

Association of Acanthosis Nigricans and Type 2 Diabetes Mellitus: A Case Control Study

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ABSTRACT

Aim: To determine the association between acanthosis nigricans (AN) and type 2 diabetes mellitus (T2DM).

Methodology: This case-control study was carried out at Jinnah Teaching Hospital (JTH) attached to Jinnah Medical College (JMC), Peshawar on total 100 consecutive patients (50 cases and 50 controls) by using non-probability consecutive sampling technique. The cases were all diagnosed diabetic patients (type 2) and controls were healthy subjects. The patients were diagnosed to type 2 diabetes mellitus (cases) on basis of American diabetes association criteria. Patients age 25 years and above, both genders, and Pakistani nationals were included in the study. For each patient data on frequency of AN, and gender, obesity, age, random blood sugar, HbA1c and body mass index (BMI) were recorded. Descriptive statistics were calculated for all variables in SPSS

Results: Mean age was 40.7±10.34 years. The males were 54(54%) and females were 46(46%). The frequency of acanthosis nigricans was higher in cases (n=31, 63.3%) than controls (n=18, 36.7%) and the difference was statistically significant (P<0.01). Among the cases, there was a statistically significant association of AN with BMI (P=0.02, 95% CI=-6.61, -0.592), HbA1c (P=0.018, 95% CI=-1.95, -0.195), random blood sugar (P=0.024, 95% CI=-72.64, -5.30), and waist circumference (P<0.01, 95% CI=-6.726, -2.204).

Conclusion: The frequency of AN is higher than most other population in T2DM. Acanthosis nigricans is associated with type 2 diabetes mellitus and can be used as a cutaneous marker in screening of type 2 DM.

Keywords: Acanthosis nigricans, type 2 diabetes mellitus, association, body mass index

INTRODUCTION

Acanthosis nigricans (AN) is symmetrically distributed hyper-pigmentation and velvety skin thickening especially on the nape of the neck and the axillary regions.¹ The most probable mechanism is the local growth factors expression in skin and the second mechanism may be due to hyperactivity of insulin or insulin-like growth factor (IGF-1) receptors located on epidermal cells and melanocytes.² It is associated with systemic diseases and acts as a cutaneous marker. Other conditions like Cushing's syndrome, Acromegaly, Prader-Willi syndrome, polycystic ovarian syndrome (PCOS), hyperthyroidism, ovarian hyperthecosis, stromal luteoma, ovarian dermoid cyst and T2DM are associated with this disease³.

The diagnosis of AN can be confirmed by skin biopsy⁴. Acanthosis nigricans (AN) is not a disorder by itself, but a sign of different pathologic etiologies. The underlying cause should be treated then AN can be treated.⁵

METHODOLOGY

This case-control study was carried out at Jinnah Teaching Hospital (JTH) attached to Jinnah Medical College (JMC) Peshawar, on total 100 consecutive patients. Among them 50 were cases having type 2 diabetes (T2DM) and 50 were controls (non-diabetic healthy subjects). Sampling was

one using non-probability consecutive sampling technique. Approval was taken from ethical review committee of the hospital. After detailed explanation to the participants regarding the purpose of the study a verbal informed consent was taken.

A detail history was taken followed by relevant examination. The controls were healthy subjects not having type 2 diabetes mellitus and were matched for age and gender to the cases. The controls were free from other endocrine and systemic diseases known to result in AN. The patients taking drugs that can cause AN like nicotinic acid, oral contraceptives, and topical fusidic acid were also excluded from controls. Data were recorded in pre-structure proforma. For each patient data on demographic features like frequency of AN, age, and gender, obesity (BMI>30 Kg/m²), random blood sugar (RBS), HbA1c and anthropometric measures like height, weight, and BMI were recorded. Data analysis was performed in SPSS version 20.

RESULTS

The detail of results is given in tables 1, 2, 3

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Table 1: Age, BMI, HbA1c, blood sugar and waist between diabetic and non-diabetics

Group		Mean ± SD	P-value	3.98, 5.1095% CI
Age (yrs)	Case (n=50)	40.7±10.4	0.859	-4.61, 3.85
	Control(n=50)	41.08±10.8		
BMI (Kg/m ²)	Case (n=50)	31.76±5.38	0.041	0.103, 4.82
	Control(n=50)	29.30±6.46		
HbA1c(%)	Case (n=50)	9.51±1.57	<0.01	3.98, 5.10
	Control(n=50)	4.96±1.23		
RBS(mg/dl)	Case (n=50)	289.64±60.01	<0.01	91.1, 136.7
	Control(n=50)	175.70±54.64		
Waist (inches)	Case (n=50)	42.40±4.4	<0.01	6.46, 9.89
	Control(n=50)	34.22±4.24		

Student's t-test; P<0.05 significant

Table 2: Gender, obesity and Acanthosis Nigricans between diabetic and non-diabetics

	Group	Group				P-value*
		Cases (n=50)		Controls (n=50)		
		n	%	N	%	
Gender	Male	27	49.1	28	50.9	0.841
	Female	23	51.1	22	48.9	
Obese	Yes	23	62.2	14	37.8	0.062
	No	27	42.9	36	57.1	
AN	Yes	31	63.3	18	36.7	.016
	No	19	37.3	32	62.7	

Chi-Square test; P<0.05 significant;

Table 3: Variables in diabetic and healthy subjects with or without Acanthosis Nigrican

Parameter	Acanthosis Nigricans	Mean ± SD	P-value*	95% CI*
Diabetic				
BMI	No (n=19)	29.53±4.3	0.02	-6.61, -0.592
	Yes (n=31)	33.13±5.5		
HbA1c	No (n=19)	8.84±1.3	0.018	-1.95, -0.19
	Yes (n=31)	9.92±1.6		
RBS	No (n=19)	265.47±52.5	0.024	-72.4, -5.30
	Yes (n=31)	304.45±60.2		
Age	No (n=19)	39.83±11.3	0.461	-3.86, 8.39
	Yes (n=31)	42.10±8.7		
Waist circumference	No (n=19)	39.63±4.2	P<0.01	-6.73, -2.20
	Yes (n=31)	44.10±3.6		
Non diabetic				
BMI	No (n=32)	30.34±7.6	0.13	-883, 6.67
	Yes (n=18)	27.44±3.02		
HbA1c	No (n=32)	5.03±1.3	0.59	-535, 0.93
	Yes (n=18)	4.83±1.1		
RBS	No (n=32)	175.38±60.5	0.956	-33.60, 31.79
	Yes (n=18)	176.28±43.7		
Age	No (n=32)	41.56±11.06	0.681	-5.169, 7.85
	Yes (n=18)	40.22±10.8		
Waist circumference	No (n=32)	34.47±4.6	0.586	-1.84, 3.22
	Yes (n=18)	33.78±3.4		

Student's t-test; CI, Confident interval; P<0.05 significant level

DISCUSSION

Our findings showed that among the diabetic cases, the frequency of AN was 63.3%. Grandhe et al.⁶ carried out a study in Indian population and similar results were seen. i.e. (62.6%) of AN in diabetic cases. Our results of AN in diabetic case are higher than many past studies. The prevalence of AN among diabetic cases reported in literature are; 52.7% in Caribbean population⁷, and 41.1% in Texas⁸. But in Cherokee Indians the prevalence of AN in diabetic cases was very high (73.3%).⁹ The difference in these results can attributed to genetic, ethnic and environmental variations.

Our findings showed that the frequency of AN was higher in diabetic than healthy subjects. The results were statistically significant which showed an association between AN and T2DM. Similar results were found in other studies^{3,9}.

Grandhe et al⁹ conducted a case-control study on association of type 2 diabetes and AN in Indian population on 150 cases. They reported that the frequency of AN was higher in diabetic (60%) than non-diabetic controls (40%).

CONCLUSION

The frequency of AN in diabetes type 2 patients in our sample population is higher than most other population. Acanthosis nigricans is strongly associated feature of type 2 diabetes mellitus and can be used as a cutaneous marker in screening of type 2 diabetes mellitus.

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