Kesmas

Volume 19
Issue 3 *August 2024*

Article 2

8-23-2024

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Harahap *et al. Kesmas: Jurnal Kesehatan Masyarakat Nasional (National Public Health Journal)*. 2024; 19 (3): 162-168
DOI: 10.21109/kesmas.v19i3.1088

Kesmas: Jurnal Kesehatan Masyarakat Nasional (National Public Health Journal)

Risk Factors for Cognitive Impairment in Adult Population of Coastal Area: A Cross-Sectional Study in Maringkik Island, Indonesia

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Abstract

Cognitive impairment is a medical condition commonly found in elderly populations, which can be due to vascular risk factors in patients. There remains limited data on risk factors for cognitive impairment among coastal region populations. This study aimed to investigate risk factors for cognitive impairment in the adult population of Maringkik Island, West Nusa Tenggara Province, Indonesia. Data collected were age, sex, education level, hypertension, antihypertensive treatment, diabetes mellitus, cigarette smoking, and body mass index status. A total of 114 participants were recruited using a consecutive sampling method. The participants' cognitive function assessment used the Mini-Cog instrument. The cognitive impairment frequency in the island's adult population was approximately 48.2%. The final model of multiple regression analysis showed that hypertension (OR: 2.3; 95%CI: 1.0 – 5.0; p-value: 0.045) was a characteristic associated with the cognitive impairment frequency. Thus, the high frequency of cognitive impairment and hypertension frequency as primary risk factors for cognitive impairment in the island's adult population implies the need to develop strategies for detecting and managing hypertension and hypertension-related cognitive impairment in the population by local health authorities.

Keywords: coastal area, cognitive impairment, hypertension, vascular risk factor

Introduction

Cognitive impairment is a common medical condition found in the population over 55 years, increasing with age. Dementia has a global prevalence of 2-3% in the 70-75 age group. This percentage increases 10-fold to 20-25% in the age group of 85 years.[1,2] This cognitive impairment can be found in a wide clinical spectrum, ranging from mild to severe cognitive impairment, a condition called dementia.[3] In the dementia stage, patients will experience a decline in social and functional capacities, resulting in a high dependence on their caregivers. This condition will ultimately give rise to economic, social, and health burdens for patients, families, and health service providers.[4]

The cognitive impairment can develop with increasing age or due to existing vascular risk factors in patients, including hypertension, diabetes mellitus, dyslipidemia, overweight/obesity, stroke, and cigarette smoking.[5,6] Identification and good control of these vascular risk factors should be integrated with the cognitive impairment and dementia intervention program developed by healthcare authorities for both community-based and hospital-based populations. In addition to health-related risk factors, socioeconomic factors and limited access to healthcare services also influence and contribute to the decline in cognitive function in the elderly population.

Higher socioeconomic status is associated with better cognitive abilities among the elderly population. Good financial and emotional support is linked to better cognitive abilities.[7] Cognitive impairment is more prevalent among the elderly

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Received: February 7, 2024
Accepted: July 9, 2024
Published: August 23, 2024

population with low economic status. However, education and improved access to healthcare centers help improve the cognitive function of the elderly population with low economic status.[8] A proper intervention for cognitive impairment in at-risk populations is a cost-effective way to slow the progression of cognitive impairment and allow them to maintain optimal social and functional activities for many years before their cognitive function ultimately declines significantly.[9,10]

Population living in coastal areas is susceptible to myocardial infarction associated with distinct vascular risk factors.[11] Since vascular risk factors also increase the risk of cognitive impairment and dementia, the population living in coastal regions should be considered to have a distinct frequency of cognitive impairment. Previous studies showed that hypertension was the vascular risk factor consistently showing a high prevalence in coastal regions,[12–14] while other well-identified vascular risk factors, including hyperlipidemia, diabetes mellitus, smoking, alcoholism, and arterial peripheral disease, show mixed results.[11,14,15] Differences in the distribution of vascular risk factors other than hypertension in various regions based on previous studies are mainly due to differences in economic levels, education levels, eating habits, and climatic conditions in different regions.[16]

The consumption of high-salt marine products generally found in coastal populations among Southeast Asian countries, including Indonesia, is likely an important dietary factor contributing to the high frequency of hypertension.[17] However, data on the frequency of cognitive impairment in coastal populations is currently still scarce. Given the different sociocultural characteristics between coastal and non-coastal populations, investigating risk factors for cognitive impairment in coastal populations is pivotal. This study aimed to investigate risk factors for cognitive impairment in the adult population of Maringkik Island, representing populations of coastal areas in the West Nusa Tenggara Province.

Method

This study was conducted on Maringkik Island, a small island located in the Southeastern part of Lombok Island, West Nusa Tenggara Province, Indonesia. This small island has an area of six hectares inhabited by approximately 2,763 people based on the latest 2019 population census.[16] More than half of male islanders are fishermen. The island has relatively limited health and education service facilities for its inhabitants, an auxiliary Primary Health Care, and formal education facilities up to junior high school. Most islanders commonly use sodium salt as a food flavoring and a traditional preservative for their seafood products.

This cross-sectional study involved the adult population of Maringkik Island as participants recruited consecutively between January and June 2023. Using the formula $(Z\alpha 2PQ)/d2$ to calculate the sample size, where $Z\alpha = 1.96$, prevalence (P) = 31.5,[18] Q = 1 – P, and margin of error (d) = 0.1, the minimum sample size required in this study was 85 (n = 85). The inclusion criteria were participants aged ≥18 years, fully conscious, and voluntarily participated. The exclusion criteria included significant visual and hearing impairments, as well as illiteracy. All participants provided written informed consent before participating in the study.

Data collected in this study were sociodemographic and clinical characteristics of the participants. Sociodemographic data, including age, sex, and education level, were collected using a questionnaire. Age was categorized as adult (<60 years old) and older adult (≥60 years old); sex was categorized as male or female; and education level was categorized as lower (≤6 years) or medium to high (>6 years). Clinical data, including hypertension, diabetes mellitus, cigarette smoking, and body mass index (BMI) status, were obtained using questionnaires and/or physical examinations.

Participants were categorized as having hypertension if they had a record of hypertension diagnosis and/or were taking antihypertensive medicines at the time of the interview and/or had systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg at the time of physical examination. They were categorized as having diabetes mellitus if they had a record of diabetes mellitus diagnosis and/or were taking antidiabetic agents at the time of examination and/or had a random blood glucose level of ≥200 mmHg. Participants were categorized as smokers if, at the time of the interview, they were actively smoking. The participants' BMI was obtained by dividing their weight in kilograms by the square of their height in meters (kg/m^2). Using the cut point value of 25 kg/m2, the BMI status of the participants was categorized as normoweight (BMI <25 kg/m^2) or overweight/obese (BMI ≥25 kg/m2). Data collection on the sociodemographic and clinical characteristics of the participants was carried out by well-trained fourth-year medical students.

The cognitive function of the participants was assessed using the Mini-Cog instrument. The Mini-Cog is a simple cognitive function evaluation instrument that is suitable for use at the population level, and its screening value is not significantly affected by education.[19] The instrument consisted of sequential instructions, including repeating and

remembering three unrelated words, completing the clock drawing test, and recalling the three unrelated words mentioned earlier. This instrument had a score range of 0-5, and participants with a score ≥3 were considered to have normal cognitive status, while those with a score <3 were considered to have cognitive impairment. Evaluation of cognitive function using the Mini-Cog instrument for the participants was carried out by well-trained general practitioners.[20]

In the first step, participants entitled to visit the public health examination program that had been prepared were directed by the research team to the fourth-year medical students to obtain information on research procedures to confirm their willingness to participate in the study. The participants who agreed to participate were asked to sign an informed consent form provided. In the second step, participants voluntarily agreed to participate in this study. They underwent an interview session with the fourth-year medical students on the same day, which was the first step in obtaining data on their sociodemographic and clinical characteristics using structured questionnaires.

Blood pressure measure, random capillary blood glucose examination, and participants' weight and height measures were also conducted in the second step. Any data collected from the participants were recorded carefully and in detail on the participant's case report form by the fourth-year medical students responsible for the completeness of the participant's data. In addition, capillary blood glucose examination was carried out aseptically by trained laboratory staff using test strips and blood glucose meters.

Data are presented as mean value±standard deviation (SD) for continuous variables or frequency (%) for categorical variables. The analyses were performed in two steps. First, simple logistic regression tests were conducted to determine the factors associated with the frequency of cognitive impairment among participants. Second, a final model of multiple logistic regression tests was applied to determine factors with a p-value of <0.25 in the first analysis, which were significantly associated with the frequency of cognitive impairment among participants. Statistical significance was set at a p-value of <0.05.

Results

This study recruited a total of 114 participants. Table 1 shows the sociodemographic and clinical characteristics of participants. The frequency of cognitive impairment in the adult population of Maringkik Island was approximately 48.2%. Most participants were adults and females with lower levels of education. Hypertension and obesity/overweight were vascular risk factors found with high frequency in this adult population.

Table 2 shows the results of a simple regression analysis examining the association between independent variables (sociodemographic and clinical characteristics) and dependent variables (cognitive status). This analysis showed that age (OR: 2.7; 95%CI: 1.1 – 6.7), education level (OR: 2.0; 95%CI: 0.9 – 4.8), and hypertension (OR: 2.7; 95%CI: 1.3 – 5.8) were the eligible characteristics for inclusion in the multiple logistic regression analysis. However, other characteristics, including sex, antihypertensive treatment, diabetes mellitus, overweight/obese, and cigarette smoking, were ineligible for subsequent analysis (p-value ≥0.25).

Table 3 shows the results of the final model of multiple regression analysis examining the risk factor for cognitive impairment among participants. This analysis showed that hypertension (OR: 2.3; 95%CI: 1.0 – 5.0) was the only characteristic that was a risk factor for cognitive impairment. However, older adults and lower educational levels were not the risk factors for cognitive impairment.

Table 1. Characteristics of the Participants

Variable	Mean±SD or Frequency (%)
Age in years, mean±SD	47.6±12.5
Age category, n (%)	
Adult	87 (76.3)
Older adult	27 (23.7)
Sex, n (%)	
Male	26 (22.8)
Female	88 (77.2)
Years of education, mean±SD	
Education level, n (%)	6.2±3.4
Lower (≤6 years)	83 (72.8)
Medium to high (>6 years)	31 (27.2)
Hypertension, n (%)	
Yes	56 (49.1)
No	58 (50.9)
Antihypertensive treatment, n (%)	
Yes	31 (27.2)
No	83 (72.8)
Diabetes mellitus, n (%)	
Yes	11 (9.6)
No	103 (90.4)
BMI, mean±SD	26.8±4.9
BMI status, n (%)	
Overweight/obese	74 (64.9)
Normoweight	40 (35.1)
Cigarette smoking, n (%)	
Yes	22 (19.3)
No	92 (80.7)
Mini-Cog score, mean±SD	2.4±1.2
Cognitive status, n (%)	
Impaired	55 (48.2)
Normal	59 (51.8)

Notes: SD = standard of deviation, BMI = body mass index.

Table 2. Simple Logistic Regression Showing Variables Associated with Cognitive Impairment Among Participants

Variable	Cognitive Status		Crude OR (95%CI)	p-value
	Impaired	Normal		
Age category, n (%)				
Older adult	18 (66.7)	9 (33.3)	2.7 (1.1–6.7)	0.031*
Adult	37 (42.5)	50 (57.5)	Reference	
Sex, n (%)				
Male	12 (46.2)	14 (53.8)	1.1 (0.5–2.7)	0.808
Female	43 (48.9)	45 (51.1)	Reference	
Education level, n (%)				
Lower (≤6 years)	44 (53.0)	39 (47.0)	2.0 (0.9–4.8)	0.099*
Medium to high (>6 years)	11 (35.5)	20 (64.5)	Reference	
Hypertension, n (%)				
Yes	34 (60.7)	22 (39.3)	2.7 (1.3–5.8)	0.010*
No	21 (36.2)	37 (63.8)	Reference	
Antihypertensive treatment, n (%)				
Yes	15 (48.4)	16 (51.6)	1.0 (0.4–2.3)	0.985
No	40 (48.2)	45 (51.6)	Reference	
Diabetes mellitus, n (%)				
Yes	5 (45.5)	6 (54.5)	1.1 (0.3–3.9)	0.846
No	50 (48.5)	53 (51.5)	Reference	
BMI status, n (%)				
Overweight/obese	36 (48.6)	38 (51.4)	1.0 (0.5–2.3)	0.907
Normoweight	19 (47.5)	21 (52.5)	Reference	
Cigarette smoking, n (%)				
Yes	8 (36.4)	14 (63.6)	1.8 (0.7–4.8)	0.218
No	47 (51.1)	45 (49.9)	Reference	

Notes: *eligible for multiple regression analysis, OR = odds ratio, CI = confidence interval, BMI = body mass index.

Table 3. Final Model of Multiple Logistic Regression Analysis Showing Eligible Variables Associated with Cognitive Impairment Among Participants

Variables	Cognitive status		Adjusted OR (95%CI)	p-value
	Impaired	Normal		
Age category, n (%)				
Older adult	18 (66.7)	9 (33.3)	1.9 (0.7–4.9)	0.201
Adult	37 (42.5)	50 (57.5)	Reference	
Education level, n (%)				
Lower (≤6 years)	44 (53.0)	39 (47.0)	1.8 (0.7–4.4)	0.193
Medium to high (>6 years)	11 (35.5)	20 (64.5)	Reference	
Hypertension, n (%)				
Yes	34 (60.7)	22 (39.3)	2.3 (1.0–5.0)	0.045*
No	21 (36.2)	37 (63.8)	Reference	

Notes: *eligible for multiple regression analysis, OR = odd ratio, CI = confidence interval.

Discussion

This study investigated the frequency of cognitive impairment and its risk factors in the adult population of Maringkik Island, a small coastal area in the West Nusa Tenggara Province, Indonesia. This is the first study conducted among the adult population of residents in coastal areas. This study showed a quite high frequency of cognitive impairment in the adult population of Maringkik Island at 48.2%, and hypertension was a risk factor for cognitive impairment. Previous studies showed that hypertension was an important vascular risk factor for cognitive impairment, both independently and through its interaction with other vascular risk factors.[21,22] Therefore, hypertension management is a crucial intervention that should be made as an effort to prevent cognitive impairment in the adult population on Maringkik Island.

Previous studies showed that populations in coastal areas typically had hypertension as their major vascular risk factor.[23–25] This might be related to the population's high daily consumption pattern of sodium salt (>5 grams per day), either through the long-standing habit of consuming marine food sources that are high in sodium, the use of sodium salt as a food seasoning, and the use of sodium salt to preserve fish for daily consumption.[17,26] Theoretically, sodium intake contributes to the pathophysiology of hypertension by affecting vascular smooth muscle cells, sodium pump dysfunction, influx of calcium ions, vascular smooth muscle contraction, and increased vascular resistance.[27]

Accordingly, educating the population about the necessity of reducing daily salt intake as an effort to prevent and control hypertension is pivotal. Optimal control of hypertension is expected to reduce the risk of cognitive impairments related to hypertension in coastal populations. However, since more than half of the Maringkik Island population has a low level of education and consuming sodium salt in food is their habit, developing an educational strategy for low daily consumption of sodium salt in this area poses a challenge for the local health authority.

This study also showed that clinical characteristics, including diabetes mellitus, overweight/obesity, and cigarette smoking, were not associated with an increased frequency of cognitive impairment in the Maringkik Island population. The relationship between these variables and the frequency of cognitive impairment in coastal populations has never been studied. Previous studies have shown that diabetes mellitus, overweight/obese, and cigarette smoking are risk factors for cognitive impairment in the general population.[5,6]

The difference between the results of this study, which represents the adult population in coastal areas, and the results of previous studies conducted on the general population regarding the relationship between these variables and the frequency of cognitive impairments might be related to differences in participant characteristics and the study methods applied, including differences in cognitive assessment instruments. Despite these differences in results, identification and intervention strategies for vascular risk factors such as hypertension, diabetes, and smoking still need to be carried out as part of cognitive impairment intervention strategies designed for coastal populations.

This study has several limitations. First, most of the data on the characteristics of participants were obtained only based on the participants' self-reports, which could lead to possible inaccuracies in the data. Since participants mostly had a low level of education, recall bias of the participants regarding the data collected was likely to occur. Second, the diagnosis of diabetes mellitus is ideally based on measuring blood glucose levels during and two hours after the oral glucose tolerance test using a venous blood sample. Considering that this method is difficult to apply to the population studied due to their busy daily activities, the measurement of blood glucose levels in this study used samples obtained from capillary blood examined using the strip test and glucose meter method.

Third, since this study was carried out on a single population and small sample size with a cross-sectional design, generalization of the study results to populations in other coastal areas should be done carefully. Fourth, the consecutive sampling technique is a non-randomized method, meaning that the samples collected were possibly not

evenly distributed. This uneven distribution could potentially impact the study findings. Fifth, the absence of adaptation of the Mini-Cog instrument to potential cultural or educational differences in Maringkik Island and the lack of validation and questionnaire reliability testing might affect the results of this study. Sixth, this study did not evaluate depression as part of confounding variables. However, due to the lack of data on the frequency and risk factors for cognitive impairment in coastal populations, the results of this study are valuable to be used as a basis for developing early detection strategies and interventions for cognitive impairment and accompanying vascular risk factors in coastal populations.

Conclusion

The adult population of Maringkik Island has a high frequency of cognitive impairment, and hypertension is the risk factor for this high frequency. Strategies developed for early identification and intervention of cognitive impairment and accompanying risk factors in this population should be structured based on their sociodemographic characteristics. A longitudinal study is suggested to be conducted to investigate the influence of hypertension on the progression of cognitive function impairment in Maringkik Island. In addition, future studies should include the analysis of relevant biomarkers to observe pathological changes and utilize more comprehensive neurocognitive evaluation tools to confirm the diagnosis.

Abbreviations

BMI: Body Mass Index; SD: standard deviation; OR: odds ratio; CI: confidence interval.

Ethics Approval and Consent to Participate

This study was approved by the Health Research Ethics Commission of Universitas Mataram, Mataram (Register number: 352/UN18.F7/ETIK/2022). All subjects provided were informed under written consent prior to their participation.

Competing Interest

The authors declare no competing financial, institutional, or personal interest.

Availability of Data and Materials

Data and materials for this study are available from the corresponding author at reasonable request and for non-commercial purposes.

Authors' Contribution

HSH, AWR, N, FFZ, DS, LOS, and YI were conceptualizing and designing the study. HSH, AWR, NN, FFZ, DS, LOS, YI, AA, MH, and ADH were analyzing and interpreting the results of the study. HSH, AWR, and YI were drafting the manuscript. HSH, AWR, N, FFZ, DS, LOS, and YI were revising the manuscript.

Acknowledgment

The authors would like to acknowledge the contribution of Lembaga Penelitian dan Pengabdian Masyarakat (LPPM) of the University of Mataram in this study.

References

1. Ruano L, Araújo N, Branco M, et al. Prevalence and causes of cognitive impairment and dementia in a population-based cohort from Northern Portugal. Am J Alzheimers Dis Other Demen. 2019; 34 (1): 49-56. DOI: 10.1177/1533317518813550.
2. Lu Y, Liu C, Yu D, et al. Prevalence of mild cognitive impairment in community-dwelling Chinese populations aged over 55 years: A meta-analysis and systematic review. BMC Geriatr. 2021; 21 (1): 10. DOI: 10.1186/s12877-020-01948-3.
3. Knopman DS, Beiser A, Machulda MM, et al. Spectrum of cognition short of dementia: Framingham Heart Study and Mayo Clinic Study of Aging. Neurology. 2015; 85 (19): 1712-1721. DOI: 10.1212/WNL.0000000000002100.
4. Cipriani G, Danti S, Picchi L, et al. Daily functioning and dementia. Dement Neuropsychol. 2020; 14 (2): 93-102. DOI: 10.1590/1980-57642020dn14-020001.
5. Cheng YW, Chiu MJ, Chen YF, et al. The contribution of vascular risk factors in neurodegenerative disorders: From mild cognitive impairment to Alzheimer's disease. Alzheimers Res Ther. 2020; 12 (1): 91. DOI: 10.1186/s13195-020-00658-7.
6. Ganguli M, Fu B, Snitz BE, et al. Vascular risk factors and cognitive decline in a population sample. Alzheimer Dis Assoc Disord. 2014; 28 (1): 9-15. DOI: 10.1097/WAD.0000000000000004.
7. Shi L, Tao L, Chen N, et al. Relationship between socioeconomic status and cognitive ability among Chinese older adults: The moderating role of social support. Int J Equity Health. 2023; 22 (1): 70. DOI: 10.1186/s12939-023-01887-6.
8. Zhang Z, Zhao Y, Bian Y. A role of socioeconomic status in cognitive impairment among older adults in Macau: A decomposition approach. Front Aging Neurosci. 2022; 14: 804307. DOI: 10.3389/fnagi.2022.804307.

9. Barnett JH, Lewis L, Blackwell AD, et al. Early intervention in Alzheimer's disease: A health economic study of the effects of diagnostic timing. BMC Neurol. 2014; 14: 101. DOI: 10.1186/1471-2377-14-101.
10. Sabbagh MN, Boada M, Borson S, et al. Rationale for early diagnosis of mild cognitive impairment (MCI) supported by emerging digital technologies. J Prev Alzheimers Dis. 2020; 7 (3): 158-164. DOI: 10.14283/jpad.2020.19.
11. Xiao-Dong Z, Shao-Zhao Z, Xun H, et al. Association of residential proximity to the coast with incident myocardial infarction: A prospective cohort study. Front Cardiovasc Med. 2022; 9: 752964. DOI: 10.3389/fcvm.2022.752964.
12. Chen X, Wei W, Zou S, et al. Trends in the prevalence of hypertension in island and coastal areas of China: A systematic review with meta-analysis. Am J Hypertens. 2014; 27 (12): 1503-1510. DOI: 10.1093/ajh/hpu026.
13. McElligott K, McElligott J, Rivell G, et al. Assessment of cardiovascular disease risk factors in the coastal region of South Carolina. Ethn Dis. 2014; 24 (2): 155-161.
14. He F, Liao Z, Li YM, et al. Prevalence and clustering of cardiovascular risk factors among resident of coastal areas in Qinzhou, Guangxi, China. J Cardiothorac Surg. 2023; 18 (1): 70. DOI: 10.1186/s13019-023-02137-0.
15. Liu L, Fan Y, Wang Z, et al. Disparity in risk factors of ischemic stroke in four coastal-area hospitals in China. Heliyon. 2024; 10 (2): e24745. DOI: 10.1016/j.heliyon.2024.e24745.
16. Solihin RS, Harahap HS, Verawati V, et al. Optimalisasi kesehatan masyarakat Pulau Maringkik demi terciptanya desa sehat. Pros Semin Nas Gelar Wicara. 2023; 1 (1): 319-324.
17. Farapti F, Fatimah AD, Astutik E, et al. Awareness of salt intake among community-dwelling elderly at coastal area: The role of public health access program. J Nutr Metab. 2020; 8793869. DOI: 10.1155/2020/8793869.
18. Gorska-Ciebiada M, Saryusz-Wolska M, Ciebiada M, et al. Mild cognitive impairment and depressive symptoms in elderly patients with diabetes: Prevalence, risk factors, and comorbidity. J Diabetes Res. 2014; 2014: 179648. DOI: 10.1155/2014/179648.
19. Li X, Dai J, Zhao S, et al. Comparison of the value of Mini-Cog and MMSE screening in the rapid identification of Chinese outpatients with mild cognitive impairment. Medicine (Baltimore). 2018; 97 (22): 1-5. DOI: 10.1097/MD.0000000000010966.
20. Limpawattana P, Manjavong M. The mini-cog, clock drawing test, and three-item recall test: Rapid cognitive screening tools with comparable performance in detecting mild NCD in older patients. Geriatrics (Basel). 2021; 6 (3): 91. DOI: 10.3390/geriatrics6030091.
21. Hay M, Barnes C, Huentelman M, et al. Hypertension and age-related cognitive impairment: Common risk factors and a role for precision aging. Curr Hypertens Rep. 2020; 22 (10): 80. DOI: 10.1007/s11906-020-01090-w.
22. Ungvari Z, Toth P, Tarantini S, et al. Hypertension-induced cognitive impairment: From pathophysiology to public health. Nat Rev Nephrol. 2021; 17 (10): 639-654. DOI: 10.1038/s41581-021-00430-6.
23. Adnaabaatar M, Kim YE, Go DS, et al. Burden of disease in coastal areas of South Korea: An assessment using health insurance claim data. Int J Environ Res Public Health. 2019; 16 (17): 3044. DOI: 10.3390/ijerph16173044.
24. Yodang Y, Nuridah N. Prevalence and risk factors of hypertension in coastal and estuarine communities. Int J of Med Rev. 2019; 6 (4): 128-134. DOI: 10.30491/ijmr.2019.100909.
25. Astutik E, Puspikawati SI, Dewi DMSK, et al. Prevalence and risk factors of high blood pressure among adults in Banyuwangi coastal communities, Indonesia. Ethiop J Health Sci. 2020; 30 (6): 941-950. DOI: 10.4314/ejhs.v30i6.12.
26. Alifariki LO, Tukatman T, Bangu B, et al. Differences of sodium consumption pattern hypertension sufferer in coastal and highland communities in Wakatobi islands. Revista Bionatura. 2021; 6 (2):1736-1740. DOI: 10.21931/RB/2021.01.02.12.
27. Touyz RM, Alves-Lopes R, Rios FJ, et al. Vascular smooth muscle contraction in hypertension. Cardiovasc Res. 2018; 114 (4): 529–539. DOI: 10.1093/cvr/cvy023.