Impact of Metabolic Syndrome Screening and Education on Cardiovascular Disease Risk Magnitude

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Abstract: **Background:** Metabolic syndrome is one of the triggers of cardiovascular disease, the leading cause of death worldwide, caused by blockages and abnormalities in the heart. The aim of this study was to determine the impact of metabolic syndrome screening and education on the risk of cardiovascular disease**. Methods:** The research method used was a systematic review conducted by searching for articles related to the relationship between metabolic syndrome and cardiovascular disease risk that have been published. Results: A systematic review of published journals showed that there is a significant association indicating that a person with metabolic syndrome is likely to be at risk of cardiovascular disease. **Results:** Based on the journals that were combined and synthesised, there is an association between metabolic syndrome and lifestyle with cardiovascular disease. Metabolic syndrome screening and education, as well as healthy lifestyle changes, are needed to prevent and reduce the risk of cardiovascular disease. **Conclusion:** Early screening to detect metabolic syndrome and education related to healthy lifestyle and preventive efforts need to be done to prevent complications of metabolic syndrome to the risk of cardiovascular disease.

1 INTRODUCTION

Metabolic syndrome is often defined as a complex metabolic disorder involving abnormalities in the metabolism of macromolecules such as carbohydrates, lipids and proteins. Components The main components of metabolic syndrome are obesity, insulin resistance, dyslipidaemia and hypertension (Guembe et al, 2020). Syndrome Metabolic syndrome is a collection of metabolic risk factors that are directly related to the occurrence of cardiovascular disease. These risk factors include atherogenic dyslipidaemia, elevated blood pressure, elevated plasma glucose levels, prothrombin state and proinflammatory state (Salari et al., 2020).

Prevalence of metabolic syndrome based on an epidemiological survey. The International Diabetes Federation puts the figure at 20-25%. The prevalence of metabolic syndrome in the adult population is reported to be around 15% in Europe, 14.2% in South Korea and 24% in the Americas. In Indonesia, 23.34% of the total population has metabolic syndrome, of which 26.6% are men and 21.4% are women (Ntougou Assoumou et al., 2023).

Metabolic syndrome is a cluster of metabolic risk factors directly linked to the development of atherosclerotic cardiovascular disease. Although metabolic syndrome is not a disease but a collection of symptoms, early detection in an individual will be of great importance if it is to be resolved and treated immediately. This is because the collection of clinical symptoms that occur together contribute to cardiovascular disease (Ananthy et al, 2021).

It is estimated that in the next five to ten years, the risk of type 2 diabetes mellitus (DM) will increase fivefold and the risk of cardiovascular disease will increase twofold. Cardiovascular disease will double. Patients with metabolic syndrome have two to four times the risk of stroke and three to four times the risk of heart attack. Other studies have also suggested a positive relationship between knowledge, attitudes and behaviours about healthy lifestyles and several cardiovascular disease risk factors, such as fasting blood glucose, waist circumference and body mass index and blood pressure. This means that the higher or better the level of knowledge, attitudes and behaviours related to healthy lifestyles, the higher the risk factors (Gebreegziabiher et al., 2021).

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2 METHODS

The research method used was a systematic review, which was conducted by searching for published articles on the relationship between metabolic syndrome and cardiovascular disease risk. The source of data for this study came from literature obtained through the internet, in the form of research results published in Google Scholar during the period 2019-2023.

3 RESULTS AND DISCUSSION

3.1 Metabolic Syndrome

Metabolic syndrome is a group of health conditions that occur together. It can increase the risk of coronary heart disease, heart attack, type 2 diabetes and stroke. A person is said to have metabolic syndrome if they have at least three of the following five conditions: high blood pressure (hypertension), low HDL levels (dyslipidaemia), high triglyceride levels, high blood sugar levels or pre-diabetes, and obesity with abdominal fat accumulation. Metabolic syndrome can increase the risk of developing serious diseases. However, the development of metabolic syndrome can be prevented by controlling the factors that lead to these five conditions, namely by adopting a healthy lifestyle every day (Iso et al, 2021).

Metabolic syndrome is a metabolic disorder mainly caused by obesity and insulin resistance (Li et al., 2020). The components of metabolic syndrome are central obesity, blood glucose levels, triglyceride levels, HDL cholesterol levels and blood pressure. HDL cholesterol and blood pressure. Central obesity is considered to be the main cause of metabolic syndrome, which is characterised by an abdominal circumference greater than normal, i.e. more than 80 cm for women and more than 90 cm for men. The prevalence of metabolic syndrome in Indonesia is still quite high at 21.66%. People with metabolic syndrome have a higher risk of developing cardiovascular complications such as stroke and coronary heart disease. A sedentary lifestyle with poor diet and low levels of physical activity leads to a high incidence of metabolic syndrome (Zolghadrpour et al, 2023).

3.2 Cardiovascular Disease

Cardiovascular disease is caused by disorders of the heart and blood vessels. Heart disease and stroke are the two most common cardiovascular diseases. In addition, there are other cardiovascular diseases that are common and worthy of attention. In Indonesia, cardiovascular diseases cause about 651,481 deaths every year. Unhealthy lifestyles such as eating too much fatty food, not exercising regularly, smoking and excessive alcohol consumption are some of the risk factors for cardiovascular disease (Chae et al., 20-23).

The cardiovascular system is responsible for circulating blood throughout the body. If there is a disorder or blockage in this part of the body, blood circulation is disturbed and this can lead to various cardiovascular diseases. The following are the most common cardiovascular diseases that you need to be aware of:

3.2.1 Arrhythmia

Arrhythmia is a condition in which the heart has an abnormal beat or rhythm, such as too fast, too slow or irregular. This cardiovascular disease occurs when the electrical impulses that control the heartbeat do not work properly.

3.2.2 Coronary Heart Disease (CHD)

Coronary heart disease (CHD) is a blockage or narrowing of the coronary arteries caused by plaque build-up. This condition reduces the blood supply to the heart. If left untreated, this cardiovascular disease can lead to heart attack, irregular heartbeat and heart failure.

3.2.3 Stroke

A stroke occurs when the blood supply to the brain is interrupted by a blocked or ruptured blood vessel. Without sufficient blood supply, the brain is deprived of oxygen and nutrients. As a result, the cells in the brain are damaged, causing cardiovascular disease in the form of a stroke.

3.2.4 Cardiomyopathy

Cardiomyopathy is a cardiovascular disease caused by abnormalities in the heart muscle. It is characterised by a weakening of the heart's ability to pump blood. Cardiomyopathy can lead to serious complications such as heart valve disease, blood clots, heart failure and cardiac arrest.

3.2.5 Deep Vein Thrombosis (DVT)

Deep vein thrombosis is a cardiovascular condition

caused by blood clots in the veins. It usually occurs in the legs. In some cases, the blood clot can travel with the bloodstream to the lungs and cause serious complications, such as a pulmonary embolism.

3.2.6 Peripheral Arterial Disease

Peripheral arterial disease (PAD) occurs when blood flow to the legs is blocked due to plaque build-up in the arteries. This cardiovascular disease can deprive the legs of blood supply, causing pain when walking.

3.3 Result

In a study conducted by Sudijanto Kamso (2011), the prevalence and determinants of metabolic syndrome in the executive group in Jakarta and surrounding areas were determined by conducting multiple logistic regression analysis to determine the relationship between several independent variables and the dependent variable. This analysis identified body mass index (overweight, odds ratio (OR) = 5.54; obesity, OR = 7.44) and total cholesterol/HDL cholesterol (HDL) ratio (OR = 8.83) as determinants of metabolic syndrome in the executive group. This study suggests that regular lipid profile screening and simple anthropometric measurements in the managerial group are important to detect the risk of metabolic syndrome.

(Zheng et al, 2023) in his study Impact of Metabolic Syndrome on the Development of Cardiovascular Disease in a General Japanese Population The Hisayama Study. He found that the overall prevalence of MetS at baseline was 25.9%. Baseline characteristics based on sex and MetS are shown in Table 1. The prevalence of MetS at baseline was 21% in men and 30% in women. There were 307 CVD events during follow-up. Compared with those without MetS, the age-adjusted incidence of CVD (per 1000 person-years) was significantly higher in subjects with MetS in both men (21.8 versus 11.6, P0.01) and women (12.9 versus 6.5, P0.01). The risk of CVD events was significantly higher even after adjustment for the following confounders: age, proteinuria, electrocardiographic abnormalities, serum total cholesterol, smoking habits, alcohol intake and regular exercise (hazard ratio, 1.86; 95% CI, 1.32 to 2.62 in men and hazard ratio, 1.70; 95% CI, 1.22 to 2.36 in women). The risk of incident CVD was found to increase with the number of components of the MetS and became significantly predictive when the number of components reached 3. Similar associations were also observed when CVD was divided into coronary heart disease and stroke.

The impact of lifestyle modification education on cardiovascular risk profile was studied by Fonny Cokro. She found that Comparison analysis of knowledge before and after education Data analysis using Wilcoxon signed rank test showed that there was a significant increase in knowledge between before and after education on face-to-face sessions group (p0.05). Comparative analysis of participants' dietary behaviour (based on HDI) before and after the training Data analysis using the Wilcoxon signed test showed that there was no significant change in HDI in all groups ($p>0.05$) between before and after the training. Comparison analysis of BMI and waist circumference before and after training Data analysis using the Wilcoxon signed test showed that there was no significant reduction in BMI and waist circumference in all groups ($p>0.05$) between before and after training. Comparative analysis of cardiovascular risk profile before and after education Data analysis using Wilcoxon signed test showed that there was no significant reduction in cardiovascular risk profile in all groups ($p>0.05$) between before and after education intervention.

Lifestyle modification education can significantly increase patients' knowledge in the face-to-face group, but not in the recorder and combination groups. Lifestyle modification education had no significant effect on dietary behaviour based on HDI, BMI, waist circumference and cardiovascular risk profile in all groups. A long-term intervention and a multi-component programme including behavioural therapy may be needed to improve lifestyle changes and reduce cardiovascular risk (Lee & Park, 2023).

Tri Umiana Soleha and M. Azzaky Bimandama said that the prevalence of MS has reached a fantastic number, which is 20-25% in the world. In patients with MS, metabolic changes are seen in the body, so if the patient has SM, they are very vulnerable to developing cardiovascular disease. This vulnerability increases the risk of death in both women and men. Conclusion Metabolic syndrome (MS) has a very close relationship with cardiovascular disease. Using the pathophysiology and criteria of MS, various syndromes will present as a disease and complicate into cardiovascular disease.

The NAZARENE FILADELFIA CHRISTIAN CHURCH YOGYAKARTA study found that the provision of MS-related education did not cause changes in glucose tolerance test, uric acid and systolic blood pressure levels. The provision of education may cause significant changes in diastolic blood pressure of 6.3 mmHg, but not clinically, as systolic blood pressure before and after education is still within normal limits. Examination of total

cholesterol results showed a mean of 162.3 mg/dl before education, and the mean total cholesterol increased significantly after education (196.7 mg/dl), although it is still within the tolerance limit of less than 200 mg/dl.

And the metabolic syndrome, as defined by the NCEP criteria, was less common in people with a university education (21% in men and 14% in women) than in those with a primary education (41% and 27%, respectively). Adjustment for health behaviours had little effect on the educational gradient in metabolic syndrome. There was a clear educational gradient in CHD incidence [hazard ratio (HR) = 0.67 95% confidence interval (CI) 0.48-0.94, men and women combined]. Adjustment for metabolic syndrome attenuated this gradient only slightly, but when individual components of metabolic syndrome were included as covariates, the attenuation was more substantial (HR = 0.73 95% CI 0.52-1.04).

4 CONCLUSIONS

Based on the journals analysed, combined and synthesised, there is an association between metabolic syndrome and lifestyle with cardiovascular disease. Screening and education about metabolic syndrome is needed so that people understand how dangerous metabolic syndrome is in increasing the risk of cardiovascular disease. Healthy lifestyle changes are also needed to prevent and reduce the risk of cardiovascular disease. Lipid profile/blood lipid levels should be measured to detect metabolic syndrome.

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