

## Correlation Between Waist Circumferences With Obstructive Sleep Apnea Risk In Ent Clinic Sanglah Hospital Denpasar

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Pauses in breathing during sleep or better known as obstructive sleep apnea (OSA) is one of the disorders that greatly disturb the quality of life of many people. Lifestyle changes such as reducing obesity can reduce OSA. One of the method to measure the level of obesity is the measurement of waist circumference, as one good indicator to know the risk of obstructive sleep apnea (OSA). Therefore, in this study would like to understand the relationship between waist circumferences with obstructive sleep apnea (OSA). This research method is analytical research with cross sectional study approach. The sample of this study was 385 visitors who came to the ENT clinic Sanglah Hospital Denpasar. The risk data for Obstructive Sleep Apnea (OSA) was taken using a research questionnaire adapted from the Berlin questionnaire and waist circumference measurements. Processing and data analyzing were done using the help of a computer program. The result of prevalence of abnormal waist circumference was 49 people (37,4%) lower than normal waist circumference group in high-risk category that was 82 people (62,6%). Based on the result of chi-square test, there was a significant relationship between increased waist circumference and risk of suffering Obstructive Sleep Apnea (OSA) ( $p = 0.000$ ) ( $p < 0.05$ ). There is a correlation between increased waist circumference and risk of suffering from Obstructive Sleep Apnea (OSA). Therefore it is advisable to keep the weight remains ideal by setting a healthy lifestyle.

**Keywords:** Correlation, Waist circumference, Obesity, Apnea, Obstructive sleep apnea.

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Pause in breathing during sleep or better known as obstructive sleep apnea (OSA) is one of the disorders that greatly disrupt the quality of life of many people. This disorder is characterized by a disturbance of breathing patterns during sleep, where breathing stops during sleep which lasts for more than 10 seconds. This occurs due to inadequate tongue and respiratory muscles. Sleep disturbances in OSA can cause excessive sleepiness during the day. This is related to difficulty to concentrate, memory deterioration, fatigue and emotional instability. This has serious

consequences such as sleepiness while driving or workplace accidents. OSA is a complex and multifactorial problem that requires proper diagnosis in order to provide appropriate therapy for patients. OSA is estimated to occur in 3-7% of male adult, 2% -5% of female adult and more than 4% occur in children. While the prevalence of OSA in the world ranges from 2-10%. Although the incidence of OSA is very high, OSA is very difficult to recognize, hence undiagnosed. This is because patients consider symptoms to be normal variations or manifestations of a bad lifestyle.

The causes of OSA are grouped into two, namely structural and non-structural factors where both parts are included in genetic factors. The structural abnormalities of OSA in the form of abnormalities of the head or cheekbones and narrowing of the nose will have an impact on the narrowing of the upper respiratory tract. While the nonstructural etiology is influenced by changes in neurological reflexes that control the airway respiratory muscles, distribution of fat tissue in the neck, obesity, damage due to smoking habits, and alcoholism.

Lifestyle changes such as reducing bodyweight can reduce the occurrence of OSA. Epidemiological research shows there is a strong relationship between obesity and OSA. People with obesity have a risk of 12 to 30 times higher than the normal population. Overweight people have soft tissue that is thicker in the upper respiratory tract, hence it became narrower. Obstructive Sleep Apnea is associated with a high prevalence in obese or overweight populations. A gain of 10% will worsen OSA degrees by 30%. Obesity is a major risk factor for OSA where it will increase the accumulation of fat tissue around the pharynx and other bodies and predispose to the onset of OSA. Central obesity is also associated with reduced lung volume, which results in reduced caudal traction in the upper airway because it will increase the collapse of the pharyngeal wall.

One of many ways to measure obesity is waist measurement, which also a good indicator of the risk of obstructive sleep apnea (OSA). Therefore, in this study we would like to know the relationship between waist circumference and obstructive sleep apnea (OSA).

## METHODS

This study is an analytic study with a cross sectional approach, with the aim to find an association between waist circumference and the risk of Obstructive Sleep Apnea (OSA). The location of the study was in the outpatient department of the ENT Sanglah Hospital Denpasar. This research will be conducted in approximately 4 months (from August 2017 to November 2017). The study population was visitors who came to the ENT outpatient department in Sanglah Hospital, Denpasar. The inclusion criteria are 17-70 years

old, married and are willing to take part in this research and already provide an informed consent. The exclusion criteria were nasopharyngeal tumors and adenoid hypertrophy. The analysis in this study consisted of univariate analysis (descriptive statistics) and bivariate analysis. Univariate analysis aims to describe the characteristics of the subject and other variables. Univariate analysis is displayed in the form of a frequency distribution table. Bivariate analysis aims to assess the relationship of waist circumference with the risk of obstructive sleep apnea by making a cross table with waist circumference in the row and the risk of obstructive sleep apnea in the column. Tables are displayed in row percentage. The statistical test used was Chi Square test where the significance was statistically assessed using a p value at  $\alpha$  0.05. Significant relationship if the p value is  $\leq 0.05$ .

## RESULTS

The research subjects were 385 visitors who came to the ENT outpatient department at Sanglah Hospital Denpasar who fulfilled the research criteria. The research was conducted from August to October 2017.

Based on the results of descriptive statistics on the research data, it was found that there were 205 male respondents (53.3%) and 180 women (46.7%), the age of the majority of respondents was 27-36 years old (33%), while the lowest was  $> 66$  years old (1.3%). Analysis of dependent variables, namely OSA risk, found 52 respondents (13.5%) included in the high-risk category; with details of 45 men and 7 women; and 333 respondents (86.5%) included in the low risk category who suffered from OSA.

From the results of the questionnaire analysis, there were 254 respondents (66.0%) with the normal waist circumference category, and 131 respondents with abnormal waist circumference categories (34.0%).

### **Bivariate analysis of the relationship between waist circumference and OSA risk**

The results of the study were the prevalence of abnormal waist circumference respondents in the high risk category, namely 49 people (37.4%) lower than the normal waist circumference respondents in the high risk category, that was 82 people (62.6%). The prevalence of respondents of normal waist

circumference in the low risk category was 251 people (98.8%) greater than the respondents of the abnormal waist circumference in the low risk category, which is 3 people (1.2%).

The significance of these proportions has been tested by bivariate Chi-square analysis. The continuity correction value is obtained at 0,000 ( $p < 0.05$ ).

### DISCUSSION

This study was a cross-sectional study to find the relationship between waist circumference and the risk of Obstructive Sleep Apnea (OSA) at the ENT outpatient department of Sanglah Hospital Denpasar. Retrieval of data was obtained from waist circumference measurements, measurements of risk of Obstructive Sleep Apnea (OSA) respondents with the Berlin questionnaire.

Obstructive sleep apnea (OSA) is an abnormality which characterized with recurrent

collapse of the upper airways, whether partial or total, that occurs during sleep. Airway collapse is associated with decreased or stopped air flow even though there is still some effort to breathe. The upper airway collapse that occurs is associated with episodes of fragmented sleep and repeated decreases in oxyhemoglobin saturation. The most common symptoms of OSA are snoring, fatigue or drowsiness throughout the day (excessive daytime sleepiness / EDS). Gold standard to ensure the diagnosis of OSA currently uses polysomnographic examination.

#### Characteristics of Research Sample

OSA prevalence in very obese people was 42-48% in men and 8-38% in women. Epidemiologically, OSA is more common in adults than children. Schechtergot snoring prevalence ranged from 3.2-12.1%, dependon the inclusion criteria used.

In children, the incidence of OSA is not gender related, whereas in male adults are more often experienced OSA than women which is around 8:1. Variable analysis depends on this study, that is OSA risk obtained by 52 respondents (13.5%) included in the high risk category; with details of 45 men and 7 women; and 333 respondents (86.5%) included in the low risk category suffered from OSA disorders. This result was in accordance with the epidemiology of OSA.

#### Waist circumference relationship with the risk of suffering from OSA

The p value obtained was 0,000 ( $p < 0.05$ ) indicated that the relationship between waist circumference and the risk of suffering from obstructive sleep apnea (OSA) sleep disorders was significant. The results of the study were the prevalence of abnormal waist circumference respondents in the highrisk category, namely 49 people (37.4%) lower than the normal waist circumference respondents in the high risk category, that is 82 people (62.6%). The prevalence

**Table 1.** Characteristics of Research Samples (n=385)

Variable	Frequency	Percentage (%)
Age Range		
17-26	114	29,6
27-36	127	33,0
37-46	47	12,2
47-56	54	14,0
57-66	38	9,9
>66	5	1,3
Gender		
Male	205	53,3
Female	180	46,7
Waist Circumference		
Normal	254	66,0
Abnormal	131	34,0
Risk of OSA		
Low risk	333	86,5
High risk	52	13,5

**Table 2.** Relation Strength

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Waist Circumference (Normal/Abnormal)	49.996	15.178	164.682
For cohort OSAS Risk = Low Risk	13.065	4.348	39.256
For cohort OSAS Risk = High Risk	.261	.214	.319

of respondents of normal waist circumference in the low risk category was 251 people (98.8%) greater than the respondents of the abnormal waist circumference in the low risk category, namely 3 people (1.2%). Relation strength was obtained with OR = 49.996 (95% CI: 15.178-164,682). Men or women who have a normal waist circumference have a chance of 49.9 times to have a low risk of OSA compared to men or women who have an abnormal waist circumference. This proved that abnormal waist circumference is one of the important factors that influence the risk of suffering from OSA.

Research conducted by Beliana showed that 34.6% of the total respondents were obese and had a high risk of suffering from Obstructive Sleep Apnea (OSA). The high risk of suffering from Obstructive Sleep Apnea (OSA) and various diseases in obese people can reduce life expectancy and the quality of life itself. Research conducted by UsepBasuki Rahman showed that there was a significant relationship between obesity and OSA risk in adolescents at SMAN 1 Purwokerto. Obstructive Sleep Apnea (OSA) sufferers with sleep disorders which means pauses in breathing during sleep which main symptoms were snoring, during sleep the pharyngeal dilator muscle activity is relatively depressed (relaxation) therefore there is a tendency for the pharyngeal lumen to narrow during inspiration.

One of the indicators of central obesity is an increase in waist circumference. Obstructive sleep apnea is associated with a high prevalence in the obese or overweight population. A gain of 10% will worsen OSA degrees by 30%. Obesity is a major risk factor for OSA where it will increase the accumulation of fat tissue around the pharynx and other bodies and predispose to the onset of OSA. Central obesity is also associated with reduced lung volume, which results in reduced caudal traction in the upper airway because it will increase the collapse of the pharyngeal wall. Schafer's study reports that the risk of OSA has a stronger correlation with the accumulation of adipose tissue in the intra-abdominal region than the neck region or BMI. This is proof of strength that waist circumference is a stronger predictor of OSA risk than neck circumference or BMI. So that it can be concluded, the accumulation of adipose tissue in the pharynx or neck and intra-abdominal

region, is very likely to be a strong predictor and contribute to the pathogenesis of the occurrence of OSA although it is very possible to influence the pathogenesis of OSA through different mechanisms.

## CONCLUSION

There is a correlation between increased waist circumference and risk of suffering from Obstructive Sleep Apnea (OSA). Therefore it is advisable to keep the weight remains ideal by setting a healthy lifestyle.

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