

Screening for dysglycaemia using anthropometric indices in an adult population in Oman

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Abstract

Background: A previous community-based cross-sectional survey conducted in a semi-urban community revealed that 44% of people aged 18+ years manifest dysglycaemia, which appears to echo the national trend. There is lack of studies examining the role of anthropometric indices in people with dysglycaemia.

Aim: We explored the screening ability of anthropometric indices, body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR), and waist-to-height ratio (WHtR) to detect dysglycaemia in the adult Omani population based on a community-based survey conducted in 2005. The potential of anthropometric indices to detect the presence of glycaemic disorder could aid in detection, prevention and health education.

Methods: A total of 480 male and 795 female subjects aged 18+ years were included in this study. The prevalence of dysglycaemia was analysed using the American Diabetic Association criteria. Logistic regression approach and Receiver-Operating Characteristic (ROC) curve analysis was performed.

Results: The analysis revealed that mean values of age, BMI, WC, WHR and WHtR increased significantly from normoglycemic to pre-diabetic and further to diabetic in both sexes ($P < 0.0001$). Dysglycemia showed an increasing prevalence with age. WHtR showed the highest sensitivity for detecting dysglycemia in all age groups compared to other anthropometric indices with sensitivity rate of 94.4% in ≥ 45 years, 88.6% in (25- 44) years and 45.6% in age group < 25 years.

Conclusion: Among the anthropometric indices we investigated, WHtR was the best predictor of dysglycaemia among Omani adults aged > 25 years.

Key words: Anthropometric measurements, Dysglycemia, Diabetes, ROC Curve

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Introduction

Oman has been internationally praised for the fulfilment of most of the Millennium Development Goals 2015 (1), however, along with the challenge of communicable diseases, there is an increasing challenge from noncommunicable diseases, and diabetes appears to be prominent, precipitated by rapid urbanisation and rising standards of living (2,3). According to 2000 data from the Ministry of Health, the prevalence of diabetes was 11.6%, rising to 12.3% in 2010 (4,5). Approximately 29% of the Omani population was classed as overweight and 9% as obese (6). In a population-based national survey 22% of those surveyed were overweight or obese (7). Obesity and overweight are recognised as independent risk factors for the development of diabetes and dysglycaemia (8,9). In a 2010 community-based cross-sectional study, 35% of the Omani men were prediabetic; advanced age and being overweight were identified as strong contributing factors (10).

Within the emerging epidemic of dysglycaemia, more studies are needed to identify anthropometric characteristic that would have a direct bearing on

dysglycaemia. In the available literature, various phenotypical indicators have been linked to the presence of dysglycaemia. In Western population, body mass index (BMI) has been associated with the presence of dysglycaemia (11). The World Health Organization has provided guidelines for using BMI to assess dysglycaemia with a cut off value of 25 kg/m² (12). It is not clear whether this is applicable to the Omani population. Waist circumference (WC) and waist-to-hip ratio (WHR) have also been suggested as indicators of intra-abdominal fat. Some studies have suggested that WC and WHR are better predictors of dysglycaemia than BMI (13–15). There is also a dissenting view suggesting the relationship between WHR and dysglycaemia is poor. Some preliminary data suggest that WHR correlates more weakly with glucose tolerance; sex is also a significant confounding factor (16). A few studies have reported that waist-to-height-ratio (WHtR) is a better screening tool than other anthropometric indices, with a cut off value of 0.5 (17,18). Against such a conflicting background, more studies are needed to determine the correlation between anthropometric measures and dysglycaemia. This would help to detect dysglycaemia cases early among apparently

healthy people, and, in turn, mitigate morbidity and mortality. This study aims to explore the screening capacity of anthropometric indices to adequately detect dysglycaemia in adult Omani population.

Methods

Survey

In this study, we used the data from a cross-sectional, community-based survey carried out on 1275 Omani adults, aged ≥ 18 years, residing in a semi-urban satellite town of Bidbid, which is situated 30 km west of the capital, Muscat, during September 2004 to February 2005.

The following exclusion criteria were used: participants with diabetics who were taking medication or insulin for the disease; pregnant women or mothers within 3 months postpartum; and people with conditions that were likely to interfere with research procedures, e.g. inability to communicate with staff or having a persistent and intransigent illnesses.

Sample design and participants

A sample size of 1500 subjects was determined based on the estimated prevalence of prediabetes (36%) (10) and diabetes (12.3%) (4), a nonresponse rate of 10%, an error margin of 5% with 95% confidence interval. We adopted a 2-stage random cluster sampling design. The first stage was the random selection of census enumeration areas, where each area comprised 100 households as defined by the Ministry of National Economy. Out of 100 census enumeration areas, 20 were randomly selected using a random number allocation method. A sampling frame of 6150 subjects was developed by conducting a census among the 20 randomly selected areas. The name, family name, sex, age, household and locality of all eligible subjects was recorded on field maps. In the second stage, 1500 subjects were randomly selected from the sampling frame using computer generated random numbers. All persons aged ≥ 18 years in the selected households were invited to participate in the study. Of these, 1275 completed the structured pre-tested questionnaire, an overall response rate of 85%.

Anthropometric and laboratory measurements

Blood glucose (both fasting and post-prandial, 2 hours following ingestion of 75 g glucose) was collected from the venous blood at sodium fluoride potassium oxalate tubes and tested at the laboratory after separating plasma on the same day, using Hitachi 911 automated clinical chemistry analysers (Boehringer–Mannheim). The reagents used were supplied by the same manufacturer. Glycaemic status according to the American Diabetes Association (ADA) criteria was used: < 5.6 mmol/L fasting normal, 5.6–6.9 mmol/L impaired fasting glucose and ≥ 7.0 mmol/L diabetes mellitus (19,20). Dysglycaemia was defined as a subject having fasting plasma glucose ≥ 5.6 mmol/L (100 mg/dL) and/or impaired glucose tolerance of ≥ 7.8 mmol/L (140 mg/dL) including prediabetes and diabetes. The fasting plasma glucose and oral glucose tolerance levels were estimated from venous blood at

the laboratory of Sultan Qaboos University Hospital according to the standard protocol. Height and weight were measured using a stature meter and high precision digital weighing machine with regular accuracy checks. Weight/height was taken in a standing posture, wearing light clothing and without shoes. The BMI was calculated as weight/height² (kg/m²) and individuals with BMI ≥ 25 kg/m² were considered overweight. Waist circumference was measured using a steel measuring tape with measurements made half way between the lower border of the ribs and the iliac crest in a horizontal plane. A value of ≥ 94.0 cm for males and ≥ 80.0 cm for females (the cut-off values recommended for Eastern Mediterranean and Middle Eastern Arab populations) was considered overweight (abnormal) (21). Similarly, hip circumference was measured at the widest point over the buttocks and the waist-to-hip ratio (WHR) was calculated; WHR ≥ 0.95 cm for males and ≥ 0.85 cm for females was considered abnormal (22,23). Waist-to-height ratio (WHtR) was also calculated for each individual and if the ratio was ≥ 0.5 , then the individual was considered as having abnormal central obesity (24).

Dysglycaemia or glycaemic disorder is an age-dependent phenomenon and magnitude of problem usually remains low in young adult, medium in middle aged and high in older age group as observed in several studies (25,26). On the other hand, sensitivity of a screening test is influenced by the prevalence of disease under investigation in a community (27). Considering the above, age-related prevalence of dysglycaemia was analysed. Following this, sensitivity analysis of dysglycaemia using various anthropometric indices (BMI, WC, WHR and WHtR) was done for each age group to obtain the sensitivity status. This was also done to understand whether the anthropometric tool could be uniformly applicable to all age groups so far as sensitivity was concerned. If not, a possible cut-off value was expected to be explored based on sensitivity status. Finally, the receiver operating characteristic curve was developed for the indices based on the findings of age group sensitivity to obtain the test accuracy in subjects with values below and above the cut-off (28). Receiver operating characteristic curves were used to determine the predictive power of various anthropometric indices for glycaemic status by comparing areas under the curve.

The Medical Research and Ethics Committee of the College of Medicine and Health Sciences, Sultan Qaboos University, approved the study. All participants gave their written informed consents prior to participating in the study.

Statistical analysis

Descriptive analysis for continuous variables was used to calculate mean values and standard deviation. Prevalence and frequencies were expressed as percentages. The differences in means of the anthropometric indices and age between the 3 glycaemic categories were assessed using 1-way analysis of variance (ANOVA). Where there was a lack of homogeneity of variance, the Kruskal–Wallis

test was used to compare the distributions between the 3 glycaemic categories. When ANOVA provided evidence of significant difference between the groups, a post-hoc test, Dunnett's T3 test was used for pair-wise comparison of the means.

To establish the relationship between anthropometric indices of obesity and glycaemic status, odds ratios and their 95% confidence intervals were estimated using logistic regression models, after adjusting for age (29). The chi-squared trend test was used for trend analysis for percentages of sensitivity and specificity across the age groups. *P*-value (2-tailed) < 0.05 was considered statistically significant. All data were analysed using SPSS, version 23.

Results

A total of 480 males and 795 females aged ≥ 18 years consented to participate in this study. Table 1 shows mean values for various anthropometric indices according to glycaemic status. The mean age for both normoglycaemic males and females was similar, around 29 years, but mean age of females was slightly older for both types of dysglycaemia, impaired fasting glucose and

diabetes mellitus. An average male appears to have had a gap of 5 years prior to development of diabetes from the prediabetic status, while females took about 7 years to reach full-blown symptoms. A similar observation was noted for developing impaired fasting glucose from normoglycaemic status: for males the average gap was 4 years but for females it was about 7 years. This indicates that diabetes progresses more slowly and at an older age in females. These differences were statistically significant (*P* < 0.05). Mean values of BMI, WC, WHR and WHtR differed significantly from normoglycaemic to impaired fasting glucose and further to diabetes in both sexes (Table 1).

Overall prevalence of dysglycaemia was 44.1% (combining all ages and both sexes) (Table 2). It is evident that the prevalence of dysglycaemia increased in both sexes with age. Prevalence in males was 49.4% and in females 40.9%; prevalence was slightly lower in females in each age group compared to their male counterparts except for the ≥ 45 years group. This indicates that diabetes is an age-dependent condition for both sexes.

It is evident that older age, BMI ≥ 25 kg/m², WC ≥ 94.0 (male)/≥ 80.0 (female), WHR ≥ 0.95 (male)/≥ 0.85

Table 1. Anthropometric indices in relation to glycaemic status for male and female adults in Oman, 2004-2005

Index	Normoglycaemic		Dysglycaemic			
	Mean (SD)	95% CI	IFG	IFG	DM	DM
			Mean (SD)	95% CI	Mean (SD)	95% CI
Males (No.)	258	–	195	–	27	–
Age (years)	29.20 (10.94)	27.86–30.55	33.84 (12.99) ^a	32.00–35.67	38.63 (11.25) ^b	34.18–43.08
BMI (kg/m ²)	24.67 (4.50)	24.12–25.23	26.22 (4.74) ^a	25.55–26.88	28.77 (4.85) ^b	26.76–30.77
WC (cm)	85.33 (11.39)	83.92–86.73	90.14 (11.42) ^a	88.54–91.75	94.88 (10.95) ^b	90.46–99.31
WHR	0.88 (0.06)	0.87–0.89	0.91 (0.07) ^a	0.89–0.92	0.94 (0.05) ^{bc}	0.92–0.96
WHtR	0.51 (0.07)	0.50–0.52	0.54 (0.07) ^a	0.53–0.55	0.58 (0.06) ^{bc}	0.55–0.60
Females (No.)	504	–	258	–	33	–
Age (years)	29.17 (9.69)	28.32–30.02	36.26 (11.84) ^a	34.79–37.73	43.81 (13.01) ^{bc}	39.12–48.50
BMI (kg/m ²)	24.65 (5.20)	24.19–25.10	27.99 (6.16) ^a	27.23–28.74	29.98 (6.41) ^b	27.70–32.25
WC (cm)	78.80 (12.67)	77.70–79.91	88.58 (13.99) ^a	86.86–90.29	97.24 (13.89) ^{bc}	92.32–102.17
WHR	0.82 (0.09)	0.81–0.82	0.88 (0.09) ^a	0.87–0.89	0.96 (0.08) ^{bc}	0.93–0.99
WHtR	0.51 (0.08)	0.05–0.52	0.58 (0.09) ^a	0.57–0.59	0.64 (0.09) ^{bc}	0.61–0.67

P-value (ANOVA) < 0.001 for all.

CI = confidence interval; IFG = impaired fasting glucose; DM = diabetes mellitus; SD = standard deviation; BMI = body mass index; WC = waist circumference; WHR = waist-to-hip-ratio; WHtR = waist-to-height-ratio.

^a*P* < 0.01 for normoglycaemic versus IFG.

^b*P* < 0.01 for normoglycaemic versus DM.

^c*P* < 0.05 for IFG versus DM.

Table 2. Age and sex distribution of Omani adults with dysglycaemia, 2004-2005

Age (years)	No. of males screened	Dysglycaemia No. (%)	No. of females screened	Dysglycaemia No. (%)	Total screened	Dysglycaemia No. (%)
< 25	164	58 (35.4)	245	59 (24.1)	409	117 (28.6)
25–44.9	250	135 (54)	461	202 (43.8)	711	337 (47.4)
≥ 45	66	44 (66.7)	89	64 (71.9)	155	108 (69.7)
Total	480	237 (49.4)	795	325 (40.9)	1275	562 (44.1)

(female) and WHtR ≥ 0.5 are significantly associated with dysglycaemia ($P < 0.001$) (Table 3). For all 4 anthropometric indices, females were at comparatively greater risk of developing dysglycaemia compared with males.

The sensitivity and specificity for detecting dysglycaemia using each anthropometric measurement

were calculated separately for each age group. Individually WHtR showed the highest sensitivity for detecting dysglycaemia for all age groups: 94.4% in the oldest age group (≥ 45 years), 88.6% in the middle age group (25.0–44.9 years) and 45.6% in the youngest age group (< 25 years) (Table 4). None of the measures

Table 3. Determinants of dysglycaemia in Omani adults, 2004-2005, based on logistic regression models adjusted for age

Index	Males			Females		
	OR	95% CI	P-value	OR	95% CI	P-value
Age (years)						
< 25	1			1		
25–44	2.14	1.43–3.21	< 0.0001	2.26	1.74–3.47	< 0.0001
≥ 45	3.66	2.00–6.68	< 0.0001	8.07	4.67–13.94	< 0.0001
BMI (kg/m²)						
< 25.0	1			1		
≥ 25.0	2.11	1.43–3.10	< 0.0001	2.60	1.90–3.55	< 0.0001
WC (cm)						
< 94.0 (M)/ < 80.0 (F)	1			1		
≥ 94.0 (M)/ ≥ 80.0 (F)	2.12	1.40–3.23	< 0.0001	3.11	2.22–4.37	< 0.0001
WHR						
< 0.95 (M)/ < 0.85 (F)	1			1		
≥ 0.95 (M)/ ≥ 0.85 (F)	1.90	1.19–3.02	0.007	3.78	2.68–5.33	< 0.0001
WHtR						
< 0.5	1			1		
≥ 0.5	2.43	1.54–3.81	< 0.0001	2.98	2.05–4.33	< 0.0001

M = male; F = female; BMI = body mass index; WC = waist circumference; WHR = waist-to-hip ratio; WHtR = waist-to-height ratio.

Table 4. Sensitivity and specificity of selected anthropometric indices for detecting dysglycaemia in three age groups in Omani adults

Index (cut-off)	Age < 25 years (n = 409)		Age 25–44 years (n = 711)		Age ≥ 45 years (n = 155)	
	TP/ TP+FN	Sensitivity %	TP/ TP+FN	Sensitivity %	TP/ TP+FN	Sensitivity %
Sensitivity						
BMI (≥ 25.0)	44/117	37.6	249/335	74.3	64/108	59.3
WC (cm) (M ≥ 94 / F ≥ 80)	30/117	25.6	234/335	69.8	75/108	69.4
WHR (M ≥ 0.95 / F ≥ 0.85)	18/117	15.4	194/335	57.9	86/108	79.6
WHtR (≥ 0.5)	52/114	45.6	288/325	88.6	101/107	94.4
BMI (≥ 25.0) and/or WHtR (≥ 0.5)	54/114	47.5	291/324	89.8	101/107	94.4
Specificity						
	TN/ TN+FP*	Specificity	TN/ TN+FP	Specificity	TN/ TN+FP*	Specificity
BMI (≥ 25.0)	207/289	71.6	189/373	50.6	30/47	63.8
WC (cm) (M ≥ 94 / F ≥ 80)	230/289	79.6	194/373	52.0	27/47	57.4
WHR (M ≥ 0.95 / F ≥ 0.85)	261/289	90.3	239/373	64.1	23/47	48.9
WHtR (≥ 0.5)	196/284	69.0	110/355	30.9	10/45	22.2
BMI (≥ 25.0) and/or WHtR (≥ 0.5)	185/284	65.1	104/355	29.3	10/45	22.2

P-value < 0.001 for all.

TP = true positive; FN = false negative; M = male; F = female; BMI = body mass index; WC = waist circumference; WHR = waist-to-hip ratio; WHtR = waist-to-height ratio; TN = true negative; FP = false positive.

showed sensitivity $\geq 50\%$ for detecting dysglycaemia in the age group < 25 years. Combining 2 sequential tests with BMI and WHtR to obtain a net gain in sensitivity in the youngest age group, sensitivity increased to 47.5%, 1.9% above WHtR alone.

Our analysis indicates that if dysglycaemia is screened for using WHtR, it would have a detecting ability of around 90% among those aged ≥ 25 years, but less than 50% among those aged < 25 years. Specificity in the youngest age group was highest with WHR (90%), followed by WC (79.6%) and BMI (71.6%). Specificity was lower for all indices in the older age groups (Table 4).

The areas under the receiver operating characteristic curves for the 4 anthropometric indices at their respective cut-off values, i.e. are most likely to identify dysglycaemia, are shown in Table 5. The receiver operating characteristic area in those aged < 25 years are: BMI 0.551; WC 0.605; WHR 0.640; WHtR 0.598 (Table 5). The area under the ROC curve for each of the 4 anthropometric indices is greater for the age group ≥ 25 years compared with < 25 years, indicating that the predictive power of each of the 4 anthropometric indices to detect dysglycaemia is greater for the older age group.

Discussion

Since noncommunicable diseases are on rise in almost all countries in the region, including Oman, initiatives were taken to identify some suitable anthropometric marker/s that would help in identifying the susceptible population at risk of developing dysglycaemia. Several studies have been conducted to explore the possible role of anthropometric marker/s for dysglycaemia. Some indicated WHtR as a strong predictor compared to WC, WHR and BMI (9,24,30,31).

As in other studies (25,26), we found the prevalence of dysglycaemia to be significantly associated with the older age in both sexes. We attempted to highlight the screening ability of 4 anthropometric indices, BMI, WC, WHR and WHtR, in detecting dysglycaemia among 3 age groups. The study showed an association between anthropometric measurements (BMI, WC, WHR, WHtR) with their cut off values and dysglycaemia. Similar

observations have been reported in other studies (32,33).

It was observed that WHtR had the highest sensitivity in all 3 age groups; BMI showed the second highest sensitivity in the youngest age group and the lowest sensitivity rate in the oldest age group as observed in a similar study (34). In a study among Jordanian adult population, the comparison between the 4 anthropometric indices was carried out for detecting metabolic abnormalities (35). The study revealed that the WHtR had a strong association and performed better for the detection of high fasting blood glucose. The estimated values of areas under the curve and odds ratios corresponding to WHtR were very close to the estimated values in our study.

Sensitivity was 90% for WHtR in this study population, when the 2 older age groups were combined (i.e. age ≥ 25 years.). This means WHtR would detect 90% of the dysglycaemia cases with a cut-off value of ≥ 0.5 , if used for community-based screening programmes for dysglycaemia (the cut off value for WHtR is the same for all age groups). This means WHtR may be used as a screening tool for dysglycaemia in community-based screening among people aged ≥ 25 years. Other advantages of this tool are: this test is cheap and easy to perform by health care workers once they are trained. Disadvantage include: lowering of sensitivity to $< 50\%$ when applied to the subjects aged < 25 years. This age-related change in sensitivity may be primarily due to the effect of increasing accumulation of visceral or intra-abdominal fat with older age. In an individual, height remains fixed but ratio between waist circumference and height changes. On the other hand, WC and WHR did not show a comparable sensitivity to WHtR. Thus, in our study WHtR appears to be a better anthropometric predictor, which could be used for community-based screening of dysglycaemia.

As indicated by the analysis of data, younger age group (< 25 years) needs special attention as no anthropometric indicator showed a sensitivity $\geq 50\%$. In principle, if 2 sequential screening tests are applied simultaneously, there is usually a net gain of sensitivity (36). Considering this principle, and since BMI showed the second highest sensitivity in the youngest age group, BMI was combined with WHtR, resulting in a slight increase in sensitivity. This indicates that even if both tests are combined, this would not be able to detect even 50% of the individuals in that age group with dysglycaemia. Consequently, finding a suitable screening tool for younger population poses a public health challenge and efforts must be continued to find a suitable predictor.

Table 5. Area under the receiver operating characteristic curves illustrating the power of the anthropometric indices in predicting dysglycaemia for Omani adults in two age groups

Index	Age (years)			
	< 25 (n = 409)		≥ 25 (n = 866)	
	Area under the curve	95% CI	Area under the curve	95% CI
BMI	0.551	0.488–0.613	0.655*	0.618–0.691
WC	0.605*	0.544–0.666	0.685*	0.650–0.720
WHR	0.640*	0.580–0.701	0.694*	0.659–0.729
WHtR	0.598*	0.537–0.659	0.686*	0.651–0.721

*P < 0.01 .

CI = confidence interval; BMI = body mass index; WC = waist circumference; WHR = waist-to-hip ratio; WHtR = waist-to-height ratio.

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Competing interests: None declared.

Dépistage de la dysglycémie au moyen d'indices anthropométriques dans une population d'adultes à Oman

Résumé

Contexte : Une enquête transversale communautaire précédemment réalisée dans une communauté semi-urbaine a révélé que 44 % des personnes de plus de 18 ans présentaient une dysglycémie, ce qui semble correspondre à la tendance nationale. Il n'existe pas d'études permettant d'examiner le rôle des indices anthropométriques chez les sujets atteints de dysglycémie.

Objectif : Nous avons exploré la capacité diagnostique des indices anthropométriques, de l'indice de masse corporelle (IMC), du tour de taille, du rapport tour de taille/tour de hanches, et du rapport tour de taille/taille pour détecter la dysglycémie dans la population d'adultes à Oman sur la base d'une enquête communautaire réalisée en 2005. Le potentiel des indices anthropométriques afin de détecter la présence de troubles de la glycémie pourrait contribuer au dépistage, à la prévention et l'éducation sanitaire.

Méthodes : Au total, 480 sujets masculins et 795 sujets féminins de plus de 18 ans ont été inclus dans cette étude. La prévalence de la dysglycémie a été analysée à l'aide des critères de l'Association américaine du diabète. On a recouru à l'approche de régression logistique et à l'analyse de la courbe ROC (caractéristique du fonctionnement du récepteur).

Conclusion : Parmi les indices anthropométriques que nous avons étudiés, le rapport tour de taille/taille était le meilleur prédicteur de la dysglycémie parmi les Omanais adultes âgés de plus de 25 ans.

فحص خلل سكر الدم لدى السكان البالغين في عُمان باستخدام مؤشرات أنثروبومترية

شيام جانجولي، كاماليش ساركار، سمير العدوي، عبد العزيز المحرزي

الخلاصة

الخلفية: كشف استقصاء مقطعي مجتمعي أجري في وقت سابق في مجتمع شبه حضري أن ٤٤٪ من السكان في الفئة العمرية ١٨ فيما أكثر، يعانون من خلل في سكر الدم، وهو ما يعكس فيما يبدو المستوى الوطني. ولا توجد دراسات كافية لفحص دور المؤشرات الأنثروبومترية في الأشخاص المصابين بخلل سكر الدم.

الهدف: قمنا باستكشاف القدرة على التحري لكل من المؤشرات الأنثروبومترية ومؤشر كتلة الجسم ومحيط الخصر و"نسبة الخصر إلى الورك" و"نسبة الخصر إلى الطول" للكشف عن خلل سكر الدم لدى السكان العمانيين استناداً إلى استقصاء مجتمعي أجري في عام ٢٠٠٥. ومن شأن ما تنطوي عليه المؤشرات الأنثروبومترية من قدرات للكشف عن وجود اضطراب في سكر الدم أن تساعد في عملية الكشف عنه والوقاية منه والتثقيف الصحي بشأنه.

طرق البحث: أدرج في هذه الدراسة ما مجموعه ٤٨٠ مشاركاً و٧٩٥ مشاركة فوق سن ١٨. وتم تحليل انتشار خلل سكر الدم باستخدام معايير جمعية داء السكري الأمريكية. واستُخدم نهج الانحدار اللوجستي وتحليل منحنى خصائص التشغيل للمتلقى.

النتائج: كشف التحليل أن متوسط قيم العمر، ومؤشر كتلة الجسم، ومحيط الخصر، ونسبة الخصر إلى الورك، ونسبة الخصر إلى الطول قد زادت زيادة كبيرة من التركيز الطبيعي للجلوكوز في الدم إلى مرحلة ما قبل السكري وإلى مزيد من المصابين بالسكري في كلا الجنسين ($P > 0.0001$). وظهر ازدياد في انتشار اضطراب مستوى الجلوكوز في الدم مع تقدم العمر. وأظهرت نسبة الخصر إلى الطول حساسية أعلى في الكشف عن اضطرابات مستوى الجلوكوز في الدم في جميع الفئات العمرية مقارنة بمؤشرات القياسات الأنثروبومترية الأخرى، بمعدل حساسية بلغ ٩٤,٤٪ في من هم في عمر ٤٥ سنة أو أقل، و٨٨,٦٪ في الفئة العمرية ٤٤-٢٥ سنة، و٤٥,٦٪ في الفئة العمرية دون عمر ٢٥ سنة.

الاستنتاج: من بين المؤشرات الأنثروبومترية التي استقصيناها، شكّل مؤشر "نسبة الخصر إلى الورك" أفضل منبئ لخلل سكر الدم لدى البالغين العمانيين في الفئة العمرية ٢٥ عاماً وما أكثر.

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