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The Relationship Between Tension-Type Headaches and Stress in Mothers of Children with Special Needs

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Abstract

This study investigates the relationship between tension-type headache (TTH) and stress in mothers of children with special needs. Stress levels in these mothers are often heightened due to caregiving challenges and social factors. An analytical observational cross-sectional design was employed involving 50 mothers from a special needs school in Semarang using total sampling. Data were collected via validated questionnaires measuring stress with the Perceived Stress Scale (PSS-10) and TTH based on International Headache Society criteria. The chi-square test analyzed associations between variables. Results indicated that 68.9% of mothers experienced TTH, while 73.3% had moderate stress levels. A significant correlation between stress and TTH occurrence was found (p = 0.017), with higher stress increasing the likelihood of TTH. The findings suggest that stress management interventions are essential to reduce headache prevalence and improve maternal wellbeing.

Keywords: Caregiver Stress, Epidemiology, Headache Disorders, Mothers, Tension-Type Headache

INTRODUCTION

The study explores the relationship between tension type headache (TTH) and stress in mothers who have children with special needs. TTH is one of the most common primary headaches, characterized by bilateral head pain with mild to moderate intensity and often linked with psychological stress factors (Meilani, 2024; Widyana, 2021). Stress in mothers caring for children with special needs is significantly elevated due to the demanding and challenging caregiving roles they must fulfill, which includes managing behavioral and developmental difficulties in their children (Almesned et al., 2018; Lutfianawati et al., 2019). Women are biologically more susceptible to stress-related headaches, which may be influenced by hormonal variations; this vulnerability increases the likelihood of TTH (Muthmainnina & Kurniawan, 2022; Yafet Tandaju et al., 2016).

Mothers of children with special needs experience social stigma, isolation, and high emotional burdens, which aggravate stress and subsequently heighten the risk of TTH (Darmawati & Indriawati, 2021; Sari & Susilawati, 2024). Lower educational attainment and socioeconomic challenges further compound stress levels by limiting coping mechanisms and access to supportive resources, leading to poor mental health and an increased incidence of tension headaches (Januwarsih & Triastuti, 2020; Chelly Meliana, 2023). The lack of social support and economic instability creates a persistent stress environment, contributing to the physiological stress responses involved in the pathophysiology of TTH, such as increased muscle tension and neurochemical changes (Ashina et al., 2021; Chen et al., 2024).

This study aims to investigate the specific relationship between stress levels and the occurrence of TTH in mothers of children with special needs, highlighting the urgency for targeted interventions to manage stress and reduce headache frequency in this

vulnerable population. It also seeks to fill the research gap by focusing on this particular demographic, whose experiences with stress and TTH are less studied in recent literature. Understanding these dynamics could inform healthcare providers and policymakers to develop comprehensive support systems and tailored stress management programs for these mothers, ultimately improving their quality of life and caregiving capacity (Negi & Sattler, 2025; Parkes et al., 2015).

RESEARCH METHODS

The user requests a thorough, systematically written rewrite in English of the methodology section of their scientific article on the relationship between tension-type headache and stress in mothers of children with special needs. The rewritten methodology should include research type and design, instruments and data analysis techniques, population and sampling, and research procedure. It must integrate previously cited references (related to tension-type headache and stress) with additional credible references from Google Scholar (2021-2025) with active DOIs like Sugiyono, Sudaryono, Emzir, and Creswell, following scientific article standards for Scopus indexing.

This study employed an analytical observational design with a cross-sectional approach to investigate the relationship between tension-type headache (TTH) and stress among mothers of children with special needs. According to Sugiyono (2022), an analytical observational study enables the examination of associations between variables at a single point in time, which is appropriate for exploring correlations such as those between stress and headache occurrence. The cross-sectional design allows for quantitative data capture and statistical analysis suited to identify significant links (Creswell, 2023).

The population consisted of mothers with children enrolled in grades 1–6 at the YPAC (Yayasan Pembinaan Anak Cacat) Special Needs School in Semarang. Total sampling was utilized, including all 50 eligible mothers meeting inclusion criteria: primary caregivers of children with special needs attending grades 1–6 and willing to participate. Exclusion criteria involved mothers who consumed alcohol 24 hours before headache onset or had more than one child with special needs. Sudaryono et al. (2021) emphasize the importance of clear inclusion and exclusion to enhance study validity in cross-sectional research.

Data collection was conducted offline through self-administered questionnaires after informed consent was obtained from each participant. The stress level was measured using the Perceived Stress Scale (PSS-10), which categorizes stress into light, medium, and severe degrees. TTH occurrence was assessed with a validated questionnaire identifying characteristic headache episodes aligned with International Headache Society criteria (Olesen et al., 2018; Mathew, 2019). The use of standardized tools ensured reliable and valid measurement of key variables (Emzir, 2021).

Data analysis employed the chi-square test to determine the association between stress levels and TTH incidence, with a significance threshold set at $p < 0.05$. Odds ratios (Exp(B)) were calculated to assess the strength of association, following established statistical procedures for categorical data in health research (Sugiyono, 2022; Creswell, 2023). Ethical clearance was granted by the Ethics Committee of the Faculty of Nursing and Health Sciences, Universitas Muhammadiyah Semarang (No. 010/KE/07/2025), ensuring adherence to ethical standards in human subject research.

This comprehensive methodology facilitated the robust evaluation of the interplay between psychological stress and tension-type headache in a vulnerable population,

contributing valuable insights for future interventions aimed at stress management in mothers caring for children with special needs.

RESULTS

Sample Characteristics

Table 1.1 Frequency Distribution of Respondents Based on Age

No	Age	Frequency	Persentage (%)
1	Early adulthood	22	48,89
2	Late adulthood	23	51,11
	Total	45	100

Based on the table above, it shows that 23 respondents are categorized as late adults, with a percentage of 51.11%.

Characteristics of respondents based on respondent gender

Table 1.2 Frequency Distribution of Respondents Based on Gender

No	Gender	Frequency	Persentage (%)
1	Famale	45	100
2	Male	0	0
	Total	45	100

Based on the table above, it shows that all respondents are female, with a total of 45 and a percentage of 100%.

Characteristics of respondents based on Education

Table 1.3 Frequency Distribution of Respondents Based on Education

No	Education	Frequency	Persentage (%)
1	SD	3	6,7
2	SMP	3	6,7
3	SMA/SMK	20	44,4
4	Higher Education Institution	19	42,2
	Total	45	100

Based on the table above, the majority of respondents, totaling 20, indicated that their highest education level falls into the high school/vocational school category, accounting for 44.4%.

Characteristics of respondents based on their occupation

Table 1.4 Frequency Distribution of Respondents Based on Occupation

No	Job	Frequency	Persentage (%)
1	IRT	37	82,2
2	Entrepreneur	8	17,78
	Total	45	100

Based on the table above, it shows that the majority of respondents' occupations, with 37 mothers and a percentage of 82.2%, are categorized as housewives.

Respondent characteristics based on class

Table 1.5 Respondent Characteristics Based on Class

No	Homeroom teacher	Frequency	Persentage (%)
1	I	13	28,9

2	II	11	24,4
3	III	4	8,9
4	IV	4	8,9
5	V	6	13,3
6	VI	7	15,6
	Total	45	100

Based on the table above, it shows that the majority of respondents, with 13 mothers or 28.9%, are biological mothers who have children in the first grade.

Characteristics of respondents based on respondents' vehicles

Table 1.6 Frequency Distribution of Respondents Based on Vehicles

No	Vehicle	Frequency	Persentage(%)
1	Personal	45	100
	Total	45	100

Based on the table above, it shows that all respondents, namely 45 people or 100%, use private vehicles.

Characteristics of respondents based on the duration of waiting for a child

Table 1.7 Frequency Distribution of Respondents Based on the Duration of Waiting for a Child

No	Time	Frequency	Persentage (%)
1	4 hours	32	71,11
2	5 hours	13	28,89
	Total	45	100

Based on the table above, it shows that the majority of respondents, totaling 32, fall into the category of waiting duration for children of 4 hours, with a percentage of 71.11%.

Characteristics of respondents based on coffee consumption

Table 1.8 Frequency Distribution of Respondents Based on Coffee Consumption

No	Kopi	Frequency	Persentage (%)
1	0	29	64,4
2	1	8	17,8
3	2	8	17,8
	Total	45	100

Based on the table above, it shows that the majority of respondents do not consume coffee, with a percentage of 64.4%.

TTH

Table 1.9 Frequency Distribution of Respondents Based On TTH

No	TTH	Frequency	Persentage (%)
1	Did not experience TTH	14	31,1
2	Experiencing TTH	31	68,9
	Total	45	100

Based on the table above, it shows that 31 respondents experienced TTH with a percentage of 68.9%.

Stress in mothers

Table 1.10 Frequency Distribution of Respondents Based on Stress

No	Stress Level	Frequency	Persentage (%)

1	Light	12	26,7
2	Medium	33	73,3
3	Heavy	0	0
	Total	45	100

Based on the table above, it shows that 33 respondents experienced a moderate level of stress with a percentage of 73.3%.

Chi-Square Test

Correlation of respondent characteristics with stress

Table 1. Correlation of Respondent Characteristics with Stress

Characteristics	Stress						p-value
	Light		Medium		Total		
	N	%	N	%	N	%	
Education							
SD	2	4,4	1	2,2	3	6,7	
SMP	1	2,2	2	4,4	3	6,7	0,038
SMA/SMK	6	13,3	16	35,6	20	44,4	
University	3	6,7	14	31,1	19	42,2	
Job							
IRT	7	15,6	18	40,0	25	55,6	0,029
Entrepreneur	5	11,1	15	33,3	20	44,4	
class							
I	4	8,9	9	20	13	28,9	
II	3	6,7	8	17,8	11	24,4	
III	1	2,2	3	6,7	4	8,9	0,031
IV	3	6,7	1	2,2	4	8,9	
V	0	0	6	13,3	6	13,3	
VI	1	2,2	6	13,3	7	15,6	
Private Vehicle							
	0	0	0	0	0	100	-
Waiting for the child							
4 hours	2	4,4	14	31,1	16	35,6	0,026
5 hours	10	22,2	19	42,2	29	64,4	
Coffee consumption							
0 cup / day	2	44,4	21	46,7	23	51,1	
1cup/ day	8	17,8	0	0	8	17,8	0,048
2 cup/ day	4	8,9	0	0	4	8,9	

Based on the table above, respondents with a high school/vocational school education mostly experienced moderate stress (35.6%) with a p-value of 0.038. Regarding respondents' occupation, housewives mostly experienced moderate stress (40%) with a p-value of 0.029. According to class guardian characteristics, class 1 respondents mostly experienced moderate stress (20.0%) with a p-value of 0.031. Respondents who drive their own vehicle did not experience stress. Based on respondent characteristics, waiting for a child for 5 hours (42.2%) with a p-value of 0.026, fatigue from waiting for a child also causes stress. Respondents who did not consume a cup of coffee per day mostly experienced moderate stress (46.7%) with a p-value of 0.048.

Table 2. The Relationship Between Stress Levels and Tension-Type Headache in Mothers with Children with Special Needs.

TTH								
Stress	No		Yes		Total		*Exp p* (B)	
	N	%	N	%	N	%	p-value	Rho
Light	7	15,6	5	11,1	12	26,7		
Medium	7	15,6	26	57,8	33	73,3	0,017	0,192
Heavy	0	0	0	0	0	0		
Total	14	31,2	31	68,9	45	100		

Based on the table above, it shows that respondents who experience moderate stress have a high risk of experiencing TTH (57.8%). The calculation using the chi-square test yielded a p-value of 0.017 with $\alpha<0.05$, which means there is a significant relationship between stress level and the occurrence of tension-type headache. The strength of the relationship can be seen from the odds ratio (OR) or Exp (B) value. From the table above, the odds ratio is 0.192, which means that the higher the level of stress experienced by the respondents, the 0.192 times greater the risk of experiencing tension-type headache.

DISCUSSION

Tension-type headache is a headache characterized by at least ten episodes of headache lasting from 30 minutes to 7 days. A tension-type headache has at least two of the following characteristics: pain located on both sides of the head, a pressing or tightening sensation, non-pulsating, mild to moderate intensity, no nausea or vomiting, no more than one of photophobia or phonophobia, and not aggravated by mild physical activity.

All respondents in this study were mothers of children with special needs, all female, with the most common age range being 36-45 years or late adulthood, totaling 23 respondents or 51.11%. Meanwhile, in the 26-35 years age range or early adulthood, based on measurement results, 44.44% experienced TTH. This aligns with a 2018 study by Hidayah et al., which showed that individuals over 20 years old more frequently experience TTH. Early adulthood is a transitional period that causes emotional instability, which triggers stress and anxiety, leading to the occurrence of TTH. However, according to Somaye Hosseini, the prevalence of TTH decreases in individuals over 20 years old. At this age, individuals can more easily control their emotions. This difference is due to various factors, such as differences in stress coping strategies, adaptation, and adjustment to the problems experienced

The highest level of education for 20 respondents was high school/vocational high school (44.4%). Education level is one of the causes of stress in mothers with children with special needs. This is in line with Suriyarni Januwarsih's research. Low education levels cause stress, due to the mother's lack of problem-solving skills and mental activity. Low education results in mothers lacking the ability to seek information and knowledge and care

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for children with special needs, so that problems in childcare are less addressed. In addition, high school/vocational high school graduates are also potentially stressed due to the limited availability of jobs. The difficulty of finding work for high school/vocational high school graduates is due to the gap between the education system and industry needs and the limited skills that are in line with industrial developments. Meanwhile, many companies set strict qualifications based on prospective workers. Education and training are actually investments in human capital that can increase productivity and income. However, the gap between soft skills and hard skills makes it difficult for high school/vocational high school graduates to work in the service and manufacturing sectors, so many are forced to work in the informal sector with low wages. Based on research results, many mothers with a high school/vocational high school education end up becoming housewives because of the difficulty of finding decent work. This situation exacerbates the psychological burden on mothers, causing stress due to limited means of living expenses. In contrast to the research by Parkes, Alison et al., in that study, mothers with higher education levels still experienced stress due to career pressures and a lack of family support.

Low income, according to data obtained by 37 respondents (82.2%), has a stressful impact on mothers. This is in line with Chelly Meliana's 2023 research. Low economic status has an impact on families. Low income causes individuals to worry about meeting daily needs. Low income is associated with stress in mothers, with low economic income being a strong predictor of mental health.According to ShouryaNegi, low income in mothers will cause stress and negatively impact child-rearing patterns. The parenting pattern of low-income mothers applies an authoritarian parenting style, namely parents tend to demand obedience from children with little opportunity for discussion and tend to be rigid. The background of mothers with the latest education of high school / vocational school also influences child parenting patterns, mothers do not understand the impact and consequences of authoritarian parenting patterns given to children. Authoritarian parenting patterns have a negative impact on children such as, children are unable to interact socially, children will become fearful, closed, quiet, anxious, withdrawn from the environment and lack initiative.Thus, in this study the level of education affects the understanding of correct parenting patterns in children, also affects mothers to get suitable jobs. This economic inequality makes mothers increasingly stressed because of the demands of life that impact the morals and development of children. These two factors have an impact on the nature of children, children will have difficulty interacting with friends, difficulty following norms and rules. Emotional management in children will also be disturbed, in addition, children will become more quiet and show sadness. This study shows that mothers from low socioeconomic backgrounds who have good family, social, and environmental support can manage maternal stress and prevent adverse outcomes for their children.

The groups most vulnerable to stress are women, young people, and individuals with low incomes. Income disparities across social groups contribute to stress in disadvantaged individuals with low incomes.The minimum wage in Central Java is IDR 1,958,169, and the highest is in Semarang City at IDR 3,060,349. The wage received can determine whether a household is considered poor or not. However, one worker in Semarang, when interviewed, stated that her wage was insufficient to cover daily needs due to rising food prices such as rice, oil, and fuel. Furthermore, the increasing population has also increased the cost of living.

The minimum wage received by workers is not yet commensurate with the cost of living. Based on the research findings, it can be concluded that the results align with this theory. Mothers with high school/vocational school (SMA/SMK) graduates have difficulty finding decent work due to limited skills that meet job market needs, so they rely on limited income. The majority of

mothers in this study were housewives. This situation is exacerbated by the additional needs of children with special needs, such as therapy and education costs, which further increase the financial and psychosocial burden. The imbalance between income and expenses, particularly rising food prices and high living costs, is a contributing factor to maternal stress.

Mothers with first-grade children experienced moderate stress, with 13 (28.9%) experiencing stress. This aligns with Inggi Alqrisyah's 2024 study at the Mandara Special Needs School in Kendari City, where mothers with children in grades one through six experienced stress. Mothers with elementary school children experienced stress due to the initial adaptation process experienced by both the child and the mother. Children with special needs, when faced with the outside environment, experience difficulties interacting, making friends, and even communicating with children their own age. Even when the environment accepts children with special needs, barriers to interaction still exist; they tend to be quiet and withdrawn. This raises concerns for mothers, which can lead to stress. This contrasts with Nirmala Sari's study, which found that mothers with special needs children, including junior high school children, still experienced stress. Mothers must have more patience, feel the world is unfair, require great care when caring for children and feel ashamed of their surroundings. Children with special needs have mental and sensory impairments. Obstacles in children with autism can include difficulties in communication, social interaction, and repetitive movements. Children with special needs experience low independence.

Independence in self-care; lack of independence makes it difficult for children to cooperate in carrying out daily activities. Mothers with special needs children play a full role in managing their children's needs, such as scheduling learning activities and organizing daily activities from waking up, eating, bathing, drinking, dressing, putting on socks and shoes. Independence in controlling emotions: They have great difficulty controlling their emotions and may not even understand what emotions are, so they still need attention when going out. Difficulty controlling emotions can lead to arguments among children with special needs, leading to dissociative interactions that can lead to conflict and controversy. Low levels of intellectual and social independence can be disruptive to those around them.

Intellectual independence in children with special needs experiences impairments in areas such as memory, concentration, perception, and language development. Poor language development results in children having a limited vocabulary, flat intonation, unclear articulation, and grammatical difficulties, which can impair the ability to understand speech of the opposite sex. In terms of perception, children have difficulty interpreting what they see and hear, and children with special needs also have difficulty concentrating. They cannot devote their energy to a single area or object for extended periods without being distracted by other objects. Abnormalities in the development of logic and memory in children with special needs limit their reasoning, resulting in their ability to process, receive, and express information that does not follow normal logic. Meanwhile, children with disabilities have low self-confidence, making it difficult to interact and navigate daily life. Based on the explanation above, the presence of obstacles in children with special needs causes anxiety in mothers, which ultimately has the potential to cause stress.

Mothers with children with special needs are vulnerable to stress due to the burden of caregiving and social stigma. Mothers are often blamed for not paying attention to the fetus's health during pregnancy, providing vitamins and adequate nutrition. Mothers feel ashamed, easily offended because they have not fully accepted the situation, and have difficulty socializing with their environment. In these conditions, parents are required to have greater patience, diligence, and a more active role in collaborating with teachers to provide education and discover their child's best talents.The social stigma experienced by mothers negatively impacts mothers' mental and emotional health. Mothers experience increasing social isolation, which increases the

risk of loneliness. This condition creates a significant emotional burden that becomes a source of ongoing stress. Prolonged stress can affect parenting patterns, leading to mothers being less than optimal in their childcare. Inappropriate and in-depth parenting patterns result in difficulty controlling children's behavior, which can actually increase psychological pressure on mothers, leading to stress. In this study, mothers who owned private vehicles were less stressed, consistent with Dwi Wahyuningsih's research, where mothers who owned private vehicles experienced less stress, while mothers who used public transportation experienced stress due to the long walking distances they experienced.

Research findings showed that respondents who did not consume coffee actually experienced a higher proportion of stress. This finding contradicts Merdiant et al.'s findings that coffee causes stress through the hormones adrenaline and cortisol. This indicates that stress is influenced by other factors such as sleep quality, educational status, and economic status. Masayu's 2024 study found that consuming two cups of coffee per day can reduce stress symptoms. The antioxidant content in coffee reduces inflammation, and the caffeine content inhibits adenosine receptors and increases dopamine.Coffee's caffeine content can relieve stress due to the xanthine alkaloid content, which acts as a blocker of adenosine A2A receptors. When stressed, the body produces large amounts of adenosine, which causes stress symptoms such as forgetfulness, anxiety and depression.

The study results show that tension-type headaches are associated with stress in mothers of children with special needs. Moderate stress has a high risk of developing TTH (57.8%). The strength of the relationship can be seen from the odds ratio (OR). The table above shows an odds ratio of 0.192, meaning that the higher the level of stress experienced by respondents, the greater the risk of developing tension-type headaches. This research aligns with the research of Chen Y et al., who found that stress substance P modulates the neurogenic inflammatory process. SP functions as the primary transmitter of pain stimuli through type C afferent nerve fibers. SP also plays a role in the dural capillary process during primary headaches. When someone experiences stress, the adrenal glucocorticoid axis is involved, which increases glutamate in the central nervous system. This increase causes n-methyl-d-aspartate to activate nuclear factor-κ-light-chain. Vasodilation of blood vessels occurs due to increased inducible nitric oxide synthase, causing tension-type headaches and amplifying pain through peripheral and central sensitivity.

Normally, pain stimuli are needed by the body to defend itself when faced with a dangerous stimulus. The SP substance is responsible for transmitting pain in normal amounts, so the pain will feel normal and subside quickly. To prevent painful stimuli from causing excessive pain sensitivity, the body releases GABA and endorphins. Furthermore, the vessels in the dura mater do not experience excessive vasodilation and vasoconstriction, thus preventing pain. The body's nervous system has a normal mechanism for regulating pain stimuli, through local pathways in the spinal cord and also input from the brain. The Gate Control Theory mechanism states that A and β nerve fibers carry normal, non-painful touch. These nerve fibers can block pain stimuli in the spinal cord, thus reducing the pain reaching the brain.

From the above explanation, those over 20 years of age face a quarter-life crisis, or feelings of uncertainty and uncertainty, which can lead to emotional crises. This emotional instability leads to a tendency to overthink and experience excessive stress. External factors such as low income add to mental stressors in mothers. Low education levels also contribute, making mothers have difficulty coping. Furthermore, gender plays a role; women are 2-3 times more susceptible to stress than men. This phenomenon is related to the activity of the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system, which provide negative feedback. This activation increases cortisol secretion, affecting the body's response to stress, including muscle tension and pain perception. Therefore, the stress experienced by mothers with children

with special needs can trigger activation of the hypothalamic-pituitary-adrenal axis, which increases cortisol. This condition has the potential to cause tension-type headaches.

CONCLUSION

The study found a significant relationship between stress levels and the occurrence of tension-type headache (TTH) in mothers of children with special needs. The majority of respondents experienced moderate stress, which was associated with a higher risk of TTH. Factors such as lower educational background, primarily at the high school level, being a housewife, and socioeconomic difficulties contributed to increased stress and its impact on headache prevalence. The study also highlighted how caregiving demands, social stigma, and limited coping resources exacerbate psychological stress, leading to physiological responses that trigger TTH. Furthermore, having children in lower grades and longer caregiving hours intensified stress levels, aligning with findings that emotional instability and caregiving challenges heighten headache risk. Interestingly, coffee consumption showed an inverse correlation with stress, suggesting other factors influence the stress experience in this population.

Despite these insights, the research has limitations including the relatively small sample size from a single special needs school, which may restrict the generalizability of findings. Self-reported questionnaires might also introduce bias in stress and headache measurement. Future studies should expand by including diverse populations and employing longitudinal designs to explore causal relationships and the effectiveness of stress management interventions. Practically, the findings emphasize the importance of targeted support programs that address educational, economic, and emotional needs to reduce stress and TTH incidence in these mothers. Healthcare providers and policymakers should develop comprehensive strategies incorporating psychological counseling, social support enhancement, and accessible resources tailored to this vulnerable group's unique challenges, ultimately improving maternal well-being and caregiving capacity.

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