

RESEARCH ARTICLE

Effectiveness of Chamomile Tea toward Sleep Quality Amount Autistic Children

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Abstract

Introduction: Autistic children often experience sleep problems when compared to children in the general population. Difficulty in starting sleep or maintaining sleep occurs in about 10% to 20% of children aged 4-15 years; it can cause other problems such as behaviour disorders, cognitive, and hyperactivity. Consuming chamomile tea before going to sleep is believed to make the body's muscles relax and make the individual sleep faster. This study aims to analyze the effectiveness of chamomile tea on sleep quality in autistic children in Surabaya. **Method:** pre-experimental research with one group pre-post-test design. The population of 221 of autistic children with a sample of 66 respondents selected by simple random sampling. The instrument used a questionnaire sheet CSHQ (Children Sleep Habit Questionnaire), the independent variable in this study was the drinking of chamomile tea, the dependent variable was sleep quality, data were analyzed using the Wilcoxon Signed Test ($\alpha = 0.05$). **Results:** after being given chamomile tea once every 2 days for 1 month it was found 54 respondents (81.8%) improved their sleep quality and 12 respondents (18.2%) had a stable sleep quality. Wilcoxon Signed Test results show the effectiveness of chamomile tea on sleep quality for children with autism $p=0.0013$. **Conclusion:** Chamomile tea has an active ingredient apigenin which will bind GABA in the brain to reduce excessive brain activity so that the body becomes calmer and more relaxed. So that chamomile tea can be consumed by children with autism to reduce sleep disorders.

Keywords: *Autistic children; Chamomile tea; Sleep quality.*

Introduction

Generally, people with autism will develop a difficult attitude to build relationships with others, unable to communicate simply, and difficult to develop social relationships and sleep disorders. The biggest sleep problems among these children include sleep difficulties, inconsistent sleep routines, restlessness or lack of sleep quality and waking up early [1, 2].

Autistic children often experience sleep problems when compared to children in the general population. Sleep problems are a major health problem in children with autism because they can cause other disorders such as behaviour, cognitive, and worsening symptoms of autism it-self. School-based epidemiological research shows that sleep disorders are often found in children. Difficulty in starting sleep or maintaining

sleep occurs in about 10% to 20% of children aged 8-9 years, sleep-related sleep disorders occur in about 1% -3% of school-aged children, and excessive daytime sleepiness seems to cause problems evident in about 10% of school-age children [3]. Other studies related to this matter were also conducted by Uren et al (2019) that children aged 2-8 years most often experience anxiety and disturbance of sleep problems, problems that are often found are difficulty in starting sleep, do not want to sleep alone, often wake up at night, tired and often sleepy during the day [4].

Sleep problems have been reported in autism spectrum disorders (ASD) for many years with estimated prevalence ranging from 44% to 83% [5]. In Abbas's study, (2013) about 35% of 80 autistic children only get 6-7 hours

of sleep at night. Also found in a descriptive study conducted by Souders et al., (2009) using CSHQ showed 66.1% of parents of children with ASD (Autism Spectrum Disorder) (62.5% autism, 76, 2% PDD-NOS (*perverse developmental disorder - not otherwise specified*), Asperger 58.3% and 45% of parents of control subjects reported that their children had sleep problems.

The dominant sleep disorder in the ASD cohort is a type of behaviour insomnia before sleep and insomnia due to PDD [6]. Chan & Tsang's research (2016) writes that the results of his research mention that based on epidemiological research, an average of 10,000 individuals found 5 cases of autism or of 10,000 individuals in which there were 20 cases, 2 cases were autism. Recent studies indicate the prevalence rate for ASD to be 60-70 cases per 10,000 individuals, The estimated prevalence of sleep problems in children with ASD ranges from 44% to 83% [7].

Estimated number of autistic children in Indonesia reaches 150-200 thousand people. If the birth rate in Indonesia is six million per year, the number of autistic people in Indonesia increases by 0.15% or 6,900 children per year. In 2000 the number of autistic persons in Indonesia was estimated at 1: 5000 children, while in 2010 it increased to 1: 500 children. In East Java in 2009 there were 93 inclusive schools with students with special needs 1,476 children and 15% were autistic children [8].

Sleep disorders that are often experienced by autistic children will have an impact on their behavioural deviations. Izazi research result showed that 30% of autistic children experiences sleep disorders and 10% of them experience deviant behaviour. Puspitasari research results (2016) showed that the sleep quality of autistic children in SLB Kulonprogo Yogyakarta is poor with an average score of 54.13 using CSHQ. The most common sleep disturbance is sleep duration which is 17% and start sleeping 17% [9].

According to several studies above it appears that sleep problems are often experienced by autistic children. Abnormalities in the brain due to autism cause less serotonin production in the brain than children in general and it is one of the causes of decreased sleep quality in children with autism [10]. Lack of sleep can

limit one's ability to think and solve problems effectively.

Sleep deprivation also affects the ability to interpret events accurately, meaning that it is difficult to respond correctly to situations and make effective, intelligent decisions. Lack of sleep, even for one night can cause eye swelling and turn the skin into pale skin. Sleep disorders can have detrimental effects on children's cognitive development and daily functioning in areas such as attention, learning, memory, mood regulation, and behaviour [11].

Besides, sleep deprivation in children with ASD has been shown to greatly influence parental sleep quality and increase stress. These sleep problems can become chronic and stable over time, and these problems will last into adulthood if left untreated [12]. Melatonin is a hormone produced in the pineal gland can play a role in regulating one's sleep. Abnormal melatonin levels have been identified in individuals with ASD by several researchers.

Another hypothesis is that synaptic pathways and gene anomalies associated with ASD alter the level of monoaminergic neurotransmitters associated with wakefulness. This dysregulation may be a basic mechanism in the high levels of anxiety, anxiety, and fear experienced by children with ASD, which can also cause difficulties in starting sleep, maintaining sleep and they often wake up in beginning [13]. The use of plants as traditional medicinal herbs in the community has been known for thousands of years ago, one of which is chamomile.

Chamomile is one of the oldest and most well-documented medicinal plants in the world and has been recommended for various healing applications [14]. Many different chamomile products have been developed, and the most popular an herbal tea which is consumed more than one million glasses per day. Chamomile tea is also often consumed as a lullaby because of its calming effect on the body. Traditionally, chamomile products such as tea and aromatherapy essential oils have been used to treat insomnia and to induce sedation. The sedative effect is caused by flavonoids, apigenin which bind GABA receptors in the brain. In another study, inhalation of chamomile oil vapors reduced

elevated levels of plasma adrenocorticotrophic hormone (ACTH) caused by stress. The purpose of this study was to analyze the effectiveness of chamomile tea on sleep quality in autistic children in Surabaya.

Method

The method used in this study is a pre-experimental method with one group pre-test-post-test design. Assessment of sleep quality in children with autism will be observed before giving chamomile tea then observed again after intervention.

The provision of intervention will be done once every 2 days for a month. The population is 221 respondents, the sampling technique uses simple random sampling, the numbers of samples in this study were 66 respondents. Inclusion criteria: autistic child, no history of tea allergy, autistic children who can still be tolerated, living with parents.

Intervention was given chamomile tea (1.5 g) brewed with 250 cc of water, given when it was warm (30-35°), then given to all autistic children aged 4-14 years, given 2 days for a week in 1 month. Then the observations were carried out with an observation sheet CSHQ to assess sleep quality. CSHQ is a questionnaire used to assess problems of sleep behaviour in children aged 4-14 years.

This questionnaire consisted of 33 items, which were divided into 8 subscales (sleep

resistance, sleep delay, sleep time, sleep anxiety, sleepless nights, parasomnia, irregular breathing, and daytime sleepiness). CSHQ has a cut-off point of 41, which when found a total score of > 41 is a sign that there is sleep disturbance [15]. We ask parents to remember their children's sleep behaviour in the past few weeks. Items are rated on a three-point scale: often / always, if sleep behaviour occurs 5-7 times a week (given a value of 3); sometimes / sometimes 2-4 times a week (given a value of 2); and rarely for 0-1 times a week (given a value of 1).

Results of data collection for the first time through a demographic data questionnaire distributed to parents/guardians. Samples are asked to fill in biodata and approval sheets to become the samples that have been provided. The questionnaire sheets collected were examined again when parents/guardians filled out the questionnaire. Univariate analysis was performed on each variable studied. Analysis of statistical tests using the Wilcoxon Signed Rank Test with the significance level (α) = 0.05, is accepted if $p < 0.05$, meaning there is effectiveness of chamomile tea on the quality of sleep in children with autism. A statement of medical research ethics issued by the Health Research Ethics Commission (KEPK) of STIKes Hang Tuah Surabaya per Number: PE/64/VII/2018/KEPK/SHT.

Results

Table 1: Characteristics of respondents (n = 66)

Characteristics of respondents	n	%
Age		
4-7 years	30	45.5
8-14 years	36	54.5
Sex		
Male	48	73
female	18	27
Education		
Pre school	10	15.1
Primary school	31	47
Secondary school	25	37,9
Type Sleep disorder		
Sleeping time	12	18
Sleep behaviour	20	30
Wake up at night	14	22
Up early	10	15
Sleepy during the day	10	15

Table 1 shows the number of children aged 4-7 years as much as 45.5%, ages 8-14 years 54.5%, male gender 73%, girls 27%, pre-school education of children 15.1%, elementary school 47%, secondary school 37, 9%. The initial findings in this study were obtained from 66 respondents since the beginning of improving sleep in various types, namely difficulty starting, rebelling during sleep (18%), restless sleep disturbance (30%), often waking up at night (22%), difficulty waking up from beds (15%) and sleepiness

during the day (15%). In general, the results of the study based on table 1 show that from 66 respondents (100%) data obtained regarding the quality of sleep of autistic children is disturbed

Table 2: Sleep quality of children before and after giving chamomile tea.

Sleep Quality	Pre-test		Post- test	
	n	%	n	%
no sleep disorder	0		54	81,8
sleep disorder	66	100	12	18,2
Total	66	100	66	100

Wilcoxon signed rank test p= 0.001

Table 2 shows that 66 respondents, the pre-test results showed 66 (100%) respondents experienced sleep disorders. After being given the chamomile 250 cc, once every 2 days for 1 month, the results of the post-test showed 54 (81.8%) respondents showed no sleep disorder, while 12 (18.2%) continued to experience sleep disorder. Wilcoxon test results Sign rank test shows p = 0.001 (alpha <0.05)

Discussion

There are several types of sleep problems found by respondents, namely sleeping, sleeping problems, waking up at night, waking up in the morning and getting sleepy during the day. Many studies suggest that autistic children often experience sleep problems compared to children in general, these symptoms are often found from reports of parents stating that their children often wake up at night and have difficulty starting sleep [16].

Parents of many autistic children report their child's problems, where most children with autism, will experience problems in their behaviour and cognitive when compared with normal children of the same age. The most common sleep disturbance in children with autism is difficult to start sleeping, often waking up at night and found restlessness during sleep.

Sleep problems in autistic children can occur due to complex interactions between psychological, biological, social, environmental and family factors, the child's development is sometimes difficult to condition in terms of sleep, so it will be difficult when starting to sleep, some of these factors can contribute to sleep problems in children autism [4].

Sleep quality has often been associated with children's behaviour, if the child has sufficient sleep and good quality, then the predicted behaviour of the child tends to be good. Poor sleep quality also causes a decrease in cognition, hyperactivity, anxiety, and stress in the family. In children with poor sleep quality, more than 50% of these children are reported to have problems with attention, social interaction, language, hyperactivity, sensory disturbance, anxiety,

eating behaviour, and self-stimulation behaviour, even good sleep only reported to have problems in three areas namely language, attention and social interaction. Sleep disorders also exacerbate maladaptive behaviour such as self-injury, tantrums, and aggression. Short sleep duration is often also associated with deficits in social skills, stereotypical behaviour, an overall increase in the value of autism [17]. Sleep disorders in children with autism are also influenced by the types of food consumed daily, as a result of inappropriate diets, children will have an impact on their daily behaviour such as not concentrating, daydreaming, raging themselves, tantrums, anxiety, maybe even insomnia.

However, the type of food that is restricted also does not directly affect their sleep quality because almost all of the food contained in L-Tryptophan is an amino acid from a protein that is digested by the body and will be converted to serotonin. The amount of each food varies; protein contains a high amount of legumes while children with autism cannot eat these ingredients because of problems in digesting food. Not following the proper dietary rules can lead to raging behaviour, self-talk, frequent anger, anxiety, hyperactivity, and even problems with sleep [18].

Sleep quality is also influenced by the condition of the body's immune modulator, where good, controlled levels of cortisol, IFN and IL-10 can improve the quality and quantity of sleep, the increase in cortisol that triggers ACHT is often also influenced by the stress experienced by children, behaviour disorders and other problems associated with these hormones [19].

After being given 250 cc of chamomile tea, which was given 2 days for 1 month it was found that there was a change in the CSHQ score (sleep quality) of autistic children, which is 54 respondents experienced sleep changes. Changes experienced by children are ease in sleeping, not sleepy during the day, the frequency of waking up at night is greatly reduced, can sleep soundly, waking up in the morning looks fresh and does not wake up at night.

There are 48 (72%) children reported experiencing improvement in sleep quality, and 6 (9%) children sometimes wake up at night and sometimes still sleepy during the day, but in general, there is an improvement in sleep quality. According to parents the child no longer looks tired or sleepy during the day or in the middle of activities, and the child wakes up alone in the morning other than that the child has no difficulty waking up in the morning.

Whereas 12 (18%) other children still experience sleep disturbance routinely at night with frequent awakening, appear to yawn often during the day, the same number of hours of sleep as before, restlessness during sleep, difficulty when starting to sleep and wake up, often wake up at night. In other research, religious relaxation therapy effectively helps in starting sleep, which shortens the time span from lying in bed and starting to sleep. Starting the process of sleep easily has a positive effect on the duration of sleep.

By starting to sleep earlier, the duration of the early stages of sleep is shorter and ultimately extending the hours of sleep [20, 21]. Sedative effects contained in chamomile such as flavonoids, apigenin will bind to the GABA receptors in the brain, which in turn will reduce levels of plasma adrenocorticotrophic hormone (ACTH) which causes interference with melatonin. Melatonin is a hormone produced in the pineal gland that can play a role in regulating one's sleep. Abnormal melatonin levels have been identified in individuals with ASD by several researchers [22]. Another hypothesis is that synaptic pathways and gene anomalies associated with ASD alter the level of monoaminergic neurotransmitters associated with wakefulness.

This dysregulation may be a basic mechanism in the high levels of anxiety, anxiety, and fear experienced by children with ASD, which can also cause difficulties in starting sleep, maintaining sleep and they often wake up in beginning [13]. Preclinical studies show that apigenin flavonoid constituents produce a sedative effect through modulation of gamma-aminobutyric acid (GABA) receptors. Chamomile tea is a natural herbal drink that has a calming effect on the consuming body [23]. GABA is a neurotransmitter that acts as an inhibitor which decreases the excitability of neuron cells. Na^+ and Cl^- are found in high concentrations outside the cell, whereas K^+ concentrations are high inside the cell.

Apigenin in chamomile tea will bind GABA receptors in the brain so that GABA can bind to its receptors, GABA receptors. GABA binding will cause hyperpolarization of cell chloride ions which results in cell concentration becoming more negative thereby inhibiting the action potential that appears in receptor neurons and the inhibitory effect of GABA acts on the entire central nervous system. When the body feels relaxed the heart and breathing activity will gradually stabilize which will cause calm and drowsiness if the body is in bed a few moments later the individual will enter stage 1 NREM which is the initial stage of the sleep process [3].

Turning off the bedroom lights will also increase the production of the hormone melatonin which increases drowsiness and makes you sleep. Thus, researchers assume consuming chamomile tea before going to sleep will make the body's muscles relax and make someone sleep faster. The results of statistical tests that function to determine whether or not there are changes in sleep quality before and after giving chamomile tea is the Wilcoxon Signed Rank Test.

From the Wilcoxon Signed Rank Test results obtained $p = 0.001$ or $p < 0.05$, which means H_1 is accepted, this means there is effectiveness in giving chamomile tea to the quality of sleep in children with autism. Consuming chamomile tea before going to sleep is very good because it can make the muscles relax and make sleep faster. Chamomile tea has an active substance

apigenin which will bind GABA in the brain reducing excessive brain activity so that the body becomes calmer and more relaxed.

Besides apigenin, chamomile tea also contains potassium which can help the intestine absorb L-Tryptophan protein which will be converted by the body into serotonin, which is a happy hormone serotonin which will make the body's muscles calmer. Many factors affect the ability to get adequate rest one of which is hyperactivity in children with autism.

In this case, good chamomile tea is consumed because the content of apigenin in chamomile tea can make the body more relaxed and naturally mood stabilizing. Waking up frequently during the sleep cycle and sleeping too much can also affect one's sleep quality. Adequate sleep can also help their cognitive development in various fields such as attention, learning, memory, mood regulation and behaviour [5].

Zick, Wright, Sen, & Arnedt, 2011 conducted a randomized trial of patients with primary insomnia ≥ 6 months given chamomile tea as much as 270 mg twice daily for 28 days, the results found that there was an improvement in the sleep quality of patients with insomnia [22]. Giving tea regularly has been proven to be able to reduce stress and make relaxation; it will certainly make someone who drinks tea easier to rest. After treatment 12 children did not experience a change in the score in the category of sleep resistance, some parents

felt less calm because their children often rebelled at bedtime, or needed to be accompanied more often by parents. Sleep duration has not changed as before, often waking up and hard to wake up in the morning. Sleep problems increase the severity of autistic symptoms such as opposition, aggressive, explosive behaviour, attention deficit, impulsivity, hyperactivity, anxiety, and depression [14].

The percentage of behaviour disorder is higher in children with poor sleep quality, compared to autistic children with good sleep quality. Chamomile tea is not the only one to help improve sleep quality, but many other therapies that can also be used as other alternatives, such as sleep hygiene and brain gym, which can also improve sleep quality and comfort [24]. Sleep disorders in adolescents today are often associated with the use of smartphones at night, where excessive use of smart phones before going to sleep, was able to cause sleep disorders and depression in adolescents [25].

Conclusion

Chamomile tea which is given 250 cc every 2 days for 1 month improves the quality of sleep in children with autism because it can make the muscles relax and make sleep faster. Chamomile tea has an active ingredient apigenin which will bind GABA in the brain to reduce excessive brain activity so that the body becomes more calm and relaxed.

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