Relationship Between Waist Circumference and The Event of Andropause in Male Employees in Government Institutions of Badung Regency

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ABSTRACT

Background: Andropause occurs with slow development and is a physiological process in males. Andropause symptoms arise vary in individuals. One of the factors that influence these symptoms is obesity, especially central obesity with a waist circumference of ≥90 cm.

Objective: The purpose of this study is to show the relationship between waist circumference and the event of andropause.

Methods: This research is an analytical study with a cross-sectional study approach conducted in one of the government institutions of Badung Regency, Bali Province. The sampling technique used was purposive sampling. The subjects consisted of 40 male employees at aged around 35-60 years. The research data were obtained from filling out the Androgen Deficiency in Aging Male (ADAM) score questionnaire and direct measurement of waist circumference. The statistical analysis used was the Chi-Square test.

Results: The results showed that from 40 subjects, 23 (57.5%) subjects had a waist circumference of ≥90 cm, and a normal waist circumference of <90 cm in 17 (42.5%) subjects. There were 22 subjects (55.0%) who experienced andropause and 18 (45.0%) subjects who did not experience andropause. It was found that there was a significant relationship between waist circumference and the event of andropause among male employees in government institutions of Badung Regency (p = 0.001, OR = 11.7).

Conclusion: The study has found that higher in waist circumference may contribute in the event of andropause. For further studies should takes a higher number of subjects to make it more accurate in wider population.

Keywords: Waist Circumference, Central Obesity, Andropause

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INTRODUCTION

Andropause in men occurs due to decreased levels of free and total testosterone.[1] Symptoms that arise include fatigue, reduced strength, loss of libido, decreased sexual performance, and mood swings.[2] Testosterone will increase 20-30 times during puberty. This condition persists in normal conditions and decreases slowly from the age of 30 years and over.[3] The decrease in testosterone is influenced by many factors, such as genetics, related diseases such as diabetes mellitus, hypertension, hypercholesterol, obesity, and lifestyle such as smoking habits, drinking alcohol, sleep quality, and psychological factors.[4]

Obesity is one of the factors that can accelerate the event of andropause. Based on data from the World Health Organization (WHO) in 2016 it was recorded that more than 1.9 billion adults at the aged of 18 years and over were overweight. More than 650 million or equal to 13% of that number had an obese in the same year.[5] According to the data from Riset Kesehatan Dasar in 2018 there was an increase in the prevalence of central obesity, especially in Indonesia at $\geq$ 15 years of age, there was an increase in the incidence of central obesity until 31.0% and Bali was in a fourth ranked as the population with the highest number of central obesity in Indonesia.[6]

Body Mass Index (BMI) can used as weight measurement methods in general. Apart from BMI, waist circumference can be used as a parameter in central obesity screening. Therefore, measuring weight by waist circumference can be used as an optional measurement method in measuring central obesity specifically.[7]

Several studies in Indonesia previously found that there was a relationship between waist circumference and the event of andropause. The results of Ulinnuha's research in 2018 in Semarang City showed that 66.7% of subjects with a waist circumference of $\geq$90 cm had andropause. Meanwhile, subjects who did not experience andropause were 53.8% with a waist circumference <90 cm.[8] Research conducted in Surakarta in 2014 by Kurniawan found 12 out of 15 men with waist circumference $\geq$90 cm experienced andropause and 16 out of 25 men with waist circumference <90 cm did not experience andropause.[9]

Based on the author's observations, there is still a lack of literature and research related to the relationship between waist circumference and the event of andropause in Bali. Moreover, the differences in behavior due to ethnicity and lifestyle also affect the event of andropause. This is especially for male employees in offices who spend more time sitting in the room. The research was selected in one of the government institutions of Badung Regency which is one of the governments with the highest number of government employees in Bali. Recorded at the Central Statistics Agency of Badung Regency until 2018 there were 8,250 government employees that works in Badung Regency.[10] It is considered to have a sufficient number of employees to represent the population. Therefore, this study aims to show the relationship between waist circumference and the event of andropause.

METHODS

The type of research is an analytic observational with cross-sectional study approach. The study was conducted at one of

the government institutions of Badung Regency in August-September 2020 and has been ethically approved by Komisi Etik Penelitian RSUP Sanglah Denpasar. The total subjects are 40.

The research data were obtained from the ADAM score questionnaire and waist circumference measurement. The data observed included waist circumference as the independent variable, the event of andropause as the dependent variable, and age, and history of disease as confounding variables.

The sampling technique used was purposive sampling. Purposive sampling is the process of selecting or taking subjects based on certain criteria including inclusion and exclusion criteria. The inclusion criteria included men aged 35-60 years, married and living with their wife, working in one of the government institutions of Badung Regency, willing to voluntarily become research subjects and sign an informed consent. The subjects would listen to the researcher explanations first and then filled out the questionnare independently.

Univariate analysis was presented in the form of numbers and tables to obtain data on the frequency distribution and proportion of the independent and dependent variables. Bivariate analysis was carried out. This stage was carried out to see the relationship between the dependent variable, which is the event of andropause and the independent variable, namely waist circumference using the Chi-Square test. The data collected was analyzed statistically using the Statistical Package for the Social Science (SPSS) for Windows 10 in 23.0 version.

RESULTS

The research results are as follows:

Table 1. Subject distribution by ages

Age (Year)	Frequency	Percentage (%)
35-45	14	35,00
46-60	26	65,00
Total	40	100,00
Mean	47,68 year	

Table 1 presents the distribution of the subjects by age group. The age range of study subjects was 35-60 years, and divided into two age categories, there were 35-45 years and 46-60 years. Based on the data, there were 26 subjects (65.00%) who at the range of ages 40-60 years old, while 14 subjects were at the range 35-45 years old (35.00%).

Table 2. Subject distribution based on waist circumferences

Waist Circumference	Frequency	Percentage (%)
Central Obesity (≥90 cm)	23	57,50
Normal (<90 cm)	17	42,50
Total	40	100,00
Mean	92,55 cm	

Table 2 presents the subjects distribution based on waist circumference. Subjects that met the criteria were 40 people who measured waist circumferences. This measurement results in data that the majority of the subject had a waist circumference of ≥90 cm as a marker of central obesity, namely 23 subjects (57.50%), and those with a waist circumference <90 cm as a marker for normal waist circumferences were 17 subjects (42.50%).

Tabel 3. Subject distributions based on ADAM score

ADAM Score	Frequency	Percentage (%)
Andropause	22	55,00
Non Andropause	18	45,00
Total	40	100,00

Table 3 presents the distribution of the subjects by the event of andropause based on ADAM score. There were 22 subjects (55.00%) who experienced andropause and 18 subjects (45.00%) who did not experience andropause.

Tabel 4. Subject distribution based on history of diseases

History of Diseases	Frequency	Percentage (%)
Hypertention	6	15,00
Hypercholesterol	4	10,00
Gout Arthritis	2	5,00
Hepatitis B	1	2,50
Hypotension	1	2,50
Asthma	1	2,50
None of disease	25	62,50
Total	40	100,00

In table 4, the majority of the subjects have no history of disease, as many as 25 subjects, while the other subjects had a history of additional diseases, such as hypertension and hypercholesterolemia, which were included in the metabolic syndrome. A total of 6 subjects had a history of hypertension, 4 subjects had a history of hypercholesterolemia, 2 subjects had a history of gouty arthritis, and 3 subjects had other types of diseases such as hepatitis B, asthma, and hypotension.

Tabel 5. Subject distribution of waist circumference based on age.

Age (Year)	Waist Circumference		Total
	Central Obesity (≥90 cm)	Normal (<90 cm)	
35-45	8	6	14
46-60	15	11	26
Total	23	17	40

The data in table 5 shows that the majority of waist circumference ≥90 cm as a marker of central obesity was found in the age range of 46-60 years as many as 15 subjects. Meanwhile, the largest number of subjects that have a normal waist circumference, namely <90 cm, are in the same age range, namely 46-60 years with 11 subjects. In the age 35-45 years there were 8 subjects with waist circumference ≥90 cm and 6 subjects were in a normal waist circumference.

Tabel 6. Subject distribution of ADAM score based on age.

Age (Year)	ADAM Score		Total
	Andropause	Non Andropause	
35-45	5	9	14
46-60	17	9	26
Total	22	18	40

The data in table 6 shows that the highest event of andropause were in the range 46-60 years, 17 subjects. While the subjects that were declared non-andropausal were in the age 35-45 years and 46-60 years, which were the same as 9 subjects. The total sampel were 40 subjects.

Tabel 7. Bivariate analysis of waist circumference with andropause event.

Waist Circum ference	ADAM Score		Total	*P*
	Andro pause	Non Andro pause		
	n	n	n	
Central Obesity (≥ 90 cm)	18	5	23	
Normal (< 90 cm)	4	13	17	0,001
Total	22	18	40	

Based on the results of the analysis of the relationship between waist circumference and the event of andropause in table 7, it was found that from 40 subjects, it was known that the event of andropause was more common in respondents who had central obesity with a waist circumference of ≥90 cm, namely 18 people (78.3%). Meanwhile, 13 respondents who did not experience andropause were found to have normal waist size <90 cm (76.5%). Additional to the table shows that the event of andropause can be experienced by respondents with normal waist circumference as many as 4 people and who did not experience andropause with a waist circumference ≥90 cm as many as 5 people. The results of statistical tests using the Pearson Chi-Square test obtained a p-value of 0.001.

DISCUSSION

The results of this study indicate that an increase in waist circumference ≥90 cm as a marker of central obesity is a risk factor that can affect the event of andropause. Centrally obese males tend to have a characteristic hormone profile described as "hyperestrogenic hypogonadotropic hypogonadism".[11] The adipose tissue that accumulates in the body will cause the aromatization process. This process is a release of the aromatase enzyme to convert testosterone into estradiol so that testosterone levels in the body will decrease. During this process, it will continue to form estrogen receptor gene expression so that there is a negative feedback response on the Pituitary-Hypothalamus-Testis (HHT) axis. This results in a decrease in testosterone production which is reflected in low levels of testosterone and circulating intratesticular testosterone and causes symptoms of andropause. The release of estrogen due to testosterone conversion can affect the increase in Sex Hormone Binding Globulin (SHBG). SHBG will bind testosterone in the blood with a higher affinity so that it has an effect on the low bioavailability of testosterone which causes a decrease in androgens.[8]

This is also known by the results of this study, from the calculations of the odd ratio (OR), the result is 11.7. This odd ratio indicates that men who had a waist circumference of ≥90 cm as a marker of central obesity tended 11.7 times more likely experiencing a faster event of andropause than men with a normal waist circumference of <90 cm.

The risk factors that can reduce testosterone levels are internal and external factors. External factors related to alcohol consumption, smoking, history of surgery such as varicocele, hernia, testicular torsion, and others. Meanwhile, internal factors are related to the history of the disease, especially metabolic diseases.[12] Obesity, especially central obesity, is included in the metabolic syndrome. In addition, hypertension, dyslipidemia, and diabetes mellitus are part of the metabolic syndrome. This can support the process of

decreasing testosterone levels.[13] This study focused on looking at the relationship between waist circumference as a parameter of central obesity and other medical history associated with decreased testosterone levels as confounding variables. Meanwhile, other risk factors have not been generalized so it is necessary to carry out further investigation in further research.

In this study, a significant relationship was found between waist circumference and the event of andropause. As men get older, their ability to produce testosterone decreases. LH production decreases with aging, which also decreases testosterone production. In addition, proteins such as SHBG will increase, thereby reducing the amount of free (unbound) testosterone in the blood. Increasing age affects the physiological decrease in testosterone levels. This situation is exacerbated when a man has central obesity due to a decrease in the function of Leydig cells, the aromatization process, and an increase in SHBG so that testosterone levels drop drastically accompanied by the appearance of andropause symptoms.[7]

The author suggests that a further research need to generalizing other risk factors that can affect the event of andropause such as smoking, drinking alcohol, psychological factors and initial screening examinations as one of the focuses such as measuring blood sugar levels, cholesterol, blood pressure at research subjects so that the inclusion and exclusion criteria can be better controlled. In addition, more in-depth research is recommended to determine the strength of the relationship between waist circumference and the event of andropause, such as measuring testosterone levels in men whose waist circumference is ≥90 cm as a marker of central obesity and comparing the results with the answers to the questionnaire filled out by respondents.

CONCLUSION

There is a significant relationship was found between waist circumference and the event of andropause.

The study has found that wider in waist circumference may contribute in the event of andropause. For further studies should takes a higher number of subjects to make it more accurate in wider population.

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