Original Article

Prevalence of sensory processing disorder among children between ages of 5 to 11 years old in Tehran

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Abstract

Introduction: Sensory Processing Disorder is defined by difficulties in setting up and organizing the variety and intensity of responses to sensory input for compliance with environmental requirements. This study was designed to investigate the prevalence of sensory processing disorder in children 5 to 11 years in Tehran city based on sensory profile questionnaire.

Methods: This study was a descriptive and cross sectional study that performed on children between the ages of 5 to 11 years old. Data collection included a demographic questionnaire and a sensory profile questionnaire

Results: In this study 2191 cases were evaluated in terms of sensory processing factors. According to this study morbidity from sensory processing disorder in boys was higher than for girls. Also, the most common disorder was observed in sensory sensitivity factor and the lowest was fine movement and perception.

Conclusion: Different sensory processing function in these children may explain their abnormal behaviors. These sensory processing dysfunction effects on child's daily life in areas such as play, academic skills and peer relationships, self-help activities. Therapists should consider the child's sensory processing functions when they set therapeutic plans.

Declaration of Interest: None.

Keywords: Sensation Disorders, Sensation, Child.

Introduction

A sensory integrative approach that is derived from cognitive neuroscience, today in occupational therapy and a lot of Rehabilitation Sciences has been widely used. Despite the acceptability and widespread application of this approach, still there is not sufficient research to support this approach. So, conducting various studies about the effectiveness and applicability of this approach is the research priorities for Occupational Therapists all over the world. With the development of hypotheses related to sensory processing disorder by Winnie Dunn, sensory processing disorder diagnosis takes place in the classification of psychiatric diseases (1-2).

So, research in this area has been in clinical research priorities. Research in this area is essential to the existence of standard tools. Sensory profile questionnaire as a standard tool used to evaluate the child's sensory processing. So, the child's behavior and activity of daily living are expressed on sensory processing. This questionnaire can be used in the diagnosis and treatment planning (3).

Winnie Dunn proposed a model for sensory processing based on a national sample of children without disabilities. This model described the interaction between neural thresholds and behavioral responses and set the stage for further insight into the

relationship between sensory processing and occupational performance (4).

Sensory processing is defined as registration, modulation, integration and organizing sensory inputs (5). Sensory processing disorder is defined as difficulties in regulation and organizing the variety and intensity of responses to sensory input for compliance with environmental requirements (6-7). Sensory processing disorders can negatively affect the development and functional abilities in behavioral, emotional, motors, and cognitive domains (8).

Fve functional impairments associated with sensory processing disorders: decreased social skills and participation in play occupations; decreased frequency, duration, or complexity of adaptive responses; impaired self-confidence or self-esteem or both; deficient adaptive or daily life skills; and diminished fine-, gross-, and sensory-motor skill development. The lack of ability to play successfully with peers is proposed to be related to a lack of full participation in sensory and motor play from which cognitive and social skills emerge and develop (9-10).

Based on clinical experience sensory processing disorder in child without disabilities are 5-10 percent. Estimates rates of sensory processing disorders for children with various disabilities are 40-88 percent (11-15). However, preschool children, prevalence estimates of sensory processing disorder based on parent's perception 5.3% (16).

The first aim of the present study was to investigate the prevelance of sensory processing disorder in children from 5 to 11 years. Another objective of the present study was to answer the question; whether boys suffer more from sensory processing difficulties than girls.

Methods

This study was a descriptive and cross sectional study that performed on children who are 5-11 years old. This age range was chosen because the validation of a sensory profile questionnaire in Iran was conducted in children who have 5 to 12 years old. The study population was 2191 child's who were selected by random cluster sampling. After obtaining the license and the introduction of co-education centers for sampling in the first stage, from each 22 region of Tehran was selected a girl's primary school, a boy's primary school and a kindergarten that it does with simple random sampling. In the second stage, from every level of education select a level by simple random sampling method and in the last stage 10 student were selected from the list of classroom randomly. In this research sensory profile questionnaire was used to collect data. We excluded the cases who has obvious signs of psychosis, obvious physical or motor disorder, history of seizure and the absence of informed consent (at the first of this study 2280 children were selected. Then 89 of them were excluded from the study because they don't have inclusion criteria).

In this research data collected by demographic questionnaire and a Sensory profile questionnaire. A Sensory profile questionnaire that published in 1999 by Wayne Dunn, focuses on evaluation of the sensory processing of children aged 3 to 10. This Questionnaire consists of 125 items. The questionnaire results can be classified in 9 factors (3).

Factor 1 (sensory seeking): The child shows a need to a variety of sensory stimuli. Based on questionnaire standard scoring, children whose scores are low on this factor need many different sensory stimuli.

Factor 2 (emotional reactivity): shows, children's reactions to emotional-social issues. Based on questionnaire standard scoring, children whose scores are low on this factor, shows severe reaction on emotional issues like failure, fear and anxiety.

Factor 3 (low muscle tone and endurance): shows Muscle endurance of the child on different activities. Based on questionnaire standard scoring, children whose scores are low on this factor, indicating that the child has little tolerance in everyday activities and gets tired easily.

Factor 4 (oral sensory sensitive): oral sensory processing in children's shows. Based on questionnaire standard scoring, children whose scores are low on this factor, indicating that

the child has a high sensitivity to the taste, smell and temperature of the food.
Factor 5 (inattention and destructibility): represents the focus of the child's daily activities. Based on questionnaire standard scoring, children whose scores are low on this factor, indicating that the child quickly loses its focus because of environmental factors and it is not able to continue activities.
Factor 6 (poor sensory registration): Child doesn't register sensory stimuli enough. Based on questionnaire standard scoring, children whose scores are low on this factor, indicating that the child does not understand sensory stimuli enough.
Factor 7 (sensory sensitivity): children register high sensory stimuli. Based on questionnaire standard scoring, children, whose scores are low on this factor, indicating that child's record high intensity vestibular and proprioceptive sensory stimuli and show severe reaction to it.
Factor 8 (sedentary): indicates the preference of the child is the type of activity. Based on questionnaire standard scoring, children whose scores are low on this factor, indicating that the child prefers quiet and sitting activities.
Factor 9 (fine movement / perception): indicates the fine baby status. Based on questionnaire standard scoring, children whose scores are low on this factor, indicating poor eye and hand coordination for children.

The questionnaire is filling and completion time by the childcare provider is 15 to 20 minutes and score time for a_specialist is 30 minutes. The Cronbach's alpha coefficient for all of the parts is obtained between" 0.47 to 0.91" (3). This questionnaire was the norm in Iran by Mirzakhani and et al (17).

Results

2191 children participated in this study, the range of age in these children was 5 to 11 years. 1506 (68.7%) of participants were male and 685 (31.3%) of them were female. Distribution of age in these children have shown in table 1. According result that come from Table 2 the highest and lowest sensory processing disorder seen in sensory sensitivity factor and fine movement / perception factor respectively.

Table 1. Distribution of participants by age

Age	Frequency	Percent
5	100	4.6
6	85	3.9
7	437	19.9
8	526	24
9	443	20
10	251	11.5
11	349	15.9
Total	2191	100

Table 2. Classification are based on the performance of children without disabilities

Factor	Typical Performance	Probable Difference	Definite Difference
Sensory seeking	75.30	15.28	9.40
Emotional reactivity	68.59	20.58	10.81
Low muscle tone and endurance	69.87	11.95	18.16
Oral sensory sensitive	64.46	17.16	18.34
Inattention and distractibility	82.10	9.94	7.85
Poor sensory registration	66.27	18.62	15.10
Sensory sensitivity	60.33	17.43	22.22
sedentary	82.33	7.39	10.17
Fine movement and perception	89.27	7.12	3.60

As can be seen in Table 2. According to this study morbidity from sensory processing disorder in boys was higher than from girls

. Table 3. Distribution of sensory processing disorder according to gender among children 5 to 11 years in Tehran city

Factor	Group	Definite disorder (percent)
Sensory seeking	Girl	3.06
	Boy	12.28
Emotional reactivity	Girl	5.69
	Boy	13.14
Low muscle tone and endurance	Girl	13.72
	Boy	20.18
Oral sensory sensitive	Girl	13.86
	Boy	20.38
Inattention and distractibility	Girl	4.81
	Boy	9.22
Poor sensory registration	Girl	10.94
	Boy	16.99
Sensory sensitivity	Girl	19.56
	Boy	23.43
Sedentary	Girl	7.73
	Boy	11.28
Fine movement and perception	Girl	1.16
	Boy	4.71

As shown in Table 3, there is a significant relationship between gender in the prevalence of sensory processing disorders. And the chance of this disorder is higher in boys than in girls.

Conclusion

Determine the child's sensory processing status is an important step in raising awareness of occupational therapists, speech therapists, psychologist, exceptional children teachers, normal and exceptional education department in the area of sensory processing disorder and the effectiveness of therapeutic interventions for these disorders. This study was designed to investigate prevelance of sensory processing disorder in children 5 to 11 years in Tehran city based on sensory profile questionnaire. The questionnaire consists of 125 items that describe children's responses to various sensory stimuli. After completing the questionnaire by caregivers, then occupational therapist scored 125 items of the questionnaire that divided into three categories: sensory processing, sensory modulation and behavioral emotional responses. Both in internal resources or external sources have not found similar study.

Miller and colleagues in their study sensory processing disorders based on the perception of parents reported 5.3% (17). But in this study using sensory profile cut of point questionnaire, the prevalence was reported in each of the factors separately that highest and lowest sensory processing disorder seen in sensory sensitivity factor and fine movement/perception factor

Do more boys suffer from sensory processing difficulties than girls?

Although boys do seem to be more affected than girls, “boy behavior” may be mistaken for a sensory difficulty, and some behaviors commonly attributed to girls may mask a sensory issue. For instance, boys tend to seek out more intense sensory stimulation, so a boy’s normal behavior may be perceived, incorrectly, as SPD. On the other hand, a girl who is less coordinated or has lack of control of her body may pull back or sit on the sidelines but will tend to be viewed as simply not interested in physical activities, although the reason she does not participate is due to SPD (18).

Another reason that boys were perceived as having sensory processing difficulties is the fact that most boys do not develop fine motor skills or visual motor skills as early as girls. As a result, they often struggle with fine motor and visual motor demands, such as writing, copying information from a board, using a scissors, and all the other activities we use to judge our children’s academic abilities in the early grades. These difficulties may result in a

boy being referred to occupational therapy in the schools (19).

Based on the Dunn pattern if a child has impairment in sensory processing disorder, he will need more intensive stimuli to participate and respond to there. Children who are in a low arousal state and have inadequate emotional records they do not capture changes in environment and so, accommodative response will not occur (20). These children require more sensory stimulation in certain sensory modalities such as proprioception and balance. For instance, in a deep sense, these children usually seek for active resistance to muscle stimulation, deep palpation, or joint push and pull. (For example, hitting legs instead of walking, intentional failure or collision with objects or other people, or pushing big objects) they may do some serious throwing like throwing things tight. Some of these children do not understand the situation of their body organs except with severe proprioceptive stimuli. These behaviors may be interpreted as aggressive behavior. These children go up the high places, running and are stirring to receive stimuli equilibrium. These behaviors together interfere children sit to learn in school, playing with peers, self-care activities and may increase child's environmental failure (21). So there is a need for screening and interventions based on the sensory integrative approach.

Several limitations of this study should be noted. First, generalizability of these results is limited to the demographic group represented in this study. Second, although prevalence rates can be suggested from surveys, a rigorous study is needed to assess the physiologic and behavioral manifestations of sensory processing disorders in individual's identified by screening. Third, this study did not evaluate the presence, or absence, of disorders other than sensory processing disorders. The percent of this sample that might have comorbid attention deficit hyperactivity disorder or other disorders is not known. Fourth, the effect of comorbidity on rates of reported symptoms of sensory processing disorders should be carefully studied.

Conclusion

The results of this study suggest that occupational therapists consider emotional needs of children in developing treatment protocols for children with sensory processing disorder. To inform families about their children's emotional state can provide a better understanding of why children behavior. Adapt and modify the child's living environment by taking the functional status of the child is the child can lead to better performance. Obviously, the outcome of the status of children's behavior, sensory processing and cognitive skills, psychological factors, parenting styles, and other factors. Therefore, therapists must be detailed and comprehensive compilation of various therapeutic approaches such as sensory integration, perceptual- motor activities, behavioral therapy, and to use.

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