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ASSOCIATION BETWEEN SENSORY PROFILE AND DAILY FUNCTIONING IN CHILDREN WITH AUTISM

Isti Anindya, Amin Soebandrio, Ibnu Agus Ariyanto, Rini Sekartini*, Tjhin Wiguna, Novika Purnama Sari
Faculty of Medicine, Universitas Indonesia, Jl. Lingkar, Pondok Cina, Beji District, Depok City, West Java 16424, Indonesia
*rsekartini@yahoo.com

ABSTRACT

In the diagnostic criteria outlined in the DSM-5-TR (APA, 2022) Autism is characterized by hyper- or hyporeactivity to sensory input or unusual interest. Children with Autism encounter challenges in processing sensory information, leading to difficulties in regulating responses to specific sensations and stimuli. Meanwhile, behaviours such as repetitive motor movements, running, aggression, and self-harming have been correlated with sensory processing disorders. Furthermore, some daily functioning that are often disrupted due to sensory processing disorders are sleeping, eating, and social activities. Therefore in this study, we aim to examine association between sensory profile and daily functioning in children with Autism. We collected data from parents of children aged 2-5 years with Autism (N = 96) and non Autism (N = 94) in Indonesia for three months (September-December 2023). Parents filled out five types of instruments (CARS-P, FISH, BAMBI, SCQ, and SSP) and sociodemographic data. The results of this study showed a significant difference between autistic and non-autistic groups in their daily functioning ($p < 0.001$). In autistic group, we found a significant relationship between sensory profiles and eating behavior ($p < 0.001$); and social communication skills ($p < 0.001$). In the non-autistic group, only sensory profile was corelated to eating behavior ($p < 0.001$). Primary results indicate that, the sensory profile is closely related to eating behavior and social communication skills in autistic children.

Keywords: autism; daily functioning; eating behaviour; social activity; sensory profile

INTRODUCTION

Autism is a neurodevelopmental disorder characterized by social and communication deficits, limited interests and abilities, and repetitive behaviours that tends to be rigid and inflexible (1). The first studies on the prevalence of the autism appeared in between 1960s and 1970s. Autism is considered a spectrum condition and is usually accompanied by intellectual disability. These studies reported that the prevalence of the autism at that time was around 4-5 cases per 10,000 children, whilethe prevalence of atypical sensory behavior in children with autism was more than 90% (2). According to DSM-5 diagnostic criteria, hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of the environment is one of the markers of autism (3). The autism group had more problems in the subscales of tactile sensitivity, low/weak energy, and taste sensitivity. In that study, 95.8% of children with autism were shown as having significant differences in sensory processing compared than typical children. These findings are consistent with the literature, which states that 42%-95% of children with autism show sensory processing problems as measured by the sensory profile instrument through parent reports (4).

Children with sensory processing dysfunction often have difficulty regulating responses to specific sensations and stimuli and may use self-stimulation to compensate for limited sensory input or to avoid overstimulation. These atypical sensory reactions indicate poor sensory integration in the central nervous system and may explain disturbances in attention and emotion. Self-stimulatory behaviours, defined as repetitive movements with no clear purpose in the environment, can have considerable social, personal, and educational implications and often limits the ability to participate

in everyday life routines. Behaviors such as repetitive motor movements, running, aggression, and self-harming have been correlated with these sensory processing disorders (5). Some daily functioning that are often disrupted due to sensory processing disorders are sleeping, eating, and social activities. One of the most frequent complaints among parents and caregivers of children with autism is a poor sleep. Among autism children, the most common sleep problems are prolonged sleep latency, decreased sleep efficiency, reduced total sleep time, increased awakening after sleep onset, bedtime resistance, and daytime sleepiness. The severity of sleep problems is proportional to the severity of autism symptoms, one of which is a deficit in communication skills (6).

A literature study by Tordjman has shown that abnormalities in melatonin physiology may be involved or closely related to the pathophysiology and behavior of children with autism. Melatonin is also closely related to serotonin, which plays a vital role in the limited interests and rigid behavior of children with autism. An association was also found between lower nocturnal melatonin release in children with autism and increased severity of their communication disorders. Melatonin levels are closely related to circadian rhythm and sleep quality. Some studies suggest that regulating sleep initiation to improve the quality of life of children with autism may slowly alter their cognitive development, including memory, learning, and communication (7). Several studies have examined social functioning, focusing on the severity of autism symptoms. These studies provide evidence regarding the relationship between sleep quality and Autism severity. Most studies find a positive relationship between sleep quality and Autism severity, withsensory sensitivity scores also demonstrating a strong correlation with sleep duration (8).

A study reported that 70-90% of parents of autistic children also complain about eating problems in their children, for example poor eating, food rejection, food dislike, and food selective, which gives rise to rigid behavior in choosing food, pica, and obsessive eating patterns of varying degrees of severity (9). Most of the literature, to date, examined eating disorders in autistic individuals as occurring due to problems early in development that are not adequately addressed. Without proper treatment, eating problems will persist until they grow up. In a literature study that analyzed 34 studies, it was found that the most frequent problem with autistic children's eating behavior was picky eating and food avoidance (10). A study that linked sensory problems with eating behavior showed that specific sensory modalities may influence the number of eating problems in autistic children. For example, tactile sensitivity indicates problems with saliva concentration, social behavior when eating, as well as food preferences that they dislike because of the visuals, certain ingredients, color, texture, and temperature (11). Therefore, in this study, researchers will examine the association between sensory profile with performance of daily activities in children with autism, namely sleep quality, eating behavior and social activities.

METHOD

This type of research is an observational study that uses comparative or comparison methods (comparing between groups of research subjects). The research design used was cross-sectional with inclusion criteria ; mothers of children with autism and mothers of children with without autism (2-5 years old). This research involved 190 mothers consisting of 2 groups: 96 mothers of children with autism and 94 mothers of children with without autism. Instrument data was collected over three months (September-December 2023) in Indonesia. Parents completed four

questionnaires to assess their child's sensory profile and daily activity performance. The sensory profile of children with autism can be measured using various instruments, including the Short Sensory Profile (SSP) contains 38 items (12,13). Sleep behavior can be measured with various types of instruments, one of which is The Family Inventory of Sleep Habits (FISH), which is suitable for children with autism aged 2-10 years to examine at the behavior of children and parents around bedtime, sleep routines, sleep environment, habits before bedtime (14,15). Instruments for assessing eating behavior were adapted to the age of autism research subjects. One instrument commonly used with autism aged 2-10 years is the Brief Autism Mealtime Behavior Inventory (BAMBI) questionnaire, which consists of 18 items to assess mealtime behavior in children with autism (16). Communication and social abilities of children with autismcan be measured with various types of instruments. One instrument that is often used is the Social Communication Questionnaire (SCQ), which can be filled in by parents with 40 questions and focuses on items related to autism symptoms that parents can observe (17,18). Data analysis in this study used univariate and bivariate analysis. The univariate analysis consisted of respondent characteristics with mean and frequency distribution. Bivariate analysis in this study used the Spearman Rank test. Ethic Number : KET-824/UN2.F1/ETIK/PPM.00.02/2023.

RESULTS AND DISCUSSION

This study analyzed data from 190 mothers, consisting of 96 mothers of children with autism and 94 mothers of children without autism. In the group of mothers who have children with autism, 81.3% of mothers have higher education, but 68.7% of them do not work. The duration of therapy for autistic children is 98% under four years. Meanwhile, in the group of mothers who had children without autism, 96.8% of the mothers had higher education, and 41.5% of them were working mothers (table 1).

Table 1.
Characteristic of respondents

Charateristic	Mothers of Children with Autism (N=96)		Mothers of Children with Without autism (N=94)	
	f	%	f	%
Education				
College	78	81.3	91	96.8
No College	18	18.7	3	3.2
Employment Status				
Employed	30	31.3	39	41.5
Unemployed	64	68.7	55	58.5
Child Therapy Duration				
<4 years	94	98	-	-
>4 years	2	2	-	-

The association between sensory profile and daily functioning in children with autism and without autism (table 2) is significant for the sensory profile with eating behavior (*p-value* = 0.000) and social communication skills (*p-value* = 0.000) in the group of children with autism. Meanwhile, the children with without autism showed a significant relationship between sensory profile and eating behavior (*p-value* = 0.002).

Table 2.
Association between sensory profile and daily functioning in children with autism and without autism

Daily functioning	Short Sensory Profile (N Autism = 96)			Short Sensory Profile (N Non Autism= 94)		
	N	%	*p-value*	N	%	*p-value*
CARS-P Score						
Mild	1	1.1	0.081365			
Moderate	82	85.4				
Severe	13	13.5				
FISH Score						
Mild	31	32.3	0.279951	54	57.4	0.401140
Moderate	65	67.7		40	42.6	
Severe	0	0		0	0	
BAMBI Score						
Mild	42	43.8	0.000*	59	62.8	0.002*
Moderate	53	55.2		35	37.2	
Severe	1	1.0		0	0	
SCQ Score						
Mild	9	9.4	0.000*	86	91.5	0.860156
Moderate	71	74.0		8	8.5	
Severe	16	16.7		0	0	
Total	96	100		94	100	

*Correlation is significant at the 0.05 level (2-tailed).

Differences in daily functioning in children with Autism and without autism (table 3) are significant for all variables. Autism symptoms were significantly seen using the CARS-P instrument (p-value = 0.000), sleeping behavior was significantly seen using the FISH instrument (p-value = 0.001), eating behavior was significantly seen using the BAMBI instrument (p-value = 0.008), social skills and communication looks significant using SCQ (p-value = 0.000), and sensory profile looks significant using SSP (p-value = 0.000).

Table 3.
Differences in daily functioning in children with Autism and without autism

	CARS-P Score	FISH Score	BAMBI Score	SCQ Score	SSP Score
Mann-Whitney U	3782.000	3377.000	3636.500	743.000	2736.000
Wilcoxon W	8247.000	7842.000	8101.500	5208.000	7201.000
Z	-3.794	-3.477	-2.667	-11.101	-5.875
Asymp. Sig. (2-tailed)	.000*	.001*	.008*	.000*	.000*

*Correlation is significant at the 0.05 level (2-tailed).

This study aimed to describe and analyze sensory profiles concerning their daily functioning in children with and without autism. Our main findings were that the sensory profile in children with autism significantly influences their eating behavior and social communication. The relationship between sensory processing and eating behavior suggests that sensory processing underlies various eating behaviors in autism. Exciting findings from a study looking at the novel eating disorder of

avoidant/restrictive food intake disorder (ARFID) showed that the oral sensory processing score was found to be the most significant predictor of ARFID comorbidity in ASD and reliably predicted ARFID in autistic children in the clinical setting. Autistic children with ARFID show differences in social functioning, sensory processing, eating attitudes, and quality of life compared to children with autism and those without autism (19). Other research suggests that all children with autism—exhibit sensory hyper- or hyporesponsiveness. Four main sensory dimensions were associated with eating behavior in autism. Differences in eating and sensory profiles were also found between groups of children with and without autism (20).

Food selectivity is a common problem in children with autism spectrum disorders. This term covers various situations and behaviors, including refusing certain foods, disliking specific tastes, colors, textures, or temperatures, and adopting a diet limited to specific food categories. Food packaging and presentation can also play a role. While selectivity is often associated with sensory integration problems, oral desensitization is fundamental in introducing new foods to the child (21). Another study also showed that children with autism and problems with their sensory profiles, mainly taste and smell sensitivity, also experienced problems when eating. Auditory screening also influences eating behavior, as does taste/smell sensitivity. This confirms that eating is indeed a complex multisensory experience (22). In this study, sensory profile and eating behaviour had a statistically significant relationship (p-value = 0.000016) for children with autism. This aligns with previous research identifying statistically significant relationships between sensory features and several other characteristics, such as adaptive behavior, emotional state, hyperactivity, motor development, aggression, fear, sleep, and eating. The findings also reveal potential sociodemographic disparities that warrant further investigation regarding the treatment of sensory features (23).

The sensory profile of children with autism is also closely related to their social communication skills. Children with autism have low social motivation; this includes difficulties such as initiating or maintaining social interactions or feeling tense in social situations. Previous studies have reported negative correlations between lack of responsiveness, language scores, and severity of socio-communicative symptoms in groups of children with autism (24). In this study, sensory profile and social communication skills had a statistically significant relationship (p-value = 0.000001) for children with autism. This is in line with previous research, autistic children in that study have different patterns of sensory processing than their peers, which are significantly related to their patterns of social functioning. Sensory features can serve as a good predictor of social functioning in in children with autism (25). Sensory differences in children with autism destabilize the presentation of others as meaningful expressive entities, leaving experiences of fuzziness and inaccessibility of social meaning that disrupt the possibility of social engagement (26). Social cognition is hampered by atypical sensory processing during early development. Recent studies suggest that deficits in multisensory integration in children with autism may impact speech perception and communication processes. In most communication processes, failure to understand the environment's visual, sensory, and auditory components can result in missing important social cues and message content (27). In a recent study, they have comprehensively evaluated the correlation between sensory response patterns and various core and autism-related symptoms in a single sample. Even after correcting for multiple comparisons, nearly all of the correlations between sensory response patterns and overall core autistic traits, adaptive behavioral skills, internalization of problem behavior, and language abilities were significant, with moderate to large

effect sizes (the only exception was the association between somatization and sensory seeking, which were small and insignificant). The majority of these associations were also substantial in controlling for nonverbal IQ (28).

These findings showing varying measures of sensory response when studying children from an early age who are heterogeneous in terms of chronological age were undertaken to hone in on the developmental period in which these sensory differences emerge and are linked to communication. Theorized links between early sensory differences and communication may be essential to study between the ages of 12 months, when spoken words are thought to appear, and 18 months when infants with delayed communication development are likely to be identified and referred for early intervention (29).

CONCLUSION

The sensory profile is closely related to eating behavior and social communication skills in children with autism.

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