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**PROFILE OF Creatine Kinase Myocardial Band (CK-MB) LEVELS IN
PEOPLE WITH FITNESS HABITS**

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ABSTRACT

Fitness activities are classified as types of sports that require high optimal work of the heart. Fitness exercises if done excessively can cause a risk of increasing Creatine Kinase levels, one of which is the Creatine Kinase Myocardial Band (CK-MB). CK-MB is the most abundant creatine kinase isoenzyme in cardiac muscle cells. Thus resulting in muscle fatigue and muscle injury in that section. This study aims to determine the levels of Creatine Kinase Myocardial Band (CK-MB) in people who regularly do fitness. This study uses a descriptive method with a quantitative approach, namely studying data in the form of numbers. Using a research population of 75 people with a sample of 30 male sex in productive age who regularly do fitness. Examination of the Creatine Kinase Myocardial Band (CK-MB) was carried out by taking venous blood and then testing it using the routine TMS 50i Superior by Tokyo clinical chemistry tool at the Surabaya Health Laboratory Center (BBLK). Based on the examination results and obtained data on the levels of Creatine Kinase Myocardial Band (CK-MB) from a total of 30 samples, 30% (9 people) were normal and 70% (21 people) were abnormal.

Keywords: Fitness, CK-MB Levels, Habits

BACKGROUND

In this modern era, technological advances and modernization have had a huge influence on people's lifestyles. Changes in people's lifestyles tend to try to achieve a good quality of life, one of which is the health and appearance of the body. Fulfilling this change in lifestyle is a phenomenon that has recently developed among urban communities. Most urban residents use fitness centers to carry out sports activities (Dewi et al., 2020). One sport that is popular is fitness in the form of lifting weights.

“Physical activity,” “exercise,” and “physical fitness” are terms that describe different concepts. However, the terms are often confused, and are sometimes used interchangeably.

Physical activity is defined as any body movement produced by skeletal muscles that results in energy expenditure. Energy expenditure can be measured in kilocalories. Physical activity in daily life can be categorized into work, exercise, conditioning, household, or other activities. Exercise is part of physical activity that is planned, structured and repetitive and has the final or intermediate goal of improving or maintaining physical fitness. Physical fitness is a set of attributes related to health or skills (Caspersen et al., 1985) .

From the results of a survey at one of the gyms in the East Surabaya area, precisely in North Keputih, it was found that the number of gym members in the span of 6 months starting from September 2022 to February 2023 was 663 members, it appears that fitness is in great demand. Not only teenagers but adults are also interested in this sport.

The main factors of fitness include exercise, nutritional supplements, and regular rest. From the combination of these three factors, it can be hoped that you will get an ideal and healthy body. In the current era of development, an ideal body can also be used as a means of seeking fortune, such as being a model, a dancer or dancer, the police, and the army. The lifestyle of fitness people indirectly makes good living habits and increases the degree of health to support muscle needs. However not everyone makes fitness a healthy lifestyle due to limited knowledge and knowledge about the world of fitness. The fitness actors have different goals depending on the individual. There are several goals of fitness training, namely building muscles, losing weight, and increasing muscles (Anugarista et al., 2022). The impact of resistance training on health not only increases muscle mass and strength, but also reduces the risk of death. Participation in resistance training can improve physical and cognitive function, increase cancer survival, and manage metabolic health. We propose that resistance training be placed at the forefront of physical activity guidelines alongside aerobic exercise. However, it can be recognized that implementation and adherence to resistance training in clinical populations is still low; The most frequently mentioned barriers to resistance training were the risk of injury (a risk that can be reduced when lifting relatively lighter weights) and the need for access to gym facilities. In particular, prevention of disability, reduced risk of falls, and improved cognitive ability are potential health motivations for engaging in resistance training. it is recommended to perform resistance training with relatively light to moderate loads ($\geq 30\%$ but $< 70\%$ of 1RM) or only use body weight as resistance. Repetitions in a given series should be performed to a point that produces a high level of effort or is relatively close to instantaneous muscle failure. Such resistance training routines are as effective as lifting relatively heavy weights ($\geq 70\%$ of 1RM) for health benefits (Abou Sawan et al., 2023). Doing fitness exercises for new members without the supervision of a Personal Trainer is also dangerous to oneself which can cause injury.

When fitness training is done excessively, it can have a bad effect on the body's condition, including causing the heart muscle to work faster and more rapidly than normal. Based on the results of interviews conducted by researchers with several gym members, they said they had experienced similar complaints of feeling short of breath, chest pounding faster, and injuries to the hips after doing fitness sports. Generally, the heart of a fitness person will be bigger than that of a non-fitness person. This larger heart size is basically good because the heart can pump blood more efficiently. According to a number of studies, exercise fitness can reshape the heart. When doing this exercise, the heart will stretch and become bigger and stronger so it can pump more blood. However, in some cases, it is suspected that there is a link between fitness, namely heart swelling and an increased risk of atrial fibrillation (Saragih, 2020).

During fitness activities, the heart experiences intermittent hemodynamic stress in the form of excess pressure, excess volume, or both. To normalize these stresses and to meet the systemic

demand for increased blood supply, the heart undergoes morphological adaptation to repetitive exercise by increasing its mass, primarily through increasing the thickness of the ventricular chamber walls (Nystoriak & Bhatnagar, 2018).

The heart will work continuously as long as a human lives, so it can gradually decrease the ability of the heart to function. Heart function can decrease drastically if there are other influencing factors such as infection of the heart muscle, myocarditis or pericarditis muscle lining, reduced oxygen due to narrowing of the arteries. If the pumping movement of the heart stops due to damage to the heart muscle cells, death can occur (Wijaya, 2021). Of the several factors above that can cause decreased heart function, it can be done with tests such as the Creatine Kinase Myocardial Band (CK-MB) parameter.

Creatine Kinase Myocardial Band (CK-MB) is the most abundant creatine kinase isoenzyme in cardiac muscle cells. CK-MB enzymes in serum can be increased in muscle trauma. Creatine Kinase Myocardial Band (CK-MB), CK-MB Isoenzyme is present in fairly high concentrations in cardiac muscle cells. A number of other markers have been proposed as markers of heart muscle damage but CK-MB and troponin T are still the most widely used tests. For more than 20 years, measurement of CK-MB in serum has been used as the gold standard for detecting AMI, but CK-MB is not specific for detecting damage to the heart muscle. CK-MB enzymes in serum can increase in muscle trauma (Aprina, 2019). Weight-bearing exercise can cause transient increases in CK and CK-MB; CK-MB is also found in skeletal muscle, although in lower concentrations. Chronic skeletal muscle disorders such as autoimmune myopathies and inflammatory myopathies can cause persistently high plasma CK-MB levels due to ongoing injury and repair. Damage to the myocardium releases CK-MB, and because the myocardium contains the largest percentage of CK-MB, patients with CK-MB that rise and fall rapidly beyond the normal reference range should be considered to have AMI until proven otherwise (Kurapati R, 2023) .

Every human physical activity always requires energy. The energy needed comes from the food consumed which is provided by various chemical reactions that occur in the body. The most quickly available source of energy for muscle contraction is Adenosine Phosphate or it can be called ATP. ATP is a sudden source of energy for muscle contraction. It is stated that in the body there is a chemical compound in the form of ATP (adenosine phosphate). During activity, this compound is converted into Adenosine Diphosphate or ADP. The amount of ATP in the muscles is limited so it will be used up soon if it is used. However, the system in the muscle is able to form ATP from the ADP that is present in the muscle. The formation of ATP helps muscles to continue contraction during exercise. In general, providing energy for muscle contraction can occur in two ways, namely anaerobic (not using oxygen) such as jumping rope, fitness and aerobic (using oxygen) such as running, swimming, cycling, walking (Sandi, 2019).

In the preliminary test that the researchers carried out, they visited a gym in the East Surabaya area. Researchers took 3 samples, there were 2 samples whose CK-MB levels exceeded normal levels or were said to be high, namely sample code X1 found 33 U/L and sample code X2 obtained 26 U/L from the normal value <25 U/L. In people who have a habit of exercising with heavy intensity, one of which is fitness, it can cause an increase in CK-MB levels. This isoenzyme can indicate damage to the heart muscle (Aprina, 2019). One of the reasons behind the increase in CK-MB is because there are gym members who do not follow the Personal Trainer (PT) directions.

So based on the background of the problems above, researchers are interested in conducting research on "Analysis of Myocardial Band Creatine Kinase (CK-MB) Levels in People Who Have Fitness Habits".

RESEARCH METHODS

This research method uses a descriptive type of research with a quantitative approach. Research that describes, studies and explains a phenomenon using data in the form of numbers (Wahyudi, 2022). The sampling technique used was purposive sampling, which was carried out by determining specific criteria according to the research objectives. The criteria for the sample in this study were male sex of productive age and willing to do venous blood sampling who did fitness in June 2023 at three gyms in the Surabaya area. The independent variable in this study is people who like to do fitness. The dependent variable in this study is the CK-MB level. The data source in this study is primary data, namely data obtained by testing using the TMS 50i Superior by Tokyo Boeki Machinery Ana-lyzer. Data collection can be done by taking samples in the form of serum from fitness members at 3 gyms in the Surabaya area. Examination of CK-MB levels was carried out by optimizing UV testing based on the homogeneous DGKC and IFCC methods for CK by inhibiting CK-M isoenzymes by monoclonal antibodies.

RESULTS AND DISCUSSION

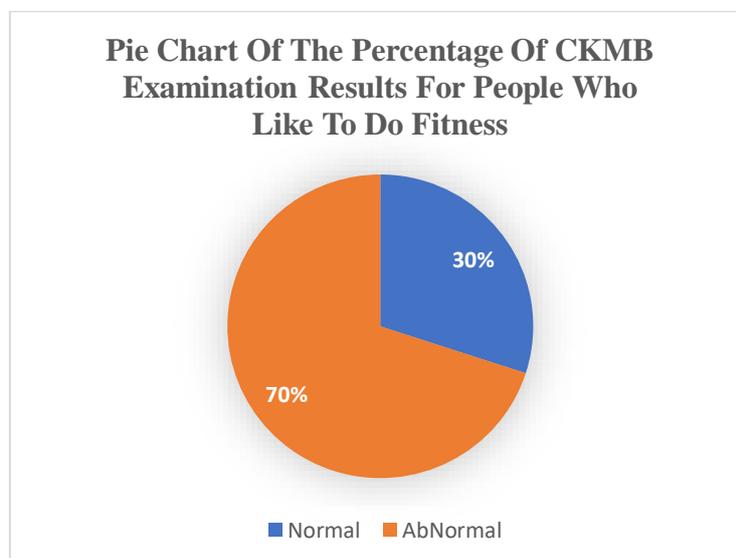
Based on research results, analysis of CK-MB levels in people who like to do fitness at several gyms, namely Speedrocky gym, Vin's Club gym, Among Rogo gym and examinations carried out at the Health Laboratory Center (BBLK) Surabaya, the following results were obtained:

Table 1. Results of the Percentage of CK-MB Levels for People Who Like to Do Fitness

Check up result	Amount	(%)	average
Normal	9 people	30%	18,88 U/L
AbNormal	21 people	70%	46,23 U/L

Source: Clinical Pathology Laboratory, the Surabaya Health Laboratory Center (BBLK), June 2023

Picture 1. Diagram of the results of the analysis of CK-MB levels in people who like to do fitness



Based on the data in the preliminary test that the researchers did, they visited a gym in the East Surabaya area. Researchers took 3 samples, there were 2 samples whose CK-MB levels exceeded normal levels or were said to be high, namely in sample code X1 it was found to be 33 U/L and sample code CK-MB due to lack of supervision from the Personal Trainer (PT) during training. And continued with research with the results obtained, which was carried out in three gyms in Surabaya with a research population of 75, there were 30 samples of people who had the habit of doing fitness. The normal value for CK-MB levels is <25 U/L. Obtained from the results of the examination, the average CK-MB level in respondents was 38.03 U/L, the lowest CK-MB level was 12 U/L and the highest CK-MB level was 141 U/L. CK-MB levels with normal results were 9 samples with a percentage of 30% and the average normal CK-MB level was 18.88 U/L. CK-MB levels with abnormal results were 21 samples with a percentage of 70% and the average abnormal CK-MB level was 46.23 U/L.

In 9 samples with a percentage of 30% normal CK-MB levels, the results of the questionnaire showed that people who like to do fitness have normal CK-MB levels because the training pattern is done < 3x a week and the training duration is < 90 minutes a day, using the required load and adjusted during exercise, besides that fitness people consume high-protein foods properly and correctly as needed. If someone has a habit of doing sports activities, it is highly recommended to consume protein sources. A supplement that is often used by people who do fitness is synthetic creatine which functions to increase muscle mass and strength for lifting weights. Supplement consumption is intended to fulfill nutritional deficiencies that cannot be met from the food consumed (Suparmanto et al., 2019).

Meanwhile, the results of research on 21 people with a percentage of 70% abnormal CK-MB levels, based on the results of the questionnaire, people who like to do fitness have abnormal CK-MB levels because their exercise pattern reaches >3 times a week with a duration of >90 minutes per day. the load used is also greater. Because doing intensive physical exercise, with increasing duration and load, will cause physiological adaptations in the form of increasing the volume and filling pressure of the left ventricle of the heart. Then, over time, the muscles of the left ventricular wall will thicken and the size of the left ventricular chamber in the heart will increase. Stroke volume will increase significantly as a result of increased end-diastolic volume and cardiac output which increases 5 to 6 times during exercise at maximum power, causing a decrease in heart rate frequency (Maharjito & Handayani, 2019).

The results of research conducted by (Paramita, 2019) namely that creatinine levels in fitness members based on weekly exercise were found to be 66.7% (20 people) who exercised >2 times per week with normal levels and found to be 23.3% (7 people) do sports no more than 2 times per week. This is in line with the fact that excessive exercise can increase creatinine levels in the blood due to high muscle metabolism. Creatine Kinase Myocardial Band (CK-MB) is an important examination in evaluating a myocardial infarction and acute coronary syndrome. CK-MB as a standard diagnosis for AMI has limitations, namely that it is not cardiospecific, and can increase in muscle trauma. An increase in the CK-MB isoenzyme can indicate heart muscle damage. In mild to moderate increases in CK-MB (2-4 times normal) that is caused by one of them being sports with strenuous activities (Aprina, 2019).

Fitness, one of which is carrying out weightlifting activities, is an activity that is a lifestyle and a necessity for the community which is carried out regularly to build certain muscles in the body or physically. So it can be said that fitness activities can change people's lifestyles to become healthier by doing them correctly and regularly. Balance it by consuming foods that are high in protein. However, if done excessively it is also not good because of changes in the

structure of functions in someone who exercises more than one hour every day. In addition, someone with an exercise capacity that is above normal can also experience heart enlargement and bradyarrhythms (Maharjito & Handayani, 2019).

Excessive physical exercise activity will cause changes in cardiac output to the organ systems. There is an addition of 4 times more blood flow to the heart, so that the stroke volume increases and causes a reduction in heart rate, increases the size of the left ventricle of the heart, thickens the heart muscle. There are several changes in the heart as a response to adaptation to fitness exercises that are carried out routinely including the left ventricle, right ventricle, aorta and left atrium.

Physical exercise with high activity will cause the muscles to contract anaerobically. Anaerobic muscle contraction requires the provision of ATP energy through the process of anaerobic glycolysis or the lactic acid system. During physical activity, a large amount of ATP must be formed so that it can be used by the muscles for longer and more strenuous physical exercise. If lactic acid is allowed to accumulate in the muscles, it will cause muscle fatigue (Raden Ayu Tanzila & Emir Rasyid Hafiz, 2020).

CONCLUSION AND RECOMMENDATION

CONCLUSION

From the results of examining Creatine Kinase Myocardial Band (CK-MB) levels in people who like to do fitness, it can be concluded that the Creatine Kinase Myocardial Band (CK-MB) levels were normal in 9 people (30%) and the Creatine Kinase Myocardial Band levels (30%) were normal. CK-MB abnormal was 21 people (70%).

RECOMMENDATION

1. For Further Researchers

Continuing research with Creatine Kinase Myocardial Band (CK-MB) parameters as support for determining heart disease factors in people who like to do fitness by comparing lifestyle and exercise patterns according to Personal Trainer's directions.

2. For the Community

Providing outreach to fitness members who have a habit of doing fitness due to high levels of Creatine Kinase Myocardial Band (CK-MB) which can affect heart health.

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