Indonesian Journal of Global Health Research
Volume 6 Number S6, December 2024
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

THE EFFECT OF CUPPING THERAPY TOWARDS AGGRESSIVE BEHAVIOR AND SLEEP QUALITY AMONG AUTISM SPECTRUM DISORDER (ASD) PATIENTS

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ABSTRACT
Autism Spectrum Disorder characterized by behavioral issues like aggression, starts before age 3 and is linked to lead buildup. Poor sleep quality in ASD is due to circadian disruptions. Ongoing therapy is needed, and cupping therapy, releasing toxins like lead and affecting sleep quality via Nitric Oxide, is a complementary option. Objective: This study aimed to determine the effect of cupping therapy on sleep quality in people with Autism Spectrum Disorder (ASD). Methods: Observational correlative analysis with a prospective cohort study approach, the research sample was patients suffering from ASD in the city of Medan in 2023. Results: Based on the results of the Wilcoxon statistical test, the Sig. (2-tailed) 0.000 (p-value <0.05) which means there is a significant difference in aggressive behavior and sleep quality before and after being given cupping therapy in ASD sufferers. Conclusion: There is an effect of cupping therapy on aggressive behavior and sleep quality of Autism Spectrum Disorder (ASD) sufferers in the city of Medan in 2023.

Keywords: aggressive behavior; autism cupping therapy; circadian rhythm; cupping mechanism; sleep quality

How to cite (in APA style)
Sutysna, H., Jannah, M., & Sitorus, A. R. (2024). The Effect of Cupping Therapy Towards Aggressive Behavior and Sleep Quality among Autism Spectrum Disorder (ASD) Patients. Indonesian Journal of Global Health Research, 6(S6), 175-184. https://doi.org/10.37287/ijghr.v6iS6.4755.

INTRODUCTION

Autism Spectrum Disorder (ASD) is a genetically heterogeneous group of neurobehavioral disorders characterized by disturbances in three key areas: social communication, social interaction, and repetitive behaviors. These typically manifest during early developmental stages, often before the child reaches three years of age (Hyman et al., 2020).According to the International Society for Autism Research and Wiley Periodicals LLC in 2022, it was found that the prevalence of Autism Spectrum Disorders (ASD) ranges from 1.09 per 10,000 to 436 per 10,000 worldwide, with an average prevalence of 100 per 10,000 (Zeidan et al., 2022). In line with that, data cited from Wisevoter on their webpage titled "Autism Rates by Country" shows that the United Kingdom tops the list with a ratio of 700.07 per 100,000 individuals, while Indonesia ranks 160th with a ratio of 310.09 per 100,000 individuals (Solmi et al., 2022).

According to the WHO 2014 report, the prevalence of autism in Indonesia has experienced a significant increase, from 1 per 1,000 population to 8 per 1,000 population, surpassing the global average of 6 per 1,000 population. Meanwhile, according to the Ministry of Health, there is an estimated increase of 500 individuals annually in Indonesia. During the period of 2020-2021, there were 5,530 recorded cases of developmental disorders in children, including Autism Spectrum Disorder, which received intervention at community health centers (Badan Pusat Statistik, 2022; Leigh & Du, 2015).In the city of Medan, the only prevalence data on autism was conducted by the Autism Care Society Forum (FMPA) dated April 2012, which identified 1,000 diagnosed ASD children with an estimated 250 births per year. Consequently,

this has become a crucial issue for the people of Indonesia (Panggabean, 2019). Therapies administered to autistic individuals include behavioral therapy, speech therapy, occupational therapy, play therapy, and dietary therapy. However, only a few have shown significant improvements (Ismet, 2019).

The aggressive nature often raises concerns for parents and the surrounding environment in autism. Previous research has shown a correlation between the intake of gluten, casein, and heavy metals such as plumbum (Pb) with aggressive and hyperactive behavior in individuals with autism. The levels of heavy metals (Pb) tend to increase in children with autism, which can trigger aggressive behavior. Lead can damage the DPP-IV enzyme responsible for breaking down gluten and casein into peptides. If these peptides are formed, most of them can enter the bloodstream and reach the brain, where they exhibit toxic properties and can affect the central nervous system. As a result, this can impact aggressive behavior in the brain and lead to the emergence of clinical symptoms such as aggression, hyperactivity, tantrums, emotional disturbances, and communication disorders (Siburian & C, 2018).Individuals with autism should avoid consuming gluten and casein due to the accumulation of heavy metals (Pb), which converts gluten and casein into peptides that enter the bloodstream, leading to aggressive behavior in autistic individuals. Therefore, it is necessary to remove heavy metals (Pb) (Al-Bedah et al., 2019; NK et al., 2018). According to previous research, wet cupping therapy can be used to remove heavy metals (Pb) through blood detoxification. This therapy works by extracting toxins, including excess heavy metals (Pb), from the blood through the skin, which is believed to contribute to aggressive behavior in autistic individuals (Al-Bedah et al., 2019).

Cupping therapy has been known for thousands of years as a treatment believed to cure various ailments. The most commonly used form of cupping is wet cupping. Wet cupping involves the use of a specialized tool to suction blood through the skin at predetermined cupping points. The blood drawn through cupping is expected to extract toxins and other foreign substances from the body. Several studies have already investigated cupping therapy for pain, hypertension, diabetes, and other degenerative diseases (F et al., 2018).In addition to aggressive behavior, one of the most burdensome complaints for parents of children with ASD is sleep disturbances. The prevalence of sleep disturbances in children with ASD ranges from 40-80%, compared to 25-40% in children with other disorders (Kurniasih, 2017). However, the treatment administered only aims to minimize the symptoms that appear in each individual patient. This treatment often needs to be lifelong for ASD patients (Genovese & Butler, 2020). Therefore, complementary therapies are needed to help alleviate the symptoms experienced by patients.

Cupping therapy is a therapeutic procedure where cups are placed on the body surface, creating a vacuum to draw blood from beneath the skin surface or merely for suction without bloodshed. This therapy can serve both as treatment and prevention. The common types of cupping therapy are dry cupping and wet cupping. In wet cupping, the method involves suctioning the skin surface using a cup and then making small incisions or microtrauma on the suctioned skin (Kouser, 2021). This process can stimulate several hormones, one of which plays a role in regulating the basic circadian rhythm of the human sleep-wake cycle (Kurniasih, 2017; Setyawan et al., 2021).Previous research indicates that cupping therapy can release various chemicals such as serotonin, histamine, and bradykinin (Suryanda et al., 2017). These substances function to produce a dilation response in the cupping area, which subsequently relaxes muscles and consistently lowers blood pressure (Suryanda et al., 2017). Serotonin stimulates the hypothalamus, which synthesizes melatonin through the enzyme N-

acetyltransferase, emitted in a circadian cycle from the suprachiasmatic nucleus via the retinohypothalamic tract. Increased serotonin production can decrease noradrenaline and cholinergic levels, promoting restful sleep (Alkozi, 2019). Previous study also indicate a significant correlation was found between ASD patients and sleep disturbances (Chen et al., 2021). This research suggests that assessing sleep quality in ASD patients is important due to its biological significance.

In line with that, previous study found that cupping therapy affects the quality of stroke patients, where the incisions from cupping stimulate nerves on the skin surface, particularly the cornuposterior and spinothalamic tracts towards the thalamus, which produces endorphins. These endorphins induce a relaxing effect that reduces stimuli. This reduction in stimuli leads to drowsiness and restful sleep (Audina et al., 2020). Based on the background provided, there hasn't been specific research discussing the relationship between cupping therapy and ASD patients' sleep quality. Therefore, this study aimed to examine the effects of cupping therapy on aggressive behavior and sleep quality in autism spectrum disorder patients in Medan in 2023.

METHOD

Design

The research conducted is an observational analytical study with a prospective cohort design, where the researcher observes the effects occurring within one group without a comparison group by comparing its pre-post test before and after the intervention. The aim of the study is to determine the correlation or relationship between cupping therapy and aggressive behavior in patients with ASD, as well as cupping therapy's effect on the sleep quality of ASD patients.

Sample and Setting

The study is conducted at the Home Autis Centre, Kota Medan, North Sumatra. The population in this study consists of patients diagnosed with ASD in Medan. The study sample comprises ASD-diagnosed patients in Medan who meet the inclusion and exclusion criteria. Inclusion criteria include patients diagnosed with ASD, both male and female aged 0-18 years, whose parents consent to cupping therapy for their child and agree to participate in the study by signing an informed consent form. Exclusion criteria include patients aged >18 years, patients whose parents refuse cupping therapy for their child, patients who do not complete the study, and patients who refuse to be part of the study. Sampling technique involves direct observation based on inclusion and exclusion criteria for ASD patients in Medan in 2023, using purposive sampling. Purposive sampling is chosen for its appropriateness.

Instrument

Two tools were employed in this study. Initially, researchers devised a demographic datasheet to outline participants' characteristics, such as age and gender. Two validated questionnaires were used to assess aggressive behavior and sleep quality.

Aggression Behaviour Measurement

The research instrument utilized to assess aggressive behavior was the Buss-Perry Aggression Questionnaire Scale (BPAQ) (Archer & Webb, 2006), which was adapted into the Indonesian language in a previous study (Saputra & Handaka, 2017). The BPAQ categorizes aggression into four main dimensions: physical aggression, verbal aggression, anger, and hostility. Each dimension aims to capture various forms of aggressive behavior and inclinations, spanning from physical acts to internal emotions and tendencies toward antagonism. The questionnaire comprises 29 items, with respondents indicating their agreement with each statement on a

Likert scale. The reliability score, as indicated by Cronbach's alpha, was 0.826. Therefore, the Indonesian version of BPAQ deemed suitable for use in this study.

Sleep Quality Measurement

The Sleep Quality Questionnaire (SQQ) used in this study is a modification of the Pittsburgh Sleep Quality Index (PSQI) (Buysse et al., 1989) and St. Mary's Hospital (SMH) sleep questionnaires (Ellis et al., 1981). The SQQ consists of 7 parameters, with scoring ranging from 1-4. Three sleep component items were selected from the PSQI based on respondent characteristics in Indonesia, including (1) sleep onset time, (2) total hours of sleep per night, and (3) daytime fatigue/drowsiness. From the St. Mary's Hospital questionnaire, four items were selected for use in the sleep quality questionnaire: (1) frequency of waking up, (2) feeling refreshed upon waking in the morning, (3) sleep depth, and (4) sleep satisfaction. One open-ended question is included to interpret the patient's subjective sleep quality. Thus, the KKT is structured based on 7 modified sleep components, including (1) total hours of sleep per night, (2) sleep onset time, (3) frequency of waking up, (4) feeling refreshed upon waking in the morning, (5) sleep depth, (6) satisfaction with nighttime sleep, and (7) daytime fatigue/drowsiness. The assessment of each question point in the Sleep Quality Questionnaire (SQQ) uses a Likert scale ranging from 1-4, with the lowest possible total score being 7 and the highest being 28. A higher score indicates better sleep quality.

Wet Cupping Intervention

Wet cupping intervention followed a standardized procedure consisting of five steps proposed by previous study (Setyawan, 2022; Setyawan & Saifudin, 2023), including preparation, cup placement, incision, cupping, removal and dressing. Trained professionals performed the procedure in a controlled and sterile environment to ensure safety and minimize the risk of complications. Cupping was performed on the three specific points: (1) the upper back region (Al Kahil), particularly at the first thoracic vertebra (T1), (2) the neck (Al Akhda Ain), and (3) the midline of both shoulder blade points (Bainal Katifain). Details of these steps are outlined in Table 1.

Table 1.
Wet Cupping Technique

Step	Action
"Preparation"	"The initial step involves preparing both the treatment area and the patient. The designated area for cupping is thoroughly cleaned and sterilized to uphold hygiene standards. The patient's medical history and any contraindications are carefully assessed to confirm their suitability for the treatment."
"Cuping placement"	"In the second step, cups equipped with a vacuum-sealing mechanism are chosen for wet cupping. These cups are positioned on the designated points on the skin and softly pressed to form a vacuum seal. The cups remain in position for 5 minutes, enabling the skin to rise into them."
"Incision"	"During the third step, following the removal of the cups, the therapist utilizes a sterile lancet to create small, shallow incisions on the skin's surface. These incisions are carefully made at a controlled depth and angle to minimize discomfort and bleeding."
"Cupping"	"In the fourth step, cups are repositioned over the incised areas, and a vacuum is generated to extract a controlled amount of blood or other fluids. The therapist adjusts the suction pressure according to the patient's tolerance and the intended therapeutic effect. The cups remain in position for a predetermined duration, typically ranging from a few minutes to up to 7 minutes."
"Removal and dressing"	"In the final step, after the cupping session concludes, the therapist delicately removes the cups and administers sterile dressings or antiseptic ointments to the incised areas to prevent infection. Throughout this process, the patient's comfort and safety are prioritized."

Data Analysis

The data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 22. Univariate analysis was utilized to present the frequency and percentage distribution of the variables under consideration. Normality was assessed using the Kolmogorov-Smirnov test, revealing non-normal distribution among continuous data in both the treatment and control groups. Consequently, non-parametric testing was employed. Group comparisons were performed using the Wilcoxon test, with a significance level of 95%.

Ethical Consideration

Ethical approval for the research was obtained from the Health Research Ethics Committee of Faculty of Medicine, Universitas Muhammadiyah Sumatera Utara. The reference number for ethical approval is 1087/KEPK/FKUMSU/2023.

RESULT

Participants Characteristics

In this study, a total of 34 samples were obtained from the Home Autis Centre in Medan and the Home Autis Centre Bina Ananda Mandiri, all of which met the criteria. Based on Table 2, it is evident that out of the 34 ASD patients in Medan, the majority, comprising 50% (17 individuals), were aged ≥ 5 - 10 years, and 76.5% (26 individuals) were male.

Table 2.
Participants characteristics

Variable	f	%
Age (year)		
1-5	13	38.2
>5-10	17	50.0
>10-18	4	11.8
Gender		
Male	26	76.5
Female	8	23.5

The Effects of Cupping Intervention on Aggression Behavior and Sleep Quality among Participants

Table 3 shows the statistical analysis using wolcoxon test demonstrated a highly significant effect of cupping therapy on agression behavior (Z=-5.096, p<0.001) and sleep quality (Z=-4.634, p<0.001). This indicates that cupping therapy had a substantial impact on the participants' outcomes in terms of the measured variable.

Table 3.
Pre- and post-test mean comparison of aggression behavior and sleep quality

Variable	Pre-Test (Before intervention)	Post-Test (1 day after intervention)	Z	p-value[§]
	Mean ± SD	Mean ± SD		
Agression behavior	46.62 ± 1.38	25.53 ± 1.32	-5.096	<0,001*
Sleep quality	15.15 ± 1.35	18.53 ± 1.81	-4.634	<0,001*

Note: [§]Wilcoxon test was performed, [*]Significant at p<0.05.

DISCUSSION

This study aimed to examine the effects of cupping therapy on aggressive behavior and sleep quality in autism spectrum disorder patients. Based on the research data, the age group with the highest number of samples is the children category (>5 - 10 years) with 17 individuals. A

previous study in Hong Kong stated that the likelihood of ASD diagnosis in the children group is 16.1 per 10,000 children under 15 years old (Leung et al., 2023). Meanwhile, research by another previous study suggests that ASD is typically diagnosed in preschool-aged children (Fernell & Gillberg, 2010; Larsen, 2014; Zeidan et al., 2022). Further study also supported this study findings, indicating that ASD abnormalities in school-aged children are notably evident, especially in social communication interactions (Martínez-Pedraza & Carter, 2009; Nicholas et al., 2009; Widiarti et al., 2021).

This study findings also showed that the most frequent gender among the samples is male, with 26 individuals, while females only accounted for 8 individuals. This aligns with previous study that involving 1,310 children, of which 765 were male and 393 were female (Chen et al., 2021). This finding is also consistent with the theory proposed by DSM-5, stating that ASD occurs four times more often in males than in females (Date, 2013). The exact cause of ASD being more prevalent in males than females is not fully understood, but experts suggest that ASD individuals experience disruptions in the X chromosome, where there is a repetition of CGG trinucleotides. This repetition can hinder the production of proteins crucial for cognitive development. This is more pronounced in males because when the X chromosome in males is disrupted, the disorder is immediately noticeable, whereas if this occurs in one of the X chromosomes in females, it only acts as a carrier (Haebig et al., 2020).

Based on the research data, the most commonly performed cupping points in this study are 4 points (44.1%), and the average number of cupping points used for all patients in this study is Al-Kahil on the upper back of the patient or between the two shoulders. Several patients underwent cupping at other points according to their perceived complaints, including Akhda'ain, and Al-Katifain. Each individual elicits different reactions because cupping works on specific nerve points associated with the body's response. At the Al-Kahil point anatomically located between the Spinous Processes of Cervical VII and Vertebra Thoracal I (TI), precisely within the Semispanalis Capitis muscle. This point lies between the two acromia (shoulder blades) (Khaleda, 2019). It is noteworthy that this point is where blood vessels branch out to all human organs, either towards or away from the heart. Research by three German scholars from the Fask Institute conducted over six months found that this point harbors a network of glands that regulate 72 hormones distributed throughout the body (Qureshi et al., 2018). Therefore, the Al-Kahil point has become a primary alternative for addressing various ailments. However, in ASD patients, the researcher observed that not all points could be treated according to the patient's complaints due to the respondents' uncontrolled conditions overall. Therefore, cupping therapy was administered at several points, considering the patient's condition and complaints. Each patient received intervention at the Al-Kahil point.

Based on the research data, there was a change in sleep quality scores between the pre-test and post-test of the sleep quality questionnaire. This aligns with Mia Audina's study in 2020, which found a significant influence of complementary cupping therapy on sleep quality, although the respondents were stroke patients (Mia Audina et al., 2020). According to direct interviews conducted by the researchers, some parents of the respondents mentioned that the effect of cupping therapy on their children's sleep quality was felt immediately after 3-4 hours upon returning home. Consistent with this, the mechanism theory of cupping, known as the Release of Nitric Oxide Theory, can regulate the circadian rhythm. The circadian rhythm is the body's physiological cycle over 24 hours, including regulating individual body timing for sleep-wake cycles (Al-Bedah et al., 2019). Based on the correlation results between cupping therapy and the aggressive behavior scores of ASD patients in Medan, a P-value of <0.05 was

obtained, indicating an influence of cupping therapy on the aggressive behavior of ASD patients in Medan in 2023.

The findings of this study elucidate the mechanism of cupping therapy in eliminating toxins and other foreign substances through blood detoxification. In ASD, there are heavy metals (Pb), gluten, and casein circulating in the blood, contributing to aggressive behavior in individuals with ASD. Therefore, cupping therapy can expel these foreign substances through the blood that exits from the skin (Al-Bedah et al., 2019). In previous research showed that autism exhibits an excess of heavy metal (Pb) in the body, leading to aggressive behavior. This is because lead damages the DPP-IV enzyme, which converts gluten and casein into peptides. When peptides form, they enter the bloodstream and reach the brain, resulting in aggression in the brain and clinical symptoms such as aggression, hyperactivity, tantrums, emotional disturbances, and communication disorders (Siburian & C, 2018).Based on the previous research, the blood detoxification theory in the mechanism of cupping therapy can significantly remove heavy metals such as lead (Pb), mercury, silver, and other foreign substances. Therefore, it can be concluded that heavy metals in ASD influence the aggressive behavior of individuals with ASD. Hence, wet cupping therapy, by extracting impure blood through the skin, can remove these heavy metals and make autistic children calmer (Al-Bedah et al., 2019).

Based on the research data, a significance value of $p < 0.05$. This indicates a significant influence of Cupping Therapy on the sleep quality of ASD patients. This finding is consistent with previous study, which showed a significant effect of cupping on sleep quality in stroke patients located in the brainstem (Mia Audina et al., 2020). Similar with another previous study that revealed that cupping therapy can release various substances such as serotonin, histamine, bradykinin, and others, leading to capillary and arteriolar dilation and microcirculation in the bloodstream. This results in muscle relaxation and stable blood pressure reduction (Suryanda et al., 2017). In its theory, it's explained that the sleep cycle regulation system is divided into two parts: the activation system involving the Reticular Activating System (RAS) and the Bulbar Synchronizing Regional (BSR). The Reticular Activating System (RAS) activity is heavily influenced by neurotransmitter activity such as the serotonergic, noradrenergic, cholinergic, and histaminergic systems. Increased serotonin levels, decreased noradrenaline levels, decreased cholinergic activity, and increased histamine levels can lead to restful sleep. Cupping stimulates nerves on the skin surface, which then travel through A-delta and C fibers to the dorsal horn of the spinal cord and the spinothalamic tract to the thalamus, where endorphins are produced. These endorphins have a relaxing effect, reducing stimulation. The stimulus is transmitted to the Reticular Activating System (RAS), which is then relayed to the Bulbar Synchronizing Regional (BSR). This decrease in stimulus leads to drowsiness and restful sleep (Mia Audina et al., 2020).

Based on interviews with the parents of respondents, it was noted that autistic patients typically exhibit sleep disturbances characterized by prolonged bedtime preparation, difficulty returning to sleep once awakened at night, and daytime sleepiness. Following cupping therapy, some respondents experienced improved sleep quality both during the day and at night, although five respondents showed no noticeable improvement in sleep quality before and after the therapy; their questionnaire scores remained unchanged. This could be attributed to the single cupping intervention conducted in this study, with immediate observation the following day. This aligns with previous research, which highlights the significant impact of sleep disturbances in ASD patients, emphasizing the importance of assessing sleep quality due to its biological implications. The study identified four key factors to consider in ASD

patients' sleep quality: resistance to sleep time, anxiety, prolonged bedtime preparation, and daytime sleepiness (Chen et al., 2021).

CONCLUSION

The study concludes that wet cupping therapy has a significant effect on reducing aggressive behavior and improving sleep quality in patients with autism spectrum disorder (ASD) in Medan City in 2023. The findings suggest that wet cupping therapy may offer a promising complementary therapy for managing behavioral and sleep disturbances in ASD patients. However, further research with larger sample sizes and longer follow-up periods is recommended to validate these findings and explore potential mechanisms underlying the therapeutic effects of wet cupping therapy in ASD patients. Additionally, considering the multifaceted nature of ASD and its diverse symptomatology, a comprehensive approach integrating various therapeutic modalities may be warranted for optimizing treatment outcomes

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