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The Relationship between APGAR Family Score and Sleep Quality with Hypertension Observasional Study : A Cross-Sectional Study

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Abstract

Purpose: Indonesia is the 5th country with the highest prevalence 34,11% from the population. Based on the health center report in 2020 cases of hypertension at sukoharjo, there were 110,116 cases (69.18%) consisting of 49,510 men, 60,606 women. Meanwhile, at the Gatak Health Center there were 8,041 people who experienced hypertension which were divided into two, namely, 2,932 men and 5,109 women.
Methodology: To analyze the relationship APGAR Family Score and Sleep Quality with Hypertension. Observational analytic research with cross-sectional research design on primary data. The research sample is elderly 40 - >60 years. The sampling technique used cluster random sampling with a total sample of 86 elderly.
Results: showed of the sample with elderly aged 40 - > 60 years old, male sex as many as 13 (18.6%), female sex as many as 57 (81.4%), dysfunctional family as much as 14 (20.0%), poor sleep quality as much as 66 (94.3 %). The results of the fisher test showed that there was a relationship between poor sleep quality and the incidence of hypertension with p 0.023 <0.05, but there is no relationship between APGAR family score and the incidence of hypertension with p 0.720 > 0.05.
Applications/Originality/Value: Conclusion there is a relationship between poor sleep quality with hypertension, but there is no significant relationship between APGAR family score with hypertension.

Introduction Section

When a individual's systolic blood pressure (SBP) exceeds 140 mm Hg and/or their diastolic blood pressure (DBP) exceeds 90 mm Hg, this conditions is a dissease called hypertension. (Gafane-Matemane *et al.,* 2021). Each 20 mmHg elevation in systolic pressure as well as 10 mmHg elevation in diastolic pressure elevated the probability of mortality from causes including ischemic stroke and cardiovascular disease (Herdiana & Kurniawan, 2017).

Data from WHO in 2015 found that hypertension can affects 1.13 billion people globally, which indicates that one out of every three people is affected. The number of individuals suffering from hypertension is expected to rise year after year, reaching 1.5 billion by 2025, with 9.4 million people dying as a result of hypertension and its consequences. (Kemenkes RI, 2019). The prevalence of hypertension in Indonesia itself reaches 34.11% of the population. This percentage makes Indonesia ranked 5th with the most cases of hypertension in the world. According to Basic Health Research (Riskesdas 2018), hypertension is present in 34.1% of Indonesians. This is higher than the prevalence of hypertension in the 2013 Riskesdas, which was 25.8 percent (Widyawati, 2021). Based on sukoharjo health center report in 2020 cases of hypertension, there were 110,116 cases (69.18%) consisting of 49,510 men, 60,606 women. Meanwhile, at the Gatak Health Center there were 8,041 people who experienced hypertension which were divided into two, namely, 2,932 men and 5,109 women (Dinkes sukoharjo, 2021).

Family function refers to the process of providing resources for the family and its members and helping them to complete their tasks (Zhang, 2018). family function is assessed through the communication between family members, roles between family members and the relationship between all family will result in life satisfaction and psychological health (Yeom & Lee, 2020). Excessive emotional states can trigger stress and release adrenaline into the bloodstream, increasing sympathetic nerve activity and causing an increase in blood

pressure. If this increase in blood pressure occurs continuously it will result in hypertension (Batlajery & Soegijono, 2019).

Unhealthy sleep status can change blood pressure and increase the risk of hypertension. Sleeping habits with shorter sleep duration than an average of 7-8 hours are associated with the incidence of hypertension, and usually found in people who sleep less than 6 hours per night. Aggarwal (2018) investigated that poor or insufficient sleep quality ≥ 7 hours/night in a person is associated with an increase in blood pressure (Aggarwal *et al.,* 2018).

The purpose of this study is to investigate the association among APGAR family score and sleep quality with hypertension. The goal of this research is to raise hypertension awareness in our community and avoid the disease.

Method

Materials

This study is using observational analytic study. The method of this research is a cross-sectional research design on primary data. The research subjects were elderly who is willing to participate in this research. Based on WHO, the middle age age ranges from 40-59 years and the elderly ranges from 60-74 years (Purba *et al.,* 2017). The inclusion criteria is elderly who live in Gatak, and elderly who is willingly to participate in this research. The exclusion criteria is night shift worker, and subject who undergoing intensive medical for the last 3 months. The 86 elderlies who live at Gatak, were selected as participant using cluster random sampling technique. This research using openepi to determine the number of required sample, and the result is 70 subject.

Ethical clearance

This research procedure was accepted by Health Research Ethics Committee Faculty of medicine of University Muhammadiyah Surakarta in Gonilan, Kartasura, Sukoharja, Central java (File no. 4575/B.1/KEPK-FKUMS/XI/2022).

Data Collection

Elderly who came to Puskesmas Gatak is under supervision by Gatak midwife and our superviser. The procedure and informed consent was being explained and accepted before the data was collected. The blood pressure was observed using sphygmamometer for 3 times with duration for 2 minutes. The APGAR and sleep quality was used to collect data. Age, occupation, and medical history also being collected in this stage.

The purpose of APGAR questionnaire are to measure the function of a family where there will be 5 questions, which include Adaptation, Partnership, Growth, Affection and Resolve. The answers to this test are divided into 3 parts, 'often or always happens' gain 2 points, 'sometimes' gain 1 point, and 'never happens' gain 0 points. Meanwhile, the final score for each answer will be accumulated into 3 categories, 'great family function with 7 - 10 points, 'moderate family dysfunction' with 4 - 6 points, and 'poor family dysfunction' with 0 - 3 (Wang *et al.,* 2020). In this research, the final score will only be divided into 2 category which functional family for 6-10 points and poor dysfunctional family for 0 – 3 points.

The purpose of PSQI questionnaire are to measure the quality and disturbance of sleep. The questionnaire itself has 19 question, that will be divided into 7 category. The accumulation final score for the 7 category is between 0 – 7. If the sleep quality final score < 5 is considered good quality of sleep, while the final score > 5 is considered as bad quality of sleep (Liu *et al.,* 2016). The data was being collected 2 times at different location around the Gatak Health Center. The first location is located at Ngudi Waras VII, and the elderly who came is 40. While, the second location is located at Ngudi Waras VIII, and the elderly who came is 35. The collected data will be processed using univariat to discover the distribute of the sample, bivariat using fisher test since in this research it doesnt meet the qualification of using chi square methods.

Result

Descriptive Analysis

Result

In this research, there is 86 elderly who participate, while the sample is 70. The majority is 57 female (81.4%) and 13 male (18.6%). In gender distribution of elderly, there is 2 category, the first one is middle age which contain 27 subject (38.6%) and the second is elderly which contain 43 subject (43%). The majority for APGAR category is functional family 56 subject (80%) and dysfunctional family 18 subject (20%). Sleep quality is the second variable and divided into 2 category, there is good sleep quality 4 subject (5.7%) and poor sleep quality 66 subject (94.3%). In conclusion, there is more hypertension for 56 subjects (80%) than normal tension for 14 subject (20%). You can see an example of Table 1.

Table 1. Frequency Distribution

Characteristic	Frequency (F)	Percentage(%)
	Age	
Middle age	27	38.6
Elderly	43	61.4
Total	70	100.0
	Gender	
Male	13	18.6
Female	57	81.4
Total	70	100.0
	APGAR Family Score	
Functional	56	80
Dysfunctional	18	20
Total	70	100
	Sleep Quality	
Good	4	5.7
Poor	66	94.3
Total	70	100
	Blood Pressure	
Normal tension	14	20.0
Hypertension	56	80.0
Total	70	100

Discussion

The majority in age and gender is 7 female (81.4%) and middle age 27 subject (38.6%). Around that age there will be a vulnerability to undergoing the aging process, physical limitations, decreasing psychological and social conditions, and degression in various organ functions, one of which is a decrease in heart function (Sanusi, 2020). Sartik, *et al* (2017) peformed study in Palembang, result of the study showed that increasing age will increase the risk of developing hypertension (pValue = 0.00, OR = 6.55) (Sartik *et al.,* 2017). Females are more likely to suffer from hypertension, specifically as they approach menopause. They are not protected at this time by the hormone estrogen, which elevates the amounts of High Density Lipoprotein (HDL). Elevated levels of HDL cholesterol are a preventive agent against the development of atherosclerosis diseases (Nainar *et al.,* 2020). According to Bantas & Gayatri (2019), female aged 60 and over had a risk of developing hypertension 1.25 times compared to men (OR = 1.25, pValue = 0.00653) (Bantas, 2019).

The table also shows functional family 56 subject (80%) has the highest percentage compared to dysfunctional family. Family has an important role in developing, preventing, adapting and helping solve problems suffered by family members. Health problems that occur in the family will affect the relationship between family members which can have an impact on the community around the family. The APGAR family

functions to explain the internal relationships of each family member, and it used to access how the quality of life of each family member is. Patients who have functional families can improve their adherence to their illness (Kohir & Sulastri, 2021).

Furthermore, poor sleep quality has the highest percentage 66 subject (94.3%). Poor sleep quality will escalate the systolic blood pressure. Sleep quality itself related to elevation of cortisol and causing the increase in catecholamine levels, so the person's blood vessels will experience vasoconstriction. Vasoconstriction of blood vessels will developed into peripheral vascular resistance, which results in hypertension (Setiawan *et al.,* 2022).

For the blood pressure itself, there is more hypertension elderly for 56 subject (80%) than the normal tension. Our result was in line with the result of Nainar *et al.,*(2020), which found 57 elderly respondents with stage 1 hypertension (63.5%) and 31 elderly respondents with stage 2 hypertension (34.7%). Older age will cause changes in organ function such as an intense and continuous increase in systolic blood pressure until the age of 70-80 years (Nainar *et al.,* 2020). The elevation of blood pressure due to insulin resistance which can be divided into several causes, including an increase in: a) production of angiotensinogen by adipose visceral tissue which is resistant to insulin; b) decreased NO levels due to insulin resistance which can lead to endothelial dysfunction; c) increased AT1 receptors and endothelin-1 expression; d) increased sodium reabsorption in the proximal tubule and, e) increased sympathetic activity (Tedjasukmana, 2012). When blood pressure in renin rises, the liver produces angiotensinogen (Ang), which is hydrolyzed to angiotensin I (Ang I) and increases epinephrine and norepinephrine production. Ang I is converted to angiotensin II by the activity of angiotensin converting enzymes (ACEs) generated by the lungs (Ang II). Aminopeptidases convert angiotensin II (Ang II) to angiotensin III (Ang III). Ang II is thought to be the most significant RAAS effector. AT1R that is activated by Ang II and regulates a variety of physiological processes such as vasoconstriction, ventricular hypertrophy, myocardial infarction, atherosclerosis, reactive oxygen species (ROS) formation, tissue inflammation, and aldosterone synthesis. Aldosterone can enhance the formation of ROS, which causes organelle dysregulation and increases the production of ROS. In mitochondria, high energy phosphates are produced. Adrenergic receptor malfunction and coronary vasoconstriction will result from this impact, these disorders can result in hypertension (Ma *et al.,* 2022).

Bivariate Analysis

Result

Based on Table 2, the result of bivariat analysis test can be seen. From its calculations, P = 0.720 which the result is not significant (P > 0.55). The OR is 1.636

Table 2. Bivariate analysis of APGAR family score with hypertension

APGAR Family Score							
APGAR Family Score	Normal tension		Hipertension		P value	OR value	95% CI
	N	%	N	%			
Fungsional	12	17.1	44	62.9	0.720	1.636	0.321 – 8.330
Non-Fungsional	2	2.9	12	17.1			
Total	14	20	56	80			

Based on Table 3, the result of bivariat analysis test can be seen. From its calculations, P = 0.023 which the result is significant (P < 0.55). The OR is 15.00

Table 3. Bivariate analysis of sleep quality with hypertension

Sleep Quality				
	Normal tension	Hipertension	OR value	95% CI

Sleep Quality	N	%	N	%	P value		
Good	3	4.3	1	1.4	0.023	15.000	1.425 – 157.904
Poor	11	15.7	55	78.6			
Total	14	20	56	80			

Discussion

In this study, we receive P = 0.720 This suggests that there is no association among APGAR family score and hypertension incidence because the finding is indeed not relevant. (P > 0.05). in our own findings were consistent with earlier research Affusim *et al.,* (2018) where pValue = 0.873 was found, so there is no relationship between the APGAR Family Score and the incidence of hypertension. This conditions can be happen because in functional families they had a good relationship between family members which can reduce the risk of cardiovascular responses during stressful situations and reduce the risk of hypertension. Meanwhile, non-functional families occur due to lack of family support and causing a subject to become more susceptible in experiencing stressful conditions which can increase the risk of developing hypertension (Affusime *et al.,* 2018).

Unfortunately, this statement is inversely proportional to Wang *et al.,* (2020) where a pValue result of 0.008 was obtained and it was stated that there was a significant relationship. This can be happen when a family has a higher APGAR score, the health status will increase. Hypertensive patients will depend on other family members for information regarding their illness and emotional family support. Thus, family functions needs to achieve special attention for low-income patients with hypertension (Wang *et al.,* 2020).

As we can see in table 3, we receive P = 0.023, It leads to the conclusion that there is a link between quality of sleep and the prevalence of hypertension. In other words, the result is significant between 2 variabel (P < 0.05). Yang *et al.,* (2021) and Makarem *et al.,* (2022) revealed that P <0.001 so this poor sleep quality is related to the incidence of hypertension itself. Thus, it is necessary to optimize the quality of one's sleep to reduce the risk of hypertension (Leman *et al.,* 2021). one of the causes is short sleep duration. As a result, it has the potential to increase the prevalence of obesity, diabetes, and hypertension. Short sleep duration can result in decreased sleep efficiency, increased sleep variability, excessive daytime drowsiness, circadian rhythm disruptions, and metabolic dysfunction. Poor sleep quality can also be caused by a variety of sleep disorders that increase the activity of the sympathetic nerves while decreasing the work of the parasympathetic nerves, hence speeding inflammation and oxidative stress and worsening vascular endothelial function. (Makarem *et al.,* 2022). sleep duration < 6 hours can increase the risk of developing hypertension 1.2 times. Insufficient sleep duration will result in changes in biological rhythms where it will increase sympathetic nerves, oxidative stress and the hypothalamus-pituitary axis (He & He, 2022). According Maryam *et al.,* (2022) Insomnia and hypersomnia patients had a 1.22 increased chance of acquiring hypertension. There is a 10-20% reduction in blood pressure throughout the usual sleeping period. This condition is known as nocturnal dipping. The duration of sleep time that is less or more than the hours that should be can cause this condition to experience disturbance (Rezapour *et al.,* 2022). Alex *et al.,* (2022) observed that poor sleep efficiency will result in an increase in systolic and diastolic blood pressure (pValue = 0.01 (systolic), pValue = 0.12 (diastolic)) Poor sleep quality as measured by the PSQI questionnaire (insufficient sleep, poor performance of sleep, and midday disturbance) has a significant impact on elderly health statuses such as hypertension. To maintain a normal range of systolic and diastolic blood pressure in the elderly or adults with elevated blood pressure, the guidance of promoting sleep hygiene and lifestyle modifications is required (Alex *et al.,* 2022). The other factors are weather. In surakarta, the temperature is higher in some other places in indonesia. It can affect the quality of sleep, especially in sleep fragmentasion. It causes by the hot temperature at night, can affect the subject to wake up and disturb their cycle of sleep which can affect their sleep quality (Ahmad Fakihan, 2016).

Conclusion

This study found a link between sleep quality and the occurrence of hypertension. However, there isn't any link between the APGAR family score and the occurrence of hypertension. The outcomes of this study can be used

by the community and the state to increase hypertension awareness and education about the importance of sleep quality.

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