Body Mass Index Changes After 10 Years of Work and Percentage of Body Fat in the Army Members in Kodam IX/ Udayana Denpasar Bali

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Abstract: **The Army is part that is in charge of the defense operations of the Republic of Indonesia in the land Madra. Health is one of the supports in carrying out the defense duties of an Army. The level of health can be determined by nutritional status. One of the assessment of nutritional status is by calculating body mass index (BMI). The disadvantage of measuring BMI is that it cannot measure body fat directly. This study aims to determine the change in army body mass index (BMI) after 10 years of working into the army and body fat mass at this time in members of the Army in KODAM IX / UDAYANA. The study was conducted with a descriptive longitudinal design method. Samples were selected from the population based on inclusion and exclusion criteria. Data were analyzed using a data analysis program on the computer to get the characteristics of the Army in KODAM IX / UDAYANA based on sociodemography, initial BMI, final BMI, percentage of body fat mass, and analysis of initial and final BMI changes. The results of the BMI distribution study showed that at the beginning of the selection the acceptance of the Army all had a normal BMI (100%) and at the end of the BMI when the study was the highest percentage in BMI overweight categories (52%). From the aspect of body fat mass percentage showed the most in the category of obesity (50.4%). Based on the analysis of changes in BMI there was a change in the majority of late BMI into overweight categories at the beginning of BMI normal category (52%).**

Keywords: **Army, BMI, Body Fat Percentage.**

I. INTRODUCTION

Health is one aspect that supports a member of the Army in carrying out the main duties of the Army, namely upholding the country's sovereignty, maintaining the territorial integrity of the Unitary State of the Republic of Indonesia based on the Pancasila and the 1945 Constitution of the Republic of Indonesia, and protecting all nations and all spilled blood. Indonesia from threats and disturbances to the integrity of the nation and the State.[1]

Assessment of a person's health level is influenced by several factors, one of which is the assessment of nutritional status. Nutritional status is a condition caused by a balance between the intake of nutrients from food with the nutritional requirements needed for the body's metabolism as well as one of the important benchmarks in achieving optimal health. People who have good nutritional status are not susceptible to disease, both infectious and degenerative diseases.[2]

Assessment of a person's nutritional status can be done in various ways one of them by calculating the Body Mass Index (BMI). Body mass index (BMI) is an inexpensive, easy and simple method for assessing the nutritional status of an individual by calculating the proportion of body weight (in kilograms) divided by the square of height (in meters). Measurements and assessments using BMI are related to deficiency or excess nutritional status so that according to the WHO category BMI can be categorized into underweight to obese.[2]

BMI calculation also has limitations one of which is not able to measure body fat directly, it is necessary to measure body fat mass to determine the optimal composition of a person's body. The percentage of optimal body fat in children and adolescents is 11-20% for men and 16-25% for women. Routine body composition measurements are needed to monitor changes in muscle mass and body fat mass. Decreased muscle mass and increased body fat mass have a negative impact on body metabolism, strength, and endurance.[3]

During the Ceremony, January 2015 Commander Korem 073 / Makutarama also gave directions, one of which was that members of the Indonesian Army always maintain a healthy body, maintain body weight with exercise, and pay attention to eating patterns, not to exceed the limits, so that they become fat, because the army must not be distended.[1]

In an effort to maintain good health and good body shape for members of the Indonesian Army, a health check is carried out, one of which is by monitoring the Body Mass Index (BMI) of the army regularly. BMI examination aims to determine the weight category. Where between body fat and BMI has a very decisive relationship to body shape and body proportionality. [4]

II. METHODOLOGY

This research is a descriptive study with a longitudinal design to see changes in BMI at the beginning and after 10 years of work and the percentage of body mass mass of members of the army in the Army in KODAM IX / UDAYANA, Denpasar, Bali. The population of this research is the Army AD at KODAM IX / UDAYANA, Denpasar, Bali, which has been working as the Army for more than 10 years, totaling 125 people.

The sampling technique in this study was carried out using a non-probability sampling method through consecutive sampling, where all subjects who had been in the Army for more than 10 years and met the inclusion and exclusion criteria were included in the study until the required number of subjects were met. The study was conducted after obtaining permission from the Research Ethics Commission of the Faculty of Medicine of Udayana University with Ethical Clearance Information Number: 2176 / UN14.2.2.VII.14 / LP / 2019 dated 30 July 2019.

The material of this research is secondary data obtained from initial physical measurement data when carrying out the selection of Army acceptance at the AJENDAM Kodam IX/UDAYANA and the primary data obtained from sociodemographic interviews consisting of age, marital status, rank and length of work and anthropomteri measurement in the form of weight, height, and thickness of subcutaneous fat carried out during the study. The tools used are digital weight scales with an accuracy of 0.001 kg to measure body weight, microtoise with an accuracy of 0.1 cm to measure height, and skinfold caliper with an accuracy of 1 mm. Parts of the body that are measured using a skinfold caliper are triceps, biceps, subscapules, and suprailiac fat folds.[5]

After the data is collected, the data is processed using a data analysis program on a computer and analyzed descriptively to take the sociodemographic distribution, BMI, body fat mass, changes in the initial BMI since registering as Private, Military, and Army Officers. Data is grouped based on research variables and presented in the form of frequency distribution tables.

III. RESULT AND DISCUSSION

The sociodemographic characteristics of the army at KODAM IX / UDAYANA consisted of age, marital status, rank and length of work. Age is divided into three categories based on the Ministry of Health of the Republic of Indonesia (2009), namely early adulthood (26-35 years), late adulthood (36-45 years), early elderly (46-55 years). Marital status is divided into 3 groups, namely unmarried, married, and separated / widower. Rank is divided into 4 groups of ranks in army namely Tamtama, Bintara, First Officers and Middle Officers. While the length of work is determined from the length of the respondent being the Army and divided into 5 categories, namely categories with tenure of 15-15 years, categories 16-20 years, categories 21-25 years, categories 26-30 years, and categories> 30 years.

Table 1 shows the most respondents in the age category of the elderly with the age range 46 - 55 years and the majority of respondents were married. In terms of rank shows that the majority of respondents have rank rank Bintara. While based on years of service, most respondents in the category of tenure of 15-15 years.

Table 1. Distribution of Army in KODAM IX / UDAYANA Based on Sociodemographic Characteristics

Variabel	N	%
Age		
Early adulthood	39	31,2%
Late adulthood	37	29,6%
Early elderly	49	39,2%
Marital Status		
Unmarried	6	4,8%
Married	117	93,6%
Separated / widower	2	1,6%
Rank		
Tamtama	16	12,8%
Bintara	64	51,2%
First Officer	38	30,4%
Middle Officer	7	5,6%
Length of Work		
10 – 15 years	43	34,4%
16 – 20 years	16	12,8%
21 – 25 years	24	19,2%
26 – 30 years	23	18,4%
>30 years	19	15,2

In general, based on WHO standards, BMI is divided into four categories, namely underweight, normal, overweight, and obesity. Underweight if the BMI is less than 18.5. For BMI 18.5 to 24.9, it is categorized in the normal BMI category. Excessive weight if BMI is between 25 and 29.9. Whereas BMI if more than 30 are categorized as obese. In the measurement results the percentage of body fat is divided into categories of less, normal, excess weight and obesity.

Table 2. Distribution of Army in KODAM IX / UDAYANA Based on Anthropometric Measurements

Variabel	N	%
Initial BMI		
Normal	125	100%
End BMI		
Normal	49	39,2%
Overweight	65	52%
Obesity	11	8,8%
Percentage of Body Fat		
Normal	8	6,4%
Overweight	54	43,2%
Obesity	63	50,4%

Based on table 2, all respondents had a normal initial BMI. At the end of BMI the majority of respondents have a end BMI overweight category ie at more than half of the respondents followed by a late BMI normal category and at least at the end BMI the obese category.In the measurement results of the percentage of body fat attached in table 2, the majority of respondents have a body fat mass in the obesity category, followed by the excess body weight category, and at least in the normal category.Table 2 shows that the group of respondents who had a normal initial BMI the majority of more than half of respondents experienced a change in BMI into an excess weight category, followed by respondents who had a final BMI category of normal or fixed, and the least respondents who experienced a change in BMI into the obesity category.

IV. DISCUSSION

Based on the results of the initial BMI research obtained from secondary data measurements of body weight and height when the selection of acceptance of the army showed all respondents in the normal category. This is consistent with research conducted by Yusuf A in the majority of Malaysian troops aged 18-25 years having a normal BMI (60%). [3] The official website of the Indonesian Army states that one of the conditions for selection of acceptance of the Army is having a minimum height of at least 163cm and has a balanced weight according to applicable regulations.[6]

Table 2 also attaches the distribution of characteristics of the Army based on final BMI with the highest number in the overweight category (52%), followed by the normal category (39.2%), and the obesity category (8.8%). These results are in accordance with the results of previous studies conducted by Shiozawa B, et al in 2019 in the army in America that more than half (51.2%) of the study subjects had a BMI overweight category, 28.9% of respondents had a normal category of BMI , and 19.7% had BMI in the obesity category. Based on research conducted by Sudikno in 2015 on risk factors for overweight and obesity in adults in Indonesia also mentioned that civil servants / military / police are at risk of 2.31 times obesity compared to other jobs such as farmers, fishermen, laborers, private employees, and entrepreneurs because the ease of getting consumption related to income and the ease of being found at work that causes a decrease in physical activity. [7]Body fat mass measured using body fat percentage in the form of thickness measurements under the skin folds on the biceps, triceps, subscapules and suprailiaca are attached in table 2. The results of the study showed that the majority of respondents had obese body fat mass (50.4%) followed by weight categories excess (54%) and normal (6.4%). There is a conformity with research conducted by Katie et.al in 2008 on members of the military in the United States in which 81.1% of respondents were obese based on the percentage of body fat mass.[8]

The results of the analysis of changes in the initial and final BMI are shown in table 2 with the result that the army that has a normal initial BMI reaches the highest percentage of respondents who have changed the BMI category to an overweight category (52%) followed by respondents who have not experienced a change in the BMI category or remained in the normal BMI category (39.2%) and at least in respondents who experienced a change in the BMI category to obesity (8.8%). Changes in BMI can occur due to weight gain caused by an imbalance in the number of calories consumed with those needed by the body. Excess calories will be stored as fat so that an increase in the size and number of fat cells that have an impact on weight gain.[5] Increased body weight can also occur due to an increase in skeletal muscle mass. Physical exercise can change the structure of skeletal muscle cells so that skeletal muscle fibers will experience hypertrophy, an increase in the number of cell organelles and the number of blood vessels which can eventually lead to an increase in skeletal muscle mass.[9]

The weakness of this study is that there is no measurement of body fat percentage when selecting army admissions so that it cannot observe changes in body fat mass. This research is descriptive so it needs to do further analytic research regarding the relationship between the final BMI with fat percentage.

V. CONCLUSIONS AND SUGGESTIONS

Based on the results of research on changes in body mass index after 10 years of work and body fat mass of the army in the Army AD at KODAM IX / UDAYANA, Denpasar, Bali in 2019 who have met the inclusion requirements, the following conclusions are obtained:

1. Based on 125 TNI AD at KODAM IX / UDAYANA all respondents had an initial BMI normal category of 125 people (100%).

2. Based on 125 TNI AD in KODAM IX / UDAYANA who became the majority of respondents had a final BMI of overweight category, amounting to 65 people (52%).

3. Based on 125 Army AD in KODAM IX / UDAYANA who became the majority of respondents in the category of obese body fat mass percentage, amounting to 63 people (50.4%).

4. Based on 125 TNI AD in KODAM IX / UDAYANA who became the majority of respondents 65 people (52%) experienced a change in BMI from the normal category to overweight.

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