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ORIGINAL ARTICLE / ОРИГИНАЛНИ РАД

Skin tags associated with obesity and diabetes mellitus in patients with chronic kidney disease

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SUMMARY

Introduction/Objective Both chronic kidney disease and skin tags are associated with similar cardiovascular risk factors such as obesity, diabetes mellitus, dyslipidemia, hypertension, etc.
The aim of this study was to determine the prevalence of skin tags in patients with chronic kidney disease, and to assess the relationship between skin tags and cardiovascular risk factors such as diabetes, hypertension, dyslipidemia, obesity, and metabolic syndrome.

Methods We evaluated 358 patients [149 (41.6%) female and 209 (58.1%) male, 197 (55%) predialytic and 161 (45%) dialytic] with chronic kidney disease. All the patients were examined for skin tags by the same clinician, and evaluated for body mass index, diabetes mellitus, hypertension, and dyslipidemia.

Results Skin tags were detected in 199 (55%) patients. Prevalence of skin tags was higher in males than in females ($p = 0.041$) and was also higher in diabetic patients than in nondiabetic ones ($p = 0.013$). Body mass index was higher in patients with skin tags when compared to patients without skin tags ($p = 0.047$). Skin tags were detected in 48.3% of normal, in 58% of overweight, and in 66% of obese patients ($p = 0.029$).

Conclusion The presence of skin tags is merely related to male sex, obesity, and diabetes mellitus in patients with chronic kidney disease.

Keywords: skin tags; obesity; diabetes mellitus; chronic kidney disease

INTRODUCTION

Chronic kidney disease (CKD) is a growing health problem worldwide that leads to end-stage kidney failure and cardiovascular complications [1]. CKD is defined as kidney damage and/or decreased kidney function expressed as glomerular filtration rate (GFR) for at least three months, regardless of the cause. CKD is classified into five stages based on the severity of the disease [2, 3]. The overall prevalence of CKD is 15.7% in Turkey. In addition, the prevalence rate of dyslipidemia is 83.4%, of hypertension 56.3%, of metabolic syndrome 46%, of obesity 29.2%, and of diabetes mellitus the prevalence is 26.6% in subjects with CKD in our country [4].

Skin tags are stalked or sessile papules the size of a pinhead or larger, with a color ranging from native skin to dark brown. They have been reported with an incidence of 46% in the general population [5]. Although the etiology is unknown, skin aging, obesity, diabetes mellitus, pregnancy, acromegaly, and genetic predisposition are thought to be associated with skin tags [5–12]. There are some studies showing associations between skin tags and diabetes mellitus, impaired glucose tolerance, insulin resistance, and disorders of lipid metabolism [8, 10–13]. In addition, skin tags are one of the independent predictors of the occurrence of cardiac disease [14].

As mentioned above, both CKD and skin tags are associated with similar cardiovascular disease (CVD) risk factors such as obesity, diabetes mellitus, dyslipidemia, hypertension, etc. Although there have been some reports that the presence of skin tags is associated with diabetes mellitus, hypertension, obesity, and atherogenic lipid profile, no data in the literature show the presence of skin tags in patients with CKD [5, 8, 10–13, 15].

The aim of this study was to determine the prevalence of skin tags in patients with CKD, and to assess the relationship between skin tags and other cardiovascular risk factors such as diabetes, hypertension, dyslipidemia, obesity, and metabolic syndrome.

METHODS

We evaluated 358 patients [149 (41.6%) female and 209 (58.1%) male, 197 (55%) on predialysis and 161 (45%) on dialysis] with CKD. All the patients were examined by the same physician. Information on smoking habits was recorded.

All the patients were evaluated for blood pressure, body mass index, creatinine, lipids, glucose, glycated hemoglobin (HbA1c). Samples

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for plasma glucose, creatinine, HbA1c, and lipid level determinations were taken in the morning after at least an eight-hour fast. Fasting glucose levels were measured by enzymatic colorimetric assay method (GLU, Roche Diagnostics GmbH, Mannheim, Germany). Fasting cholesterol and triglyceride levels were measured by enzymatic colorimetric assay method (Roche Diagnostics GmbH). The levels of HbA1c were measured by the turbidimetric inhibition immunoassay (TINIA) method (HBA1C II, Roche Diagnostics GmbH).

CKD was defined as kidney damage with or without a decrease in GFR, which was calculated using a simplified version of the Modification of Diet in Renal Disease (MDRD) formula [$186 \times (S_{cr})^{-1.154} \times (Age)^{-0.203} \times (0.742$ if women)] [16].

Height and weight were measured by the same person with the subjects wearing light clothing but not shoes. Body mass index (BMI) was calculated as weight in kilograms divided by the square of the height in meters. Overweight was defined as a BMI 25–30 kg/m^2, and obesity as a BMI of 30 kg/m^2.

All blood pressure measurements were made with calibrated mercury manometers (Rudolf Riester GmbH, Jungingen, Germany) in the right arm with the patient in a sitting position after a rest of five minutes. Hypertension was defined as a systolic/diastolic blood pressure of 140/90 mmHg or higher, and/or current antihypertensive treatment.

Dyslipidemia was defined as the presence of at least one of the following conditions: raised serum triglycerides (> 200 mg/dl), total cholesterol (> 200 mg/dl), LDL-cholesterol (> 100 mg/dl), low HDL-cholesterol (< 35 mg/dl for men and < 45 mg/dl for women), and/or current antilipidemic treatment.

Diabetes mellitus was defined as the presence of at least one of the following conditions: raised fasting plasma glucose level (≥ 126 mg/dl), plasma glucose level after two hours of oral glucose tolerance test (≥ 200 mg/dl), HbA1c (≥ 6.5%), and/or current hypoglycemic treatment.

Statistical Analysis

Statistical analysis was done by the SPSS for Windows, Version 10.0 (SPSS Inc., Chicago, IL, USA) statistical software. The results were presented as mean ± standard deviation. Continuous variables were tested for normality according to the Kolmogorov–Smirnov test. Univariate analysis of variance and Mann–Whitney U-tests were performed to compare the groups. For comparing categorical data, the χ^2 test was performed. The correlation analysis was done using Spearman's test. A p-value of < 0.05 was considered statistically significant.

RESULTS

The patients' age was 61.7 ± 32.4 years, GFR was 38.6 ± 20, CKD duration was 5 ± 1.57 years, and BMI was 27.7 ± 6.9 kg/m^2. In regard to wight, 31.1% of the patients were normal, 34.2% were overweight, and 34.7% of the patients were obese.

Skin tags were detected in 199 (55%) patients. A total of 143 (40%) patients were diabetic, 268 (75%) were hypertensive, 143 (40%) were dyslipidemic. Prevalence of skin tags was higher in male than in female patients (p = 0.041), and in diabetic patients than in nondiabetic patients (p = 0.013) (Table 1). BMI was higher in patients with skin tags when compared to patients without skin tags (p = 0.047). Skin tags were detected in 48.3% of normal patients, in 58% of overweight, and in 66% of obese patients (p = 0.029) (Table 2).

Table 1. Prevalence of skin tags in patients

Parameter		Skin tags		p
		Present (%)	Absent (%)	
Sex	Male	60	40	0.041
	Female	49	51	
Body mass index	Normal	48.3	51.7	0.029
	Overweight	58	42	
	Obese	66	34	
Diabetes mellitus	Present	66	34	0.013
	Absent	52.5	47.5	
Hypertension	Present	58.3	41.7	0.18
	Absent	51	49	
Dyslipidemia	Present	62	38	0.099
	Absent	54	46	
Dialysis treatment	Present	59.4	40.6	0.061
	Absent	50.1	49.9	
Proteinuria	Present	58.9	41.1	0.49
	Absent	60	40	
Cardiovascular disease	Present	57.4	42.6	0.51
	Absent	56.8	43.2	

Table 2. Comparison of parameters in patients with and without skin tags

Parameter	Skin tags		p
	Present	Absent	
Age (years)	62.2 ± 13.0	61.3 ± 16.4	0.79
Body mass index (kg/m^2)	28.3 ± 5.58	26.8 ± 8.3	0.047
Glomerular filtration rate (mL/min/1.73 m^2)	37.1 ± 19.1	41.1 ± 21.2	0.17
Duration of chronic kidney disease (years)	5 ± 1.5	5 ± 1.6	0.82

DISCUSSION

Skin tags, which appear to be associated with some endocrine diseases, are skin growths histologically characterized by a papillomatous acanthotic pattern in the epidermis [17]. Recent studies suggest an association between skin tags and type 2 diabetes mellitus, glucose intolerance, obesity, insulin resistance, atherogenic lipid profile, and cardiovascular disease [5, 7–13]. On the other hand, CKD is a growing health problem worldwide that leads to end-stage kidney failure and cardiovascular complications and/or risk factors [1].

As mentioned above, both CKD and skin tags are associated with similar CVD risk factors such as obesity, diabetes

mellitus, dyslipidemia, hypertension, etc. Although there have been some reports that the presence of skin tags is associated with diabetes mellitus, hypertension, obesity, and atherogenic lipid profile, no data in the literature show the presence of skin tags in patients with CKD [5, 8, 10–13, 15]. The main purpose of this study was to determine the prevalence of skin tags in patients with CKD, and to assess the relationship between skin tags and other cardiovascular risk factors such as diabetes, hypertension, dyslipidemia, obesity and metabolic syndrome.

Skin tags have been reported with an incidence of 46% in the general population [5]. Skin tags were detected in 55% of our patients. Duration of CKD and GFR were not different in patients with and without skin tags. In this regard, our results suggest that the prevalence of skin tags was not increased in patients with CKD.

Recent studies suggest an association between skin tags and obesity. It has been reported that patients who have insulin resistance may develop acanthosis nigricans and skin tags with increasing incidence as BMI rises [7, 8, 12]. In addition to frequent skin irritation that occurs in obese patients, hormonal factors (oestrogen levels and position peripheral aromatization of androgens to oestrogen) and aging of the skin are also thought to contribute to the development of skin tags [6, 18, 19, 20]. The prevalence of obesity is 29.2% in patients with CKD [4]. Obesity prevalence was found to be 34.7% in our study population. We found higher BMI in patients with skin tags when compared to those without skin tags. In addition, skin tags prevalence was a gradual increment in overweight and obese patients. Our findings suggest that the relationship between obesity and skin tags in CKD patients is similar to that in normal population.

There have been a few reports that the presence of skin tags is associated with diabetes mellitus and insulin resistance [5, 8, 10–13]. The prevalence rate of diabetes mellitus is 26.6% in subjects with CKD in our country [4]. Forty percent of patients were diabetic in our study. We also detected high prevalence of skin tags in CKD patients with diabetes mellitus, which is comparable to normal population.

The prevalence rate of hypertension is 56.3% in subjects with CKD in our country [4]. In our study, 75% of patients were hypertensive. On the other hand, we detected a numerical but not a statistical increase in the prevalence of skin tags in patients with hypertension. The reason for this result may be associated with the development of hypertension due to CKD but is not the etiologic cause of CKD.

There are reports describing an association between skin tags and an atherogenic lipid profile [11, 12, 21]. This lipid profile is thought to be strongly associated with atherosclerosis, cardiovascular disease, and macroangiopathic diabetic complications. Crook [11] looked at the association between cardiovascular disease and skin tags in a small cohort study of four patients with the atherogenic lipid profile. The prevalence rate of dyslipidemia is 83.4% in subjects with CKD in our country [4]. In our study, 40% of patients were dyslipidemic. We detected a numerical but not a statistical increase of prevalence of skin tags in patients with dyslipidemia. Prevalence of skin tags was similar in patients with and without cardiovascular disease. We speculate that the increased risk of cardiovascular disease is not associated with skin tags in patients with CKD.

CONCLUSION

The presence of skin tags is merely related to male sex, obesity, and diabetes mellitus in patients with CKD. Further studies with large patient population are required to elucidate the association between the presence of skin tags and cardiovascular disease in patients with CKD.

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Кожни полипи удружени са гојазношћу и шећерном болешћу код болесника са хроничном бубрежном болешћу

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САЖЕТАК

Увод/Циљ Хронична болест бубрега и кожни полипи повезани су са кардиоваскуларним факторима ризика као што су гојазност, дијабетес мелитус, дислипидемија, хипертензија итд. Циљ рада је био да се утврди учесталост кожних полипа код болесника са хроничним бубрежним обољењем и да се процени однос кожних полипа и кардиоваскуларних фактора ризика као што су дијабетес, хипертензија, дислипидемија, гојазност и метаболички синдром.

Методе Испитано је 358 болесника: 149 (41,6%) жена и 209 (58,1%) мушкараца, и то предијализних 197 (55%) и на дијализи 161 (45%). Сви су испитивани од стране истог клиничара, а испитани су и индекс телесне масе, дијабетес мелитус, хипертензија и дислипидемија.

Резултати Кожни полипи су нађени код 199 (55%) болесника, чешће код мушкараца него жена ($p = 0,041$), и чешће код болесника са дијабетесом ($p = 0,013$). Индекс телесне масе био је већи код болесника са кожним полипима него код оних без њих ($p = 0,047$). Кожни полипи су откривени код 48,3% болесника са нормалном, код 58% болесника са прекомерном тежином, и код 66% гојазних болесника ($p = 0,029$).

Закључак Присуство кожних полипа повезано је са мушким полом, гојазношћу и дијабетесом код болесника са хроничним бубрежним обољењем.

Кључне речи: кожни полипи; гојазност; шећерна болест; хронично бубрежно обољење