment at this set-up.

We observed that **it is advisable to have more no of subjects for comparative study ie 30** But as study done for limited period of time and as per availability of subjects coming to department fulfilling eligibility criteria at that time, it is possible to take 20 subjects only.

Selection criteria

Inclusion Criteria

- Children with autism who were diagnosed using Childhood Autism Rating Scale
- Children with autism of both sexes
- Children with autism of age group between 3 to 10 year.

Exclusion Criteria

- Children with autism with associated problems like severe or profound mental retardation, visual or hearing impairments, physical disabilities etc.
- **Recent brain hemorrhage, stroke, cerebral aneurism, or brain injury or tumor**
- Any surgical procedure for correction of deformity, soft tissue release etc.
- **Recent spinal tap.**
- **Arnold Chiari Malformation** - incomplete foramen magnum.
- Down's Syndrome, Rheumatoid Arthritis (Any situation where ligaments and soft tissues are compromised should be treated with extreme care)

Materials Used

- Childhood Autism Rating Scale (CARS)
- Autism Treatment Evaluation Checklist(ATEC)

Procedures

All the subjects were screened by using CARS. The subjects those fulfilling the inclusion criteria were selected for the study.

The parents of the selected children were explained about the study, about the benefits of implementing both Craniosacral therapy & sensory integration therapy and consent was taken from them to use the children in the study. Formal consent was taken from the parents of the children to start the study.

The selected children were allotted into two groups 10 in each group conveniently. All the children were assess by using ATEC to establish the baseline data as pre-score data.

Children in one group (experimental group) were given combined approach of Craniosacral therapy & sensory integration therapy and children in the other group(control group) were given only sensory integration therapy. The subject of both the group were given intervention for 2 month,5 days a week and 1 hour per session.

The subjects of Group I (experimental group) had undergone for 15 minute CST and 45 minute of SIT. The subjects of Group II(Control group) were given 1 hour of SI intervention.

At the end of 2 month, ATEC was administered again and post-score data were collected .Pre and post score of ATEC in all the subjects were taken for statistical analysis.

Protocol

Cranio-Sacral Therapy:

Consists of slow, gentle manipulations of the bones of the cranium, spine and sacrum to release abnormal tensions in the cranial membranes, eliminate excessive compression between cranial bones and harmonize the cranial motion.

Recommended 10 step protocol of CST has been used

Sensory Integration Therapy:

Usual SI therapy strategies used.

Results

The data was analysed using statistical package for social sciences(SPSS) version 21.0 and significant value was set at $P \leq 0.05$. Both descriptive methods and inferential methods are used. The mean of pre- and post-scores in experimental & control groups was calculated by using descriptive statistics. Comparison between the groups and within the groups was carried out by using inferential statistics.

Descriptive Statistics:

Table 1:
Descriptive characteristics of pre scores /post-scores changes along with mean & mean difference of total score range of ATEC in both experiment and control group subjects

Group		No. Of Subjects	Minimum Scores	Maximum Scores	Mean	Std. Deviation	Mean Difference (Pre-Post)
1.Experiment	Pre	10	75.00	122.00	93.00	13.12335	45.30
	Post	10	28.00	70.00	47.70	13.62229	
2.Control	Pre	10	58.00	112.00	88.70	18.52356	10.30
	Post	10	46.00	100.00	78.40	17.08931	

Table 2:
Descriptive characteristics of pre and post mean scores of individual components(Speech/Language/Communication, Sociability, Sensory/Cognitive Awareness, Health/Physical/Behavior) score range of ATEC in both experiment and control group subjects

Group		Speech/Language /Communication Mean Scores	Sociability Mean Scores	Sensory/Cognitive Awareness Mean Scores	Health/Physical/ Behavior Mean Scores
1.Experiment	Pre	22.2000	22.7000	23.0000	25.1000
	Post	15.4000	8.5000	11.4000	12.4000
2.Control	Pre	24.5000	22.6000	23.0000	18.6000
	Post	23.2000	19.5000	19.1000	16.6000

Inferential Statistics:

Total Score Range:

Between the group:

To know the equality between the experiment and control groups, prescores of both the groups were compared by using Mann-Whitney U test.

Table 3 :
Comparison of baseline scores of experiment and control groups.

Group		No. Of Subjects (N)	Mean Rank	Z Value	P Value
1.Experiment	Pre	10	10.60	-0.076	0.971
2.Control	Pre	10	10.40		

It is found from the above table that both the experiment and control groups are not significantly different statistically as the mean rank of pretest scores of both the groups is not significantly different & also Z value of -0.076 corresponds to p value of 0.971, which is more than the set value, indicating that the

baseline scores are identical and that the two groups can be compared. Hence, further steps in the experiment were carried out.

To compare the post-intervention scores Mann-Whitney U test is used.

TABLE 4:
Comparison of the post-intervention scores of experiment and control groups

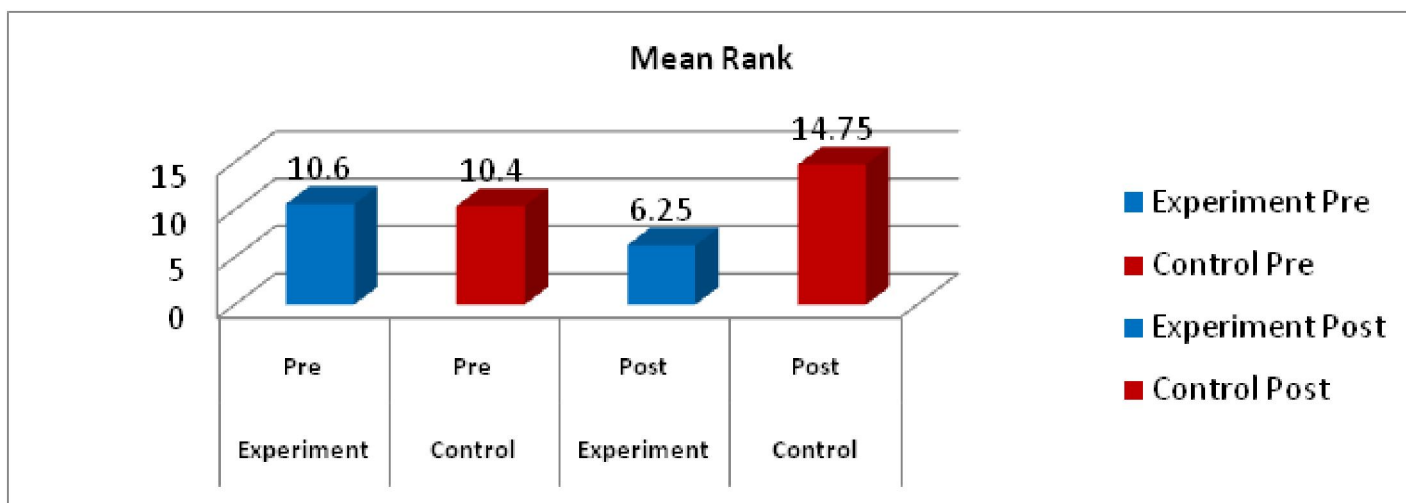
Group		No. Of Subjects (N)	Mean Rank	Z Value	P Value
1.Experiment	Post	10	6.25	-3.220	0.001
2.Control	Post	10	14.75		

The scores are analysed using SPSS 21. Z value of -3.220 corresponds to p value of 0.001, which is less than the set value. Hence, there is statistically significant difference between

posttest scores of experiment and control group.

Besides as the mean rank is lesser for experiment group, it suggest better improvement compared to the control group.

Graphical representation of mean rank of pre-scores/post-scores change of total score range of ATEC in both experiment and control group subjects



Within the group:

Table 5:

To know the effect of Therapy(Experiment) protocol, Wilcoxon signed-ranks test is used within the experiment group

		No. Of Subjects (N)	Mean Rank	Z value	P value
Post expt.-Pre expt.	NegativeRanks	10 ^a	5.50	-2.805	0.005
	Positive Ranks	0 ^b	0.00		
	Ties	0 ^c			
	Total	10			

a. postexperiment < preexperiment ; b. postexperiment > preexperiment ; c. postexperiment = preexperiment

Table 6:

To know the effect of Therapy(Control) protocol, Wilcoxon signed-ranks test is used within the control group

		No. Of Subjects (N)	Mean Rank	Z value	P value
Post control-Pre control	NegativeRanks	8 ^a	4.40	-2.552	0.011
	Positive Ranks	1 ^b	1.00		
	Ties	1 ^c			
	Total	10			

a. postcontrol < precontrol ; b. postcontrol > precontrol ; c. postcontrol = precontrol

From TABLE 5 & TABLE 6, it can be noted that z value of -2.805 corresponds to p value of 0.005 in experiment group, which is less than the set value, thus there is significant difference between post score & prescore in expt. group. Also Z value of -2.552 corresponds to P value of 0.011 in control group, which also less than the set value, thus there is also improvement found in control.

Discussion

The study is aimed at knowing the effectiveness of combined approach of Craniosacral therapy and sensory integration therapy on reducing symptoms in children with autism.

From the above study it is clearly evident that there was overall improvement of children occur in both the groups. However the experiment group had shown better improvement as compared to control group. This difference in the result may be due to application of CST in experiment group. As according to Herbert, 2005, autism is caused by either abnormal brain structure, abnormal organization within the central nervous system (CNS) or both and according to researcher at John Hopkins University, autism is related to a loss of flexibility and inflammation of membrane layers surrounding the brain. This compromise create a restrictive force on brain tissue, that cause strain on different brain structures, resulting dysfunction. As there is a anatomical barrier to the brain tissue, brain function is impaired and integration of different function may not occur. CST help individual with autism gain a calmer and more relaxed state of being by decreasing structural stress and strain (Denise McCann) on their CNS. It is theorized that when brain can achieve this state. It is in a better position to heal and reorganize itself. CST also enhance the effect of other strategies (Rebecca Flowers). Hence, SIT after CST may work better showing better improvement in experiment group.

Besides increased balanced motion of the membrane surrounding the brain after CST helps flush toxin and inflammation out of the brain tissue. It naturally elevates biochemical processing, which increases the function of neurons and neurological pathways (Tad Wanveer, *Massage Today*, 07).

Individual component of ATEC analysis proves that improvement was found in the subcomponents of sensory and cognitive awareness followed by sociability, speech/language/communication and health/physical/behavior.

More improvement found in sensory and cognitive awareness as it was suggested that CST have been help in decreasing anxiety and enhancing learning through sensory input. The above statement was substantially supported by Susan Vaughan Kratz (autismfile.com), who suggest that CST helps in reducing sympathetic behaviors (fight/flight, fear, anxiety, aggression, terror) to gain spontaneous skill development, calmness, relaxation, readiness to learn, readiness to be social and learning from sensation and become efficient in executive function over time.

CST enhance cognition. This was also supported by research at John Hopkins University, which suggest that improvement in

function is implicated due to more blood flow to the brain. To establish this they perform thermographic monitoring of the autistic child's hand during CST session, demonstrates hand warming, often as much as 2 to 3 degree Fahrenheit. The increased blood flow is related to relaxation of autonomic (sympathetic) nerve control of the blood vessels. This sympathetic nervous system relaxation results in a reduction of internal physiological and emotional stress factors. Thus people with autism who have difficulty bringing different cognitive function together in a integrated way, became able to perform well as they feel tranquility while performing function (Prior, Hoffman, 1990; Ozonoff et al. 1991; Hughes et al. 1994).

Sociability also improved a lot after sensory/cognitive awareness. This facts was supported by study at Michigan State University by Ernest Retzlaff, Jon Vredevoogd, which state that alleviation of abnormal transverse compression of cranial vault resulted in the child immediately demonstrating love and affection. Subsequently improved socialization is often demonstrated and the child often releases a lot of emotion and beginning to interact with other child and adult.

This was also supported by a study conducted by Swingle, 2003. The author reported a specific change in alpha and theta brain wave amplitude found in the back of the brain, associated with induction of a still point within the CST treatment. The author considered that inducing still points has a profound effect on quieting the brain and body as these brainwaves are being amplified. This helps child having deficits in processing and integrating sensory input to respond appropriately which ultimately enhancing child's ability in learning, behaving and also impact on their ability to participate in social, school and home activities.

Improvement in the subcomponent of speech/language/communication is supported by work of Harden, Minshew, Keshavan, 2000; Piven, Bailey, Ranson, Arndt, 1997.

They stated that corpus callosum is smaller in children with autism and neuronal activity that occurs between the two hemisphere of brain is erratic and poorly connected. As corpus callosum links left and right side of the brain, there are number of implication for this abnormality in size and function, including the language development, the development of dominance and the ability to use bilateral integration.

CST brings structural changes of corpus callosum by increasing more blood flow, thus delivering more nutrients and oxygen for the growth and maturation of neuronal tissues.

But we found less improvement as compared to sensory and cognitive awareness. This may be due to short intervention period. But it is observed that non-verbal communication (pointing, social saluting, gestural communication, etc.) along with some verbal mode emerges. So it has been suggested that if we provide CST for long duration, there may be some improvement found in the subcomponent of speech/language/communication. This was supported by Rebecca Flowers (Upledger Institute, devdelay.org, no.4, vol.12), who state

that effects usually became more evident over time with multiple treatment session.

There is least improvement found in health/physical/behavior subcomponents. Improvement in behavior is supported by work of Townsend et al. 2001, stated that CST decreases stereotype and repeated behavior, by increasing perkinje cells in the cerebellum. As previously it was proved that attention problem found in children with autism because of fewer perkinje cells in cerebellum (Bauman, Kemper, 1985; Rapin, Katzmann, 1998), one function of which is to arouse the reticular nuclei, which stimulates the arousal of muscle tone and helps person to change the focus of their attention.

Little improvement in health supported by three studies (Frymann'66, Upledger'78, White et al.'85). They directly examined the association between craniosacral mobility and CSF flow and health. Their study provided evidence of causal relationship between restrictions or misalignments in the movement of cranial bones and health.

Conclusion

From the data analysis & result of the present study it has been found that combined approach of Craniosacral therapy & SI therapy is effective on reducing symptoms in children with autism, which suggested that the experimental hypothesis has been accepted and null hypothesis has been rejected. Hence, it can be concluded that that combined approach of CST & SIT can be incorporated in usual practice to get better improvement on reducing symptoms in autistic children.

Limitations

Sample size was small, thus it is difficult to generalize the findings.

Population sample was confined to autistic children

Study duration was short

Children has no alternate choice of environment

Follow up study has not been done

Recommendations and Clinical implication

Large sample size with homogenous group can be taken

Additional studies of long term benefits can be carried out

This type of study can be implemented to other functional disabilities

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