International Journal of Research in Medical Sciences
Nurfitriani et al. Int J Res Med Sci. 2022 Mar;10(3):595-598
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20220507

Original Research Article

The relationship of diabetes mellitus and acute coronary syndrome in Bima Public Hospital: a cross sectional study

Nurfitriani[1]*, Nurfathonah Aryana[2]

[1]Department of Internal Medicine, [2]Public Health Center, Bima Public Hospital, Bima, West Nusa Tenggara, Indonesia

Received: 13 January 2022
Revised: 01 February 2022
Accepted: 05 February 2022

***Correspondence:**
Dr. Nurfitriani,
E-mail: fitrirozy24@gmail.com

ABSTRACT

Background: Diabetes Mellitus type II (DM) is one of risk factors of Acute Coronary Syndrome (ACS). Based on a study, hyperglycaemia can increase mortality in hospitalized patients due to ACS. Other studies also mention that there is significant relation between hyperglycaemia and incidence of ST elevation myocardial infarction (STEMI). Currently, data regarding the relationship between DM and ACS in Indonesia is still limited. The purpose of this study was to determine the relationship between the ACS and DM in inpatients at Bima public hospital, Indonesia.
Methods: This study was a cross sectional study. Data were obtained from medical records of inpatients at Bima public hospital in January 2020 to December 2020. The sample was selected by consecutive sampling. All 146 patient's data that met inclusion criteria were analysed using chi-square test.
Results: The 146 patients which met inclusions criteria, as many as 85 people (58,2%) were male and 61 people (41,8%) were female. Based on age characteristics, 56 people (38,4%) were elderly and 90 people (61,6%) were adults. From 73 people diagnosed with ACS, there were 47 people (64,4%) diagnosed with DM and 26 people (35,5%) were not diagnosed with DM. Results of bivariate analysis, showed a significant relationship between DM and ACS with p value= 0.003 (OR = 2.743, 95% CI= 1.403-5.361).
Conclusions: Patients with DM are 2.7 times more likely to have ACS compared to non-DM. There is statistically significant relationship between DM and ACS.

Keywords: Acute coronary syndrome, Diabetes mellitus, STEMI, NSTEMI, Unstable angina pectoris

INTRODUCTION

Acute Coronary Syndrome (ACS) is a disease caused by reduced blood supply due to blockage of atherosclerotic plaques in the walls of heart's arteries.[1] Based on data in 2019 in United States, the main cause of death was cardiovascular disease and 31.8% were caused by coronary heart disease.[2] In Indonesia, based on data in 2013, the prevalence of ACS was estimated at 1.5%.[3] ACS can divided into three types, namely ST elevation myocardial infarction (STEMI), non- ST elevation myocardial infarction (NSTEMI), and unstable angina (UAP).[4] The risk factors of ACS are divided into modifiable and non-modifiable risk factors. The modifiable risk factors are diabetes mellitus (DM), smoking, hypertension, hyperlipidemia, physical inactivity, metabolic syndrome, cocaine, and consuming fast food. Non-modifiable risk factors are gender (male), age, and family history.[4]

Diabetes mellitus (DM) is the most common risk of ACS.[5] It was estimated 285 million people in 2009 had DM and continued increase to 425 million people in 2017.[6] The prevalence of DM in Indonesia in 2018 was 8.5% or 20.4 million people, this number has increased compared to 2013. Meanwhile, the incidence of DM in Bima in 2018 was 1.86%.[7]

Based on Zou et al, the prevalence of ACS patients with DM was 37.6%, STEMI patients with DM were 37.3%, while NSTEMI patients with DM were 39.6%.[5] In meta-analysis study, the mortality rate of ACS patients was 70% in patients with blood glucose level around 180 mg/dL and 3.9% with blood glucose level around 110 mg/dL.[8] In other study concluded that there was a significant relationship between hyperglycemia with incidence of STEMI compared to the incidence of NSTEMI and UAP.[9] There are not many data showing the relationship between ACS and DM in Indonesia.

Objective

Therefore, the purpose of this study was to determine the relationship between ACS and DM in inpatients at Bima public hospital, from January to December 2020.

METHODS

This study was cross sectional and used secondary data from medical records of inpatient at Bima public hospital and was approved by Ethics Committee in Bima Public Hospital. The inclusion criteria in this study were inpatient with type 2 DM with ACS who hospitalized at Bima public hospital in January-December 2020. The exclusion criteria in this study were inpatient with incomplete medical records. ACS was determined based on anamnesis and abnormalities findings on electrocardiogram, which can be unstable angina pectoris (UAP), ST elevation myocardial infarction (STEMI) or non- ST elevation myocardial infarction (NSTEMI). Diabetes mellitus was diagnosed based on anamnesis and one of the following laboratory results tests, which can be fasting blood glucose ≥126 mg/dL, glucose tolerance test >200 mg/dL, random blood glucose test >200 mg/dL or A1c test ≥6.5%. The sample size was determined by a hypothesis test formula to test two different proportions and obtained 146 samples. The sample was selected by consecutive sampling, where data from medical record that met inclusion criteria were included until reached the minimum number of samples.

The independent variable in this study was DM and the dependent variable was ACS. Data were analyzed by univariate and bivariate methods. Univariate analysis was conducted to determine the proportion of each variable and to describe the characteristics of the subject. Bivariate analysis was conducted to determine the relationship between independent variable and dependent variable using Chi-square. The analysis was carried out using IBM SPSS 20, with significant value if $p<0.05$. The data were also reported in the form of odds ratio (OR) with a 95% confidence interval (CI) to estimate the relationship between variables.

RESULTS

From 146 patient data that met the inclusion criteria, 58.2% were men. More than half of the subjects were under 60 years old. There were 47.3% subjects were diagnosed with dyslipidaemia. The results also showed that 52.1% were diagnosed with DM and 47.9% were not diagnosed with DM with an average 54.11±13.628 which showed normal data distribution (Table 1).

Table 1: Characteristics of subjects (n=14).

Variable	Total (n[a]=146)	Mean±SD[b] (54.11±13.628)	P value (0,200)[c]
Gender, n (%)			
Man	85 (58.2)		
Women	61 (41.8)		
Age(year), n (%)			
<60	90 (61.6)		
≥60	56 (38.4)		
Diabetes Mellitus, n (%)			
DM	76 (52.1)		
Non DM	70 (47.9)		
Dyslipidaemia, n (%)			
Dyslipidaemia	69 (47.3)		
Non Dyslipidaemia	77 (52.7)		
ACS, n (%)	73 (50.0)		
Man	42 (57.5)		
Women	31 (42.5)		
<60	48 (65.8)		
≥60	25 (34.2)		
Dyslipidaemia	37 (50.7)		
Non dyslipidaemia	36 (49.3)		
DM	47 (64.4)		
Non DM	26 (35.6)		

[a] number of samples, [b] standard deviation, [c]Test of Normality Kolmogorov-Smirnov

Table 2: Bivariate analysis between DM and ACS.

Variables		ACS		OR	CI 95%	P value
		ACS	non-ACS			
DM	DM	47	29	2.743	1.403-5.361	0.003
	non-DM	26	44			

From 50% who were diagnosed with ACS, 57.5% were men, and from age characteristics, 65.8% were under 60 years old. There were 50.7% diagnosed with dyslipidaemia and 64.4% diagnosed with DM (Table 1).

Bivariate analysis was conducted to determine the relationship between DM and ACS. The results of this study obtained an odds ratio 2.743, which means that subjects with DM have 2.7 times more likely to have ACS than subjects with non-DM and it is statistically significant (p=0.003) (Table 2).

DISCUSSION

This study shows the prevalence of patients with ACS was 50%, with 57.5% of them were males and 42.5% were females. Based on age, the number of patients aged under 60 years old was more than the elderly (aged more than 60 years old). Conversely, study by Zou et al in China, prevalence of women who diagnosed with ACS was greater than men, and from aged characteristic, patients aged less than 45 years old had prevalence of 28.1% and those aged over 65 years old had prevalence 41.5%.[11] The difference in results can be caused by difference in the characteristics of samples in these two studies.

The prevalence of patients who also diagnosed with DM in this study were 64.4%. The results in this study show a number that is quite large compared to other studies. Based on research conducted by Zou et al in China, the prevalence of ACS patients with DM was 37.6%, STEMI patients with DM were 37.3%, while NSTEMI patients with DM were 39.6%.[11] Based on study by Franklin, et al., the incidence of ACS and heart failure is very often found in DM patients. Diabetes mellitus causes thickening of the walls of blood vessels, thereby blocking blood flow.[10] In other study, it was said that DM was the most common risk factor for the incidence of ACS.[6]

In bivariate analysis between DM and ACS variables, patients with DM obtained an odd ratio (OR) 2.743 with 95% confidence interval (CI) (1.403-5.361). The results of this study indicate that patients with DM had 2.7 times more likely to experience ACS than non-DM patients and statistically significant (p=0.003). The results of this study are consistent with other studies which state that DM is a modifiable risk factor for the occurrence of ACS.[4,5,6] In addition, the results of this study also consistent with Dong et al., where the results show that DM is a risk factor of ACS in women (RR=2.46, 95% CI=1.92-3.17) and in males (RR=1.68, 95% CI=1.39-2.04).[12]

The mechanism of cardiovascular disease in DM is related to genetic, epigenetic and cell signalling disorders associated with metabolic pathways and inflammatory processes. This metabolic disorder, especially at the level of endothelium, liver, skeletal muscle and cell, can be triggered by various external factors, such as high calorie intake, smoking, glucose toxicity, glycation end products and drugs use.[13]

This study used secondary data from medical records, therefore had limitations in processing confounding variables. In addition, this study had several factors were not studied who will affect the results in this research.

CONCLUSION

The results of this study indicate a significant relationship between diabetes mellitus and acute coronary syndrome in inpatients at the Bima Public Hospital. Future research is expected to use other research designs, namely by using primary data and increasing the number of samples. There is a need for research on other factors related to the incidence of ACS to find various solutions to overcome the problem of the disease.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. PERKI. Pedoman tatalaksana sindrom koroner akut, Edisi 4. Jakarta: Perhimpunan Dokter Spesialis Kardiovaskular Indonesia. 2018.
2. Sherrie R. Hearth disease and stroke statistics-2019 update: a report from the American Heart Association. Circulation. 2019;3:14-8.
3. Suling FRW, Patricia MI, Suling TE. Prevalensi dan faktor risiko sindrome koroner akut di rumah sakit umum Universitas Kristen Indonesia. Majalah Kedokteran. UKI 2018;34(3):110-4.
4. National Center for Biotechnology Information. Bookshelf: StatPearls Acute Coronary Syndrome, 2020. Available at: https://www.ncbi.nlm.nih.gov/books/NBK459157/#_ncbi_dlg_citbx_NBK459157. Accessed 10 January 2020.
5. Sethi SS, Akl EG, Farkouh ME. Diabetes mellitus and acute coronary syndrome: lesson from randomized clinical trials. Curr Diab Rep. 2012;12(3):294-304.
6. Saedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9th edition. Diabetes Res Clin Pract. 2019;157:107843.
7. Kemenkes RI. Laporan Provinsi Nusa Tenggara Barat Riskesdas 2018. Jakarta. 2018.
8. Deedwania P, Kosiborod M, Barret E, Ceriello A, Isley W, Mazzone T, et al. Hyperglycaemia and acute coronary syndrome: a scientific statement from the American Heart Association Diabetes Committee of the Council on Nutrition, Physical Activity, and Metabolism. Circulation. 2008;117(12):1610-9.
9. Kolman L, Hu YC, Montgomery DG, Gordon K, Eagle KA, Jackson EA. Prognostic value of admission fasting glucose levels in patients with acute coronary syndrome. Am J Cardiol. 2009;104(4):470-4.
10. Franklin K, Goldberg RJ, Spencer F, Klein W, Budaj A, Brieger D et al. Implication of diabetes in patients with acute coronary syndromes. Arch Intern Med. 2004;164(13):1457-63.

11. Zhou M, Liu J, Hao Y, Liu J, Huo Y, Smith Jr SC et al. Prevalence and in-hospital outcomes of diabetes among patients with acute coronary syndrome in China: findings from the improving care for cardiovascular disease in Chine-Acute Coronary Syndrome Project. Cardiovasc Diabetol. 2018;17(1):147.
12. Dong X, CaiR, Sun J, Huang R, Wang P, Sun H et al. Diabetes as a risk factor for acute coronary syndrome in women compared with men: a meta-analysis, including 10 856 279 individuals and 106 703 acute coronary syndrome events. Diabetes Metab Res Rev. 2017;33(5).
13. Rodriguez-Araujo G, Nakagami H. Pathophysiology of cardiovascular disease in diabetes mellitus. Cardiovasc Endocrinol Metab. 2018;7(1):4-9.

Cite this article as: Nurfitriani, Aryana N. The relationship of diabetes mellitus and acute coronary syndrome in Bima Public Hospital: a cross sectional study. Int J Res Med Sci 2022;10:595-8.