



PREVALENCE OF SENSORY PROCESSING DISORDER AMONG SCHOOL GOING CHILDREN IN NORTH EASTERN INDIA

Physiotherapy

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ABSTRACT

Sensory processing disorder is a condition in which the individual have difficulty organizing sensory information for use, which leads to challenges in everyday life. Due to several risk factors there is incidence for developing SPD in typical population. The purpose was to find out the prevalence of sensory processing disorder among school going children in North Eastern India. 1300 questionnaires were distributed to both parents and teachers of children between the age group 4-9 years and were returned within one week. The questionnaires were distributed in five states of North Eastern India. Results showed that there was prevalence of sensory processing disorder among school going children in North Eastern India.

KEYWORDS

Sensory Processing Disorder, Sensory Integration Dysfunction, School Going Children, Typical Children, Sensory Processing Issue

INTRODUCTION

Sensory processing means the ability to register and modulate the information received and also to organize this sensory information for situational demands. Extreme sensory processing patterns include hyper- or hyposensitivity [1]

Sensory processing disorder (SPD) is a condition in which a person has difficulty organizing and integrating sensory information for use. As a result, individuals with SPD experience challenges in acting on and adapting to sensory information, making it difficult to participate in and enjoy many everyday tasks.

SPD can affect one or multiple sensory systems—vision, auditory, gustatory (taste), olfactory (smell), tactile (touch), proprioceptive (joint position sense), and vestibular (balance and movement). Three proposed subtypes of SPD are the following:

Sensory modulation disorder (SMD), including sensory underresponsivity, sensory overresponsivity, and sensory seeking responses, Sensory discrimination disorder (SDD), Sensory-based motor disorder (SBMD), including postural disorders and dyspraxia [2]. Some individuals find the sound of vacuum cleaners or sirens highly aversive, and some children fuss about stiff new clothes and labels sewn inside collars. They may dislike being lightly touched or vigorously protest brushing their teeth. Extremes of these behaviors can prove stressful [3] [4]

Sensory processing disorder previously known as sensory integrative dysfunction was first described by Jean Ayers in the year 1968 [5]

Prevalence estimates of sensory processing disorders among children without disabilities have ranged from 5% to 10%. Also another study suggested that the prevalence of SPD is 5% to 16% in children between age group of 4- 6 years. Estimated rates of sensory processing disorders for children with various disabilities have been derived from reliable and valid survey results and were reported to be as high as 40–88 [6] [7]

Functional problems associated with sensory processing disorders outline five functional impairment such as decrease in social skills, less participation in play with peer group, or complexity of adaptive responses, decreased sleep, damage in self-confidence and self-esteem, they also have increased electro dermal response and habituate slow on a series of sensory stimuli, challenging behavior, deficient adaptive or daily life skills, and diminished fine, gross and sensory-motor skill development.

Fear, discomforts that accompany everyday situations may significantly disturb daily routines in the home/school environment. School environments have physical and social stimuli that frequently cause

these children significant anxiety. There is a relationship between asphyxia and IUGR and also there is strong evidence showing prenatal maternal stress related to tactile defensiveness. They are usually at risk for learning, behavioral difficulties and social isolation. These sensory problems if they persist into adulthood may result in social and emotional difficulties [8]-[12]

It has been proposed that unknown pre-natal problems, may contribute to children's sensory integration problems. Also it has been proposed that some children may have a hereditary or genetic predisposition, and that they may be more vulnerable to environmental toxins, anoxia at birth, or other pregnancy, birth, and/or early childhood related problems and the presence of idiopathic toe walking is an indicator regarding sensory processing issues. Also preterm infants, prolonged NICU stay, maternal stress infants with colic and excessive crying, fussing for a long time, and presence of constipation, obesity and eating disorders are being associated with sensory processing issues.[13]-[19]

Studies demonstrated reduced white matter microstructural integrity predominantly involving posterior cerebral tracts, in children using DTI which suggested that the presence of abnormal white matter serve as a biological basis for SPD and may also distinguish SPD from overlapping clinical conditions.[20] [21]

According to literature there is a potential relationship of Parasympathetic nervous system (PSNS) activity to behavioral adaptability. A study done regarding prevalence of SPD was a pilot study in autistic children [22]-[24]

A healthy sensory development occur especially in the age group 3-7 after 8 years the sensory system is almost matured as it will ever be [25] [26]. Therefore, the purpose was to explore and find out the prevalence of SPD in typical children.

LITERATURE REVIEW

Study on prevalence of Parents' Perceptions of Sensory Processing Disorders Among Kindergarten Children

This study was conducted in the year 2004 to systematically examine the estimated rates of sensory processing disorders using survey. Parents of incoming kindergartens from U.S public school district were surveyed using short sensory profile and parent-report screening tool. Total survey of 703 were returned which represented 39% of the kindergarten enrolment out of 1,796 among which 96 children met the sensory processing disorder criteria based upon parental perceptions. This study stated that based on parents' perception 5.3% of the kindergarten met the SPD screening criteria.

Study on Sensory over-responsivity in elementary school: prevalence and social emotional correlates

This study was done in the year 2009 to investigate sensory over-responsivity using sensory over-responsivity scales, child behavior checklist, the infant toddler social and emotional assessment, adaptive social behavior ratings, in elementary school aged children (n=925, 50% boys, ages 7-11 years) who were followed from infancy. 16% of parents reported atleast four tactile or auditory sensation bothered their children. This study concluded that early investigation of elevated SOR and assessment of social-emotional status are important to minimize their impact on social adaptive behavior at school age.

Study on Sensory Processing Disorders and Social Participation

This study was conducted in 2010 where they compared the reported social participation patterns of children with sensory processing disorder (SPD) with those of typically developing peers. 12 children with SPD and 12 typically developing peers, age ranging from 6-9 years for both the group. This study concluded that though social participation patterns of children with SPD are generally similar to those of their typically developing peers, notable differences exist between two groups.

Study on Distribution of sensory processing disorder in children 5 to 11 years in Tehran city

The study was conducted in the year 2016 which was a descriptive and cross sectional study that performed in children who was 5 to 11 years old. This study concluded that sensory processing dysfunction effects on child's daily life in areas such as play, academic skills and peer relationships, self-help activities.

Study on parasympathetic functions in children with sensory processing disorder

This study was conducted in the year 2010 to determine if parasympathetic nervous system activity is a significant biomarker of sensory processing difficulties in children also to evaluate PsNs activity in children with SMD and compared with typically developing children (TDC). This study provide preliminary evidence that children who have severe SMD demonstrate physiological activity different from children without SMD.

METHODS AND RESULTS

A cross sectional study was conducted in schools around North Eastern India including five states – Meghalaya, Assam, Nagaland, Mizoram and Agartala. The inclusion criteria [5] [7] [8] for the study were School going children ranging between 4-9 years of age, both boys and girls and atleast one parent is able to communicate in English. The exclusion criteria [5] [7] [8] were children already diagnosed with neurological and behavioral issues, developmental delays, having history of medication that affected cardiac activity, impairments of vision and speech.

In this study, five states of NORTH EAST, INDIA was covered – Assam, Meghalaya, Nagaland, Mizoram, Agartala in which one school from each state was selected and was approached for completing the survey. After getting permission from the respective schools informed consent was obtained from the school and parents and based on selection criteria, 1300 strength difficulties questionnaires were distributed to the teachers and 1300 short sensory profile questionnaire was given to the parents. Questionnaires were requested to return in the duration of one week after which they were collected and evaluated for statistical analysis. The outcome measures were short sensory profile which assessed the sensory profile of the children and strength difficult questionnaire which assessed the emotional and behavioral profile of the children.

The data was collected, and all the variables and its characteristics were described using tables and graphs. The data was entered and coded into software SPSS v16 for windows. The descriptive data, mean and cumulative frequency was calculated. Cross tabulation was done between gender and responses from teachers as well as parents and as well as for the different age group and responses, which gave us the percentage of children having behavioral issues and SPD.

Thirteen hundred (1300) students aged between 4-9 years were selected based on the selection criteria for both parents and teachers out of which 767 questionnaires were returned by the parents and 289 questionnaires were returned by the respective class teachers of all the five states in North Eastern India.

Parent's response showed the prevalence of SPD among the 767

children which were categorized as definite - 52.76%, probable - 14.99% and typical - 33.25%. The results showed there was prevalence of SPD in the normal population. In the study there were 467- males and 300- females, which constitute 60.9% males and 39.1% females. There were more children from the age group of 6 followed by 8, 7, 5, 9 and 4. There was more prevalence of SPD among the age group of 4-6 years followed by 6-8 and >8 that is 4-6 years have 54% of definite issues and 14.1% of probable issues, 6-8 years have 51.4% of definite issues and 16.2% of probable issues and >8 years have 44.2% of definite issues and 14% of probable issues. Prevalence of SPD was more in male than female, which constitute 52.5% male and 50.7% female.

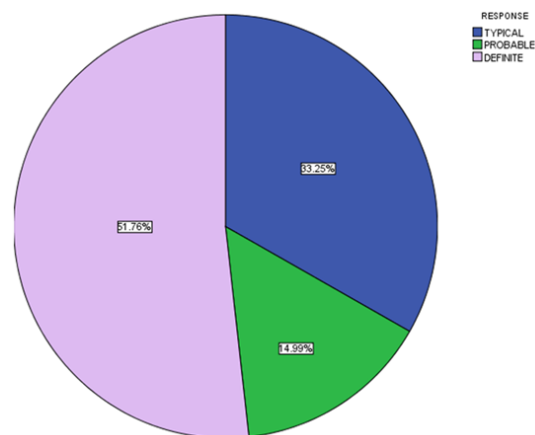


Fig 1 - Represents the prevalence of SPD

AGE2 * RESPONSE Cross tabulation

Table 1 - Represents the prevalence of SPD between age group

			RESPONSE			Total
			TYPICAL	PRO-BABLE	DEFI-NITE	
AGE2	4-6	Count	113	50	191	354
		% within AGE2	31.9%	14.1%	54.0%	100.0%
	6-8	Count	106	53	168	327
		% within AGE2	32.4%	16.2%	51.4%	100.0%
	>8	Count	36	12	38	86
		% within AGE2	41.9%	14.0%	44.2%	100.0%
Total	Count		255	115	397	767
	% within AGE2		33.2%	15.0%	51.8%	100.0%

GENDER * RESPONSE Cross tabulation

Table 2 - Represents prevalence of SPD in gender

			RESPONSE			Total
			TYPICAL	PROBABLE	DEFINITE	
SEX	M	Count	156	66	245	467
		% within SEX	33.4%	14.1%	52.5%	100.0%
	F	Count	99	49	152	300
		% within SEX	33.0%	16.3%	50.7%	100.0%
Total	Count		255	115	397	767
	% within SEX		33.2%	15.0%	51.8%	100.0%

Teachers' response showed that the prevalence of behavioural issues among 289 children in which they were categorised into definite - 3.11%, severe - 1.73%, minor - 17.65% and typical - 77.51%. In the study there were 152- males and 137- females, which constitute 52.6% and 47.4% respectively.

There were more children from the age group 6 followed by 8, 7, 5, 9 and 4. There was more prevalence of behavioural and emotional issues in the age group of 4-6 years followed by 6-8 and >8 years that is 4-6 years constitute 5.3% definite issues, 1.5% severe issues and 22.7% minor issues, 6-8 have 0.9% definite issues, 2.6% severe issues and 14.9% minor issues, >8 constitute 2.3% definite issues and 9.3% minor issues. Males showed more behavioural and emotional issues than females. Males constitute 3.9% definite issues, 2.6% severe issues and 20.4% minor issues. Whereas females constitute 2.2% definite issues, 0.7% severe issues and 14.6% minor issues.

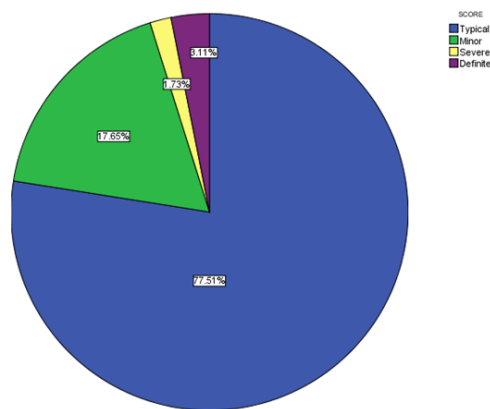


Fig 2 – Represents the prevalence of behavioural and emotional issues

*AGE2 *SCORE Cross tabulation*

Table 3 - Represents the prevalence of emotional and behavioural issues between different age group.

			SCORE				TOTAL
			TYPICAL	MINOR	SEVERE	DEFI NITE	
AGE 2	4-6	Count	93	30	2	7	132
		% within AGE2	70.5%	22.7%	1.5%	5.3%	100.0%
	6-8	Count	93	17	3	1	114
		% within AGE2	81.6%	14.9%	2.6%	.9%	100.0%
	>8	Count	38	4	0	1	43
		% within AGE2	88.4%	9.3%	.0%	2.3%	100.0%
Total	Count	224	51	5	9	289	
	% within AGE2	77.5%	17.6%	1.7%	3.1%	100.0%	

*GENDER*SCORE Cross tabulation*

Table 4 - Represents the prevalence of emotional and behavioural issues in gender.

			SCORE				TOTAL
			TYPICAL	MINOR	SEVERE	DEFINITE	
Sex	M	Count	111	31	4	6	152
		% within Sex	73.0%	20.4%	2.6%	3.9%	100.0%
	F	Count	113	20	1	3	137
		% within Sex	82.5%	14.6%	.7%	2.2%	100.0%
	Total	Count	224	51	5	9	289
		% within Sex	77.5%	17.6%	1.7%	3.1%	100.0%

DISCUSSION

SPD prevalence rate in comorbidities ranges from 40-80%, but there is also seen presence of sensory processing issues in typically developing children with the range up to 16% [7] [30]

As per evidences the risk factors or the signs and symptoms like maternal stress, low birth weight, lack of oxygen at birth excessive crying, prolong stay in NICU, hyper or hypo responsiveness to normal stimuli, decreased social skill and participation with the peer groups, impaired self-confidence, self-esteem, lacking in adaptive life skills, being in different environment puts them through lot of distress, and if these sensory processing issues persists for long period of time emotional, social and behavioral difficulties can be seen [8]-[29]

To the best of our knowledge this was the 1st study intended to know the prevalence of Sensory Processing Disorder (SPD) in school going children of North Eastern region of India. The age group of children included was from 4-9 years.

The current study showed prevalence of SPD through parents and teachers perspective in two different environments that is home and school to be definite sensory issues (52.76%) and probable sensory issues (14.99%)

Also, children having definite behavior issues were 3.11%, severe behavior issues were 1.73% and minor behavior issues was 17.65% through teacher's perspective. These results were computed based on the information provided by parents and teachers through respective questionnaires.

The parents were given the SSP which assessed the sensory profile of the children and teachers were given the SDQ which assessed the emotional and behavioral profile of the children. Literature provides evidence that sensory processing issues have correlation with the behavioral and emotional response of the children also leading to parental stress [30] [31]

In the 1960s, Jean Ayres described behavior patterns in school-aged children with learning disabilities also presenting immature behavior and motor patterns that interferes with the child's participation primarily in the school setting. These children demonstrated behaviors such as distress with face washing, bathing routines and dressing for any occasion, they avoid jumping and climbing, exhibit an irrational fear of falling, apt to be stubborn and uncooperative; and showed speech development problems that affect socialization [32]

The prevalence of sensory integration dysfunction in preschool children in Taiwan was found out to be 21%–28% in typical population [33] Our findings showed that there was more prevalence rate of SPD in males as compared to females both from teacher's and parent's perspective. As per literature, boys have more sensory difficulty compared to females. Boys tend to seek out more sensory stimulation. Also, boys do not develop fine motor and visual skills as early as girls [21] Present findings showed that the age group 4-6 showed the maximum prevalence of SPD followed by 6-8 and >8. Literature suggest that as children grow, there is ability of better sensory discrimination especially during the age of 4-6 years, but further with age the discrimination ability becomes flat trend from 7-8 and >9 year

CONCLUSION AND LIMITATION

Children with sensory processing disorder (SPD) demonstrate a wide variety of behaviors related to their sensory processing. They have variable responses in processing of, and/or organization of sensory information. Such sensory dysfunction can hinder child's ability to accomplish practical, daily activities and age-appropriate learning tasks, thus resulting in long term impairment of intellectual and social abilities [34] [35]. Prevalence of sensory processing disorder was found in typical school going children in North Eastern India.

The limitation was that out of 1300 questionnaires only 289 were returned by the teachers which did not gave us the opportunity to screen all the children for behavioural issues, also same child data for parents and teachers were very less. Generalizability of the results is not applicable as the other parts of the North Eastern India were not covered.

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