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Original Research

Correlation Between Sleep Disturbance and Aggression on Children With Autism Spectrum Disorder

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Abstracts

Introductions: Children with autism are a group of people with a pervasive developmental disorder characterized by abnormalities and or developmental disabilities, marked by the presence of abnormalities in social interaction, communication, and limited and repetitive behavior. Children with Autism Spectrum Disorder have more sleep disturbances that correlate with the severity of autism symptoms, such as aggression. The aim of this study is to determine the relationship between sleep disturbances and aggression in children with autism at the Child Psychiatry Daycare Unit of Dr. Soetomo Regional General Hospital Surabaya. **Methods:** The research design used in this study is cross-sectional with a quantitative approach. Sampling was done using the total sampling method, resulting in 40 respondents. Sleep disturbance variables were measured using the Children's Sleep Habit Questionnaire Abbreviated (CSHQ-A), and aggression variables were measured using the Modified Overt Aggression Scale (MOAS). Data were analyzed using Spearman's correlation test. **Results:** The results showed a correlation coefficient of 0.841 with a significant p-value of $< \alpha$ 5% (0.05). Data analysis indicates that sleep disturbances in children with Autism Spectrum Disorder are strongly and linearly related to the level of aggression displayed. **Conclusion:** In conclusion, the more severe the sleep disturbances experienced by autistic children, the more severe the aggression displayed by children with Autism Spectrum Disorder.

Keywords: Autism, Children, Aggression, Sleep disturbance, Well being

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INTRODUCTION

The estimated prevalence of the number of autistic children worldwide continues to increase every year and varies significantly within and across sociodemographic groups. Research indicates that children with Autism Spectrum Disorder (ASD) tend to have higher levels of aggressiveness compared to children with other developmental disorders. Aggression is associated with negative outcomes for children with ASD and their caregivers, including a decrease in quality of life, increased stress levels, and reduced availability of educational and social support [1]. The impact of Autism Spectrum Disorder itself can be detrimental to both the child and their immediate family. Children with Autism Spectrum Disorder tend to experience more comorbidity; research shows that 50-83% of people with Autism Spectrum Disorder have sleep problems or disorders [2]. Children with Autism Spectrum Disorder had poorer sleep quality scores, and it took them longer to fall asleep than non-autistic children, which caused insomnia symptoms and daytime fatigue [3]. Compared to typical children, parents observe that autistic children struggle with sleep, wake up more frequently at night, wake up earlier in the morning, sleep more while walking and talking, and experience bedwetting, resulting in a reduction in overall sleep. Less sleep and more sleep difficulties have been shown to correlate with a greater severity of ASD symptoms [4]. These ASD symptoms could be an internalizing behavior such as anxiety or could be an externalizing behavior such as hyperactivity and aggression [5]. The aim of this research is to determine the relationship between sleep disturbances and aggressiveness in autistic children at the Day Care Jiwa Anak RSUD Dr. Soetomo Surabaya.

METHODS

Participants

Respondents participating in this study will be assured of the confidentiality of the provided data and have the right to refuse participation. Before the research commences, respondents will receive information for consent and then be provided with an informed consent form to be signed, ensuring the legality of their agreement. This study has also been deemed ethically sound by the Ethics Committee of RSUD Dr. Soetomo Surabaya with ethical approval number 2103/115/3/IV/2023. This research is a descriptive analytical observational study of a cross-sectional nature with a quantitative approach conducted on parents or primary caregivers who have children with Autism Spectrum Disorder undergoing therapy at the Child Mental Daycare of RSUD Dr. Soetomo to reveal the relationship between two variables. The collected primary data will be analyzed based on the predetermined variables and organized in the form of tables or diagrams. Data will be gathered and analyzed using the Bivariate Spearman Correlation statistical test with SPSS 27 for MacBook.

Research Instruments

This study applied three research instruments: the Demographic Questionnaire, the Modified Overt Aggression Scale, and the Children's Sleep Habit Questionnaire Abbreviated. The demographic questionnaire data is utilized to understand and analyze respondent characteristics. Sleep disturbance is measured using the Children's Sleep Habit Questionnaire Abbreviated (CSHQ-A), designed to identify behavior and medical-based sleep problems in school-age children. CSHQ-A assesses 5 sleep problems in children: (I) Bedtime, (II) Sleep Behavior, (III) Night Wakings, (IV) Morning Wakings, and (V) Daytime Sleepiness. Items are rated on a three-point scale: "usually" if the sleep behavior occurs five to seven times per week; "sometimes" for two to four times per week; and "rarely" for zero to one time per week. Some items are reversed to consistently produce higher scores, indicating more disturbed sleep. A score < 41 indicates no sleep disturbance in children, while a score > 41 indicates the presence of sleep

disturbance in children [6]. Based on statistical testing on 40 samples, 27 valid items were obtained with a correlation coefficient (r) greater than the table value (>0.3120) and a significance value (p-value) <0.05. In reliability testing, a Cronbach's alpha of 0.853 was obtained, which is greater than the significant value (>0.05). This indicates that the CSHQ-A questionnaire is valid and reliable for use [7]. Aggression is measured using the Modified Overt Aggression Scale (MOAS) questionnaire. In MOAS, aggression is divided into four categories: verbal aggression, physical aggression towards objects, physical aggression towards oneself, and physical aggression towards others. Within these categories, aggressive behavior is assessed based on their respective severity levels. Scoring for MOAS varies according to the aggressive category. The weight of verbal aggression is multiplied by 1, physical aggression towards objects by 2, physical aggression towards oneself by 3, and physical aggression towards others by 4. The total aggression level is obtained by summing all categories, resulting in a MOAS total score ranging from 0 (no aggression) to 40 (maximum aggression level). A higher MOAS score indicates a higher level of experienced aggression [8]. Based on statistical testing on 40 samples, 4 valid items were obtained with a correlation coefficient (r) greater than the table value (>0.3120) and a significance value (p-value) <0.05. In reliability testing, a Cronbach's alpha of 0.597 was obtained, which is greater than the significant value (>0.05). This indicates that the MOAS questionnaire is valid and reliable for use [7].

Figure 1. CSHQ-A Validity Test on Statistical Sampling from 40 samples

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
X1.1	56.03	106.025	-.249	.865
X1.2	55.98	108.692	-.380	.871
X1.3	56.60	100.862	.104	.856
X1.4	55.53	100.666	.119	.855
X1.5	55.55	97.177	.358	.849
X1.6	56.33	90.738	.706	.839
X1.7	56.78	98.025	.361	.849

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
X1.8	55.98	92.640	.557	.843
X2.1	56.53	96.563	.429	.848
X2.2	55.75	109.218	-.460	.870
X2.3	56.08	105.866	-.257	.864
X2.4	56.45	96.356	.362	.849
X2.5	56.35	88.849	.825	.835
X2.6	56.30	90.267	.778	.837
X2.7	57.03	101.922	.172	.853
X2.8	56.23	92.948	.591	.842
X2.9	56.88	99.189	.361	.850
X2.10	56.30	92.779	.634	.842
X2.11	56.83	97.328	.531	.847
X2.12	56.70	98.421	.342	.850
X2.13	56.03	87.410	.803	.834
X2.14	56.50	93.282	.690	.841
X2.15	56.48	90.615	.861	.836
X3.1	56.20	92.421	.746	.839
X3.2	56.70	95.497	.603	.844
X4.1	55.88	106.420	-.245	.868
X4.2	56.55	94.151	.658	.842
X4.3	56.18	95.174	.418	.848
X4.4	56.28	91.179	.693	.839
X4.5	56.33	90.379	.730	.838
X5.1	56.13	108.522	-.359	.871
X5.2	56.68	98.430	.413	.849
X5.3	56.35	94.592	.471	.846

Figure 2. MOAS Realiability Test On Statistical Sampling from 40 samples

Reliability Statistics

Cronbach's Alpha	N of Items
.853	33

Figure 3. MOAS Validity Test on Statistical Sampling from 40 samples

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Y1	25.92	304.430	.558	.527
Y2	24.25	289.731	.379	.548
Y3	20.02	226.846	.389	.518
Y4	18.00	136.974	.490	.494

Figure 4. CSHQA Realibility Test on Statistical Sampling from 40 samples

Reliability Statistics

Cronbach's Alpha	N of Items
.597	4

RESULTS

Forty (40) parents or primary caregivers who have children with Autism Spectrum Disorder undergoing therapy at the Daycare Jiwa Anak RSUD Dr. Soetomo were included in this study. Table 1 shows the

characteristics of the participants. Most participants are aged 29-38 (n = 18, 45%), and most of them are female (n = 34, 85%). Data showed that the majority of the participants are happily married (n = 38, 95%), and most of them graduated from SMA/Senior High School (n = 26, 65%) as their last education. Most of the participants are housewives (n = 25, 62.5%), with monthly income more than UMR (Upah Minimum Regional) of Surabaya (n = 31, 77.5%). All of the participants also implemented a democratic parenting style (n = 40, 100%). As for the children with Autism Spectrum Disorder, most of the children are 5 years old (25%) and 7 years old (22.5%). Most of the children are male (n = 32, 80%) and mostly were born as a term (n = 38, 90%).

Table 1. Characteristic of the participants

Indicator	Sub Indicator	Frequency	Percentage (%)
Respondent Age	19-28 years old	4	10%
	29-38 years old	18	45%
	39-48 years old	15	37.5%
	49-58 years old	2	5%
	59-68 years old	1	2.5%
ASD Childern Age	3 years old	2	5%
	4 years old	7	17.5%
	5 years old	10	25%
	6 years old	5	12.5%
	7 years old	9	22.5%
	8 years old	4	10%
	9 years old	1	2.5%
	10 years old	1	2.5%
	11 years old	1	2.5%
Indicator	Sub Indicator	Frequency	Percentage (%)
Respondent Last Education	SMP (Junior High School)	3	7
	SMA (Senior High School)	26	65%
	Sarjana (Diploma/More)	11	27.5%
Respondent Occupation	IRT (Housewives)	25	62.5%
	Private Staff	12	30%
	Others	3	7.5%
Respondent Income	<UMR Surabaya	9	22.5%
	>UMR Surabaya	31	77.5%
Childern Birth History	Premature	2	5%
	Aterm	38	95%
Parenting Style	Democrative	40	100%

The characteristics of aggression among children with Autism Spectrum Disorder were varied.

Table 2 showed the types of aggression experienced by the ASD childern. Out of 40 respondents, majority of the participants stated that their children exhibited verbal aggression (n = 33, 82.5%) such as yelling, using offensive language, and making threats. Most of the ASD childern experienced autoaggression which is aggression towards themselves, including hitting themselves, pulling their hair, throwing themselves against walls, and causing minor or serious injuries to themselves (n = 31, 77.5%). ASD childern also show aggression against property and physical aggression towards other person (n = 28, 70%).

Table 2. Types Of Aggression

Types of Aggression	Total	%
Verbal Aggression	33	82.5%
Aggression Against Property	28	70%
Autoaggression (Toward Self)	31	77.5%
Physical Agression (Toward Other)	28	70%

Children with Autism Spectrum Disorder in this study were classified as children who were experiencing sleep disturbance and those not experiencing sleep disturbance. The children were classified by their score on the CSHQ-A questionnaire, the data shown in Table 3. The majority of the children (n = 25, 62.5%) were having sleep disturbances, as their score in CSHQ-A was more than 41.

Table 3. Sleep Disturbance Classification

CSHQ-A Score	Classification	Total	%
>41	Having Sleep Disturbance	25	62.5%
<41	Not Having Sleep Disturbance	15	37.5%

To determine the correlation between sleep disturbance and aggression in children with Autism Spectrum Disorder, statistical data testing was conducted. This correlation testing utilized the Spearman correlation test with the SPSS 27.0 program for MacBook. The results of the correlation test are shown in Table 4. Severe and mild aggression are categorized based on the mean in the statistical data, which is 29.40. This means that a child is categorized as experiencing mild aggression if the MOAS score is <29.40 (n = 20, 50%) and categorized as experiencing severe aggression if the MOAS score is >29.40 (n = 20, 50%).

Table 4. Correlation Between Sleep Disturbance and Aggression On Children With Autism Spectrum Disorder

	Having Sleep Disturbance	Not Having Sleep Disturbance	Total	p-Value	Spearman's Rank Correlation Coefficient
Mild-Aggression	5 (12.5%)	15 (37.5%)	20	<0.05	0.841
Severe-Aggression	20 (50%)	0	20		
Total	25	15	40		

Figure 5. Spearman Correlation Test

Correlations

			CSHQ	MOAS
Spearman's rho	CSHQ	Correlation Coefficient	1.000	.841**
		Sig. (2-tailed)	.	.000
		N	40	40
	MOAS	Correlation Coefficient	.841**	1.000
		Sig. (2-tailed)	.000	.
		N	40	40

**. Correlation is significant at the 0.01 level (2-tailed).

The results of the Spearman correlation test to examine the relationship between two variables, namely sleep disturbance and aggression among children with Autism Spectrum Disorder, show a correlation coefficient of 0.841 with a significance value (p-value) < α 5% (0.05). The p-value <0.05 indicates a significant relationship between sleep disturbance and aggression in children with Autism Spectrum Disorder [9]. Meanwhile, the correlation coefficient of 0.841 falls within the range of 0.70-0.90, indicating a strong positive relationship between the two variables [10].

DISCUSSIONS

The demographic questionnaire analysis reveals that the majority of respondents are mothers aged 29-38 years who work as homemakers. This indicates that the stress levels in mothers with children with Autism Spectrum Disorder are much higher than those in fathers [11]. Women tend to experience higher levels of stress than men in social situations, as they are more inclined to be involved in daily communication, including with their children [12]. Mothers who primarily provide care for children with disabilities tend to spend most of their time caring for their children daily, resulting in them having to stop working and being housewives or choosing to work part-time [13]. Data also showed that all of the participants, both mothers and fathers, were choosing democratic as their parenting style. This parenting style is considered ideal and provides greater benefits because it involves rules that are open, clear, and can be discussed, so the children are often more cheerful, independent, and socially responsible [14]. The parenting approach that is characterized by insufficient parental attention can elevate dopamine and norepinephrine levels, leading to the emergence of hyperactivity in children [15]. However, parental relationships are playing a major key factor that would affect the risk of mental health problems, such as depression, of a child throughout their adolescence [16]. Care-seeking by parents is very important; if the parents are aware and seek treatment during acute episodes, the quality of treatment will increase, and the patient will have a better prognosis [17].

Compared to children with other psychological disorders, children with ASD have an increased risk of behavioral disorders, especially aggression [18]. Aggression can be identified in the early stages of development, and it significantly develops around the age of 4, continuing to increase before stabilizing and decreasing when the child enters school, around 8 years old [19]. In addition to age, gender is also a factor influencing aggression in children with Autism Spectrum Disorder. Research indicates that compared to girls, boys with ASD tend to have lower social motivation, lower socialization abilities, and more extreme repetitive and stereotyped behaviors, such as hyperactivity, impulsivity, and aggression [20].

Verbal aggression is one of the most common forms of aggression experienced by autistic children. Children with autism tend to exhibit higher levels of aggression in response to threats, both from their environment and imaginary threats. Children with

autism experience speech delays, repetitive language, and mimicry of someone else's speech without communicative intent (echolalia). Research also states that communication is a major challenge in dealing with children with Autism Spectrum Disorder [21]. In addition to verbal aggression, children with autism also express their aggression by acting out towards objects, such as slamming things, tearing clothes, and breaking objects. The aggression displayed by autistic children often arises from self-stimulation, leading to increased anxiety. This anxiety prompts them to engage in various repetitive destructive behaviors. Autistic children often lose their ability to perform or enjoy activities they are engaged in. They frequently lose concentration while playing, talking, walking, and socializing, and lose their ability to process what is happening around them. This makes autistic children feel pressured, and they express their confusion by screaming, crying, kicking, and other physical aggression towards themselves or others [22].

Sleep is fundamental for brain development, especially in children during their developmental stages. Sleep disturbances in individuals with Autism Spectrum Disorder are closely related to brain development, causing issues in cognitive, attention, emotional, and behavioral domains, including aggression. The dominance of sleep disturbances in children with Autism Spectrum Disorder indicates that individuals with ASD have much worse sleep quality compared to other normal individuals [23]. Psychological conditions occur when a person can experience psychological tension. This is seen when people with psychological health problems suffer from mental disorders, including autism, which makes it difficult to fall asleep [24]. Compared to non-autistic children, children with Autism Spectrum Disorder have lower sleep duration, are more easily awakened at night, tend to wake up during the night, and have lower sleep efficiency. Poor sleep quality leads to reduced stability in the morning or afternoon for these children [3]. Chronic sleep difficulties at any age can lead to deficits in attention, responsiveness, short-term memory, and overall daily performance [25].

Research proves that boys are reported to have shorter sleep durations than girls. This is due to boys usually having more active physical activities compared to girls. The lack of sleep duration they have results in boys tending to have poorer sleep quality than girls. Sleep disturbances frequently experienced by children with ASD include delayed sleep onset, sleep maintenance disorders, early awakening, and daytime fatigue [26]. Although they both experience sleep disturbances, the differences in aggression levels are influenced by many factors. For example, external factors around the children, such as family income, also play an important role. Low socioeconomic factors are the root of various biological and environmental problems. In addition to external factors around the child, internal factors also play a role in the aggression manifested by the child, such as the endocrine system, metabolic system, cortical function, and neurological function of each individual. These functional differences result in different aggressive manifestations for each individual.

There are some limitations to this study. The research uses the CSHQ-A and MOAS questionnaires filled out directly by respondents based on events in the last week, so the research data may be biased. In addition, respondents often feel ashamed, not fully understanding, or uncomfortable describing the aggression experienced by their children. The therapy given to each ASD child in daycare also varies, which may affect the child's behavior differently.

CONCLUSION

The findings of this study support previous research, indicating a strong positive linear relationship between sleep disturbances and aggression in children with Autism Spectrum Disorder at Daycare Jiwa Anak RSUD

Dr. Soetomo Surabaya. Therefore, it is crucial to pay attention to sleep disturbances in autistic children to address them promptly before worsening the condition and potentially exacerbating aggression in these children.

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CONFLICT OF INTEREST

There are no potential conflicts of interest.

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