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The Correlation between Body Mass Index with the Occurrence of Skin Tag

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Abstract

BACKGROUND: Skin tag is a benign tumour of the skin with a soft consistency which commonly occurs in the flexure area. Skin tag often found in individuals with middle and old age. Until now, there are many of theories have been proposed to explain the mechanism of the skin tag, one of the theory is obesity.

AIM: To determine the body mass index (BMI) in patients with skin tag.

METHODS: This study is an analytic study with cross-sectional designs involving 32 subjects with skin tag and 32 controls. Diagnosis of skin tag was made based on anamnesis and clinical examination. All subjects underwent a physical examination (height and weight) to determine BMI (weight in kilogrammes divided by the square of height in meters). To analyse association between higher BMI with the occurrence of skin tag we use student t-test.

RESULTS: The mean BMI in the skin tag group (28.1+ 3.9 kg/m^2) was higher compared with the control group (24.1 + 2.3 kg/m^2). Statistical analysis by Student t-test found the p-value < 0.05.

CONCLUSION: We found a correlation between increased BMI with the occurrence of the skin tag.

Introduction

Skin tag or Acrochordons are pedunculated papules or tumours that are most commonly located on the eyelids, neck, axillae, and groyne [1, 2]. The prevalence of skin tag in the general population varies depending on the population studied, e.g. 46 % in Germany or 0.7 % in India [3, 4]. There is no difference incidence of skin tag between male and female [2, 4], but skin tag more common in middle-aged individual and older age [3, 5].

Until now, the aetiology of skin tags is not yet well understood. Some theories have been proposed the friction processes, family history, pregnancy, impaired glucose metabolism and obesity as potential etiological or associated factors of skin tag [3, 6]. The plausible mechanism of skin tag in obesity is associated with hyperinsulinemia and insulin resistance that are often found in patients with obesity [7]. Hyperinsulinemia can stimulate growth factors in tissue, through the activation of IGF-1 [7, 8]. Moreover the occurrence of skin tags in obese patients may also be affected by increased levels of leptin. Obesity is frequently associated with elevated of leptin levels [5, 9]. Leptin is the product of the gene obese (Ob) which can stimulate the growth factors, differentiation, and proliferation of epithelial cells in the dermis layer and epidermis [10]. It has been shown that the cells residing in epidermis and dermis possess leptin receptors [5].

Method

This is an observational descriptive study with cross-sectional (cross-sectional) design enrolled 64 subjects, consisting of 32 subjects with skin tags and 32 control conducted at dermatology outpatient clinic, Adam Malik General Hospital from August until October 2016. All subjects underwent an anamnesis, dermatologic examination and physical examination. The number of skin tag (single or multiple (>1 lesion), type of skin tag (non-pedunculated (papule or filiform),

pedunculated, mixed type (combination pedunculated and non-pedunculated)) and location (flexure and non-flexure area) of skin tag was recorded.

Body mass index is measured with formula weight (kg)/height x-height (cm), with the interpretation of BMI according to WHO criteria: Underweight defined as BMI < 18.5 kg/m^2, Normoweight defined as BMI 18.5 to 24.9 kg/m^2, Overweight define as BMI 25 to 29.9 kg/BB m^2 and Obesity defined as BMI > 30 kg/m^2 [12].

In this study, all subjects were in good health; there is no subject in pregnant/lactating condition. All subjects agree to participate and sign informed consent voluntarily. Statistical analysis was performed by using SPSS 22 software. Student's T test was used to analysis the collected data. A p-value $\leq$ 0.05 was considered as significant.

Results

Characteristics of the skin tag subjects in this study are shown based on sociodemographic characteristics that include gender, age, education level, occupation, family history, and duration of skin tag (Table 1). Majority subjects in skin tag group were female (68.7%), the distribution age group showed most in 40-49 years (46.8%), 16 subjects (50%) had a history of skin tag in.

Table 1: Demographic characteristic in skin tag patients

Variable	n	(%)
Gender		
Male	10	31.3
Female	22	68.7
Age (years)		
20-29	3	9.4
30-39	3	9.4
40-49	15	46.8
50-59	8	25
60-69	3	9.4
Education		
Elementary	4	12.5
Junior high school	6	18.8
Senior high school	5	15.6
University	17	53.1
Occupation		
Government employee	11	34.4
Private employee	5	15.6
Enterpreneur	6	18.8
Student	2	6.2
Unemployment	8	25
History of skin tag		
Father	7	21.9
Mother	9	28.1
None	16	50
Duration of skin tag (years)		
1-5	20	62.5
6-10	9	28.1
11-15	2	6.3
16-20	1	3.1

Characteristic of skin tag lesion in this study showed majority type of lesion is the mixed type (56.2%), 25 (78.1%) subjects had a multiple lesion, and 28 (87.5%) subjects had a skin tag lesion in flexure area (Table 2).

Table 2: Characteristic of skin tag lesion

Keterangan	n	(%)
Type of lesion		
Pedunculated	7	21,9
Non pedunculated	7	21.9
Mixed	18	56.2
Number of lesions		
Multiple	25	78.1
Single	7	21.9
Location		
Flexure area	28	87.5
Non-flexure area	4	12.5

The result in this study found the mean BMI was higher in the skin tag group (28.1 ± 3.97 kg/m^2) compared with the control group (24.1 ± 2.29 kg/m^2). We found a significant correlation between increased BMI with the occurrence of the skin tag, based on a statistical test by using Student T-test we found p-value < 0.05 (p = 0.00) (Table 3).

Table 3: Comparison BMI between skin tag group and control group

Variable	BMI (kg/m^2				
	Min	Max	Mean	SD	P*
Skin tag	21.1	36.5	28.1	3.97	< 0.01
Control	18.7	29.1	24.1	2.29	

*Student t-test.

Obesity is considered as other risk factors for the development of skin tag, the number of skin tag have been reported correlate with weight and obesity, 5 but until now there is still a difference of opinion regarding the correlation between the occurrences of skin tag with weight. The results from our study are consistent with research conducted by Sari et al., who previously reported a BMI in patients with skin tags (29.9 ± 5.3 kg/m^2) were found to be higher when compared with a BMI in the control group (21.5 ± 3.5 kg/m^2), 13 Furthermore our result in this study also agreement with study by Tosson et al, they reported the BMI in skin tag group (32.8 ± 4.4 kg/m^2) was higher than the control group (28.5 ± 2.9 kg/m^2) [6].

Table 4: BMI category in skin tag patients

Category	n	%
Normoweight	8	25
Overweight	12	37.5
Obesity	12	37.5
Total	22	100

A study from 32 subjects with skin tag who participated in this study, only 8 (25%) subjects had a norm weight, while 24 (75%) subjects had an overweight and obesity condition (Table 4). The results in our study accordance with the studies done in the past, the study conducted by Sari et al. showed from 113 skin tag patients were recruited in their study, 61 (53.9%) patients were overweight and 38 (33.6%) patients were obesity, and statistically significant (p <0.001) [13], moreover the agreement was also found in the study conducted by Erkek et al

who reported 21(36.2%) patient overweight, and 30 (51.7%) patients were obesity [5].

Based on the characteristics of skin tag lesions (Table 5), the higher BMI value was found in the group of mixed type lesions (29.2 + 3.9 kg/m^2), furthermore subject with multiple lesions group (28.7 + 3.9 kg/m^2) had a higher BMI compare with the single lesion group (26 + 3.52 kg/m^2), and the higher BMI values found in the flexure area (28.7 + 3.9 kg/m^2) compare with the nonflexure area (26 + 3.52 kg/m^2).

Table 5: BMI value based on characteristic of skin tag patients

Variable	IMT (kg/m^2			
	Min	Max	Mean	SD
Gender				
Male	24.8	36.5	28.2	3.74
Female	21.1	34.3	28.1	4.15
Age (years)				
20-29	24.1	33.2	28.3	4.57
30-39	24.0	36.5	28.8	6.69
40-49	22.5	34.3	29.3	3.88
50-59	21.1	31.2	25.7	3.03
60-69	25.8	30.1	27.2	2.45
Duration of skin tag (years)				
1-5	21.1	36.5	27.7	4.20
6-10	24.4	33.3	29.5	3.79
11-15	25.8	29.1	27.4	2.33
16-20	24.8	24.8	24.8	24.8
Type of lesion				
Pedunculated	23.5	32.7	26.2	3.42
Non pedunculated	21.1	33.2	27.1	3.97
Mixed type	22.5	36.5	29.2	3.98
Number of lesions				
Multiple	21.1	36.5	28.7	3.94
Single	23.5	32.7	26.0	3.52
Location of lesion				
Flexure area	21.1	36.5	28.7	3.94
Non-flexure area	23.5	32.7	26.0	3.52

Discussion

The results of this study according to the study conducted by Demir and Demir and Hegazy et al who found that there is a correlation between the number of skin lesions with the increased of BMI values [14, 15], but contrast with studies conducted by Sari et al and Rasi et al who previously reported there is no relationship between the number of skin tag lesions with the BMI [13, 16]. Based on the location of the skin tag, the higher BMI values was obtained in the flexure area, different results are found in the study conducted by Sari et al. who revealed there is no correlation between BMI value with the location of skin tag lesions [13].

Plausible mechanisms that explain the pathogenesis of skin tags in obesity is a hyperinsulinemia and increased levels of leptin. In a study conducted by Agamia et al. found a positive correlation between the levels of leptin and insulin with the obesity. In obese, the increased number of body fat can affect the sensitivity of insulin by decreasing the expression of insulin receptor substrate-1 [17]. In the insulin resistance condition, the pancreas will compensate by produce greater quantities of insulin in the blood (hyperinsulinemia) [3].

This hyperinsulinemia promotes an increase in circulatory levels of insulin growth factor-1 (IGF-1). In the skin tissues, IGF-1 can stimulate the proliferation of keratinocytes and hyperplasia epidermal [16, 17]. On the other hand, the elevated levels of IGF-1 are known can reduce the levels of insulin-like growth factor binding protein-3 (IGFBP-3). IGFBP-3 is the hormone who responsible for regulating anti-proliferation gene transcription in the epidermis by inhibits the binding of IGF-1 to its receptor. In the condition where there is a decrease in the levels of IGFBP-3 would lead to an increase proliferation and excessive cell growth, which can manifest as skin tag lesion [18-20]. Besides the role of insulin, the mechanism for evolution skin tag in obesity patients it's can also be affected by leptin levels. There are some studies that explain the role of leptin in the development of skin tag. Leptin is known as a hormone secreted by adipose tissue that regulates food intake and expenditure energy [15, 21]. The concentration of leptin is correlated with BMI and body weight, which in individuals with obesity often found elevated levels of leptin [5]. Leptin is a growth hormone that suggests active in the process of proliferation, differentiation and apoptosis. In an in vivo study showed that leptin has an ability to induce proliferation of keratinocytes, together with another growth factors [4, 17, 21], moreover leptin can affect in insulin resistance process by inhibits receptor kinase activity and phosphorylation of insulin receptor substrate-1, resulting in impairment of metabolic action of insulin in the adipocytes [17]. As was explained earlier, that one of the mechanisms of skin tag is through the mechanism of insulin resistance that will cause hyperinsulinemia, the proliferation of fibroblasts that occurs in skin tag seem to be due to hyperinsulinemia, via activation of the insulin-like growth factor (IGF-1) [9].

In conclusion, in this study we investigated the correlation between BMI value in subjects with skin tag and control. From the results we found an increased of BMI in the subject with skin tag when compared with the control group, so it can be concluded, individuals with overweight and obesity BMI have an increased risk or predisposition factor to have a skin tag lesion.

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