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Original Article

Pre-diabetes and diabetes in overweight and obese Egyptian men

Endocrinology

Sherif S. Ayoub [1], Fatma K .Hammad [2], Marwa F .Elsayed[2], Doaa A. Abd El-Fattah[3]

[1] Endocrinology Freelance Doctor, Cairo Egypt.

[2] Endocrinology Department, Faculty of Medicine for Girls Al-Azhar University, Cairo, Egypt.

[3] Clinical Pathology Department, Faculty of Medicine for Girls Al-Azhar University, Cairo, Egypt.

ABSTRACT

Background: Diabetes mellitus (DM) is a significant public health issue that is characterized by impaired carbohydrate metabolism, lipid, and protein because of insulin resistance, inadequate insulin secretion, or both.

Objective: To estimate the prevalence of pre-diabetes and type 2 DM in overweight and obese adult males as well as the relation of blood sugar parameters to the obesity indices among them.

Methodology: A cross-sectional comparative study was conducted on 211 apparently healthy adult males attending the primary care clinic of Beverages and Snacks plants in Egypt aged from 30-60 years with no history of diabetes for the last 6 months ending in September 2023. Patients were categorized into three groups regarding body mass index (BMI): Group A (Normal weight (BMI < 25 Kg/m2) 35 cases). Group B (Overweight (BMI between 25-29.9 kg/m2) 95 cases), Group C (Obese (BMI ≥ 30 Kg/m2) 81 cases).

Results: it was found that six (17%) males from group A were pre-diabetic, while 29 (30.5%) and 36(44%) from groups B and C were pre-diabetic, respectively. No diabetics were detected in group A while 4 (4.2%) and 5 (6.17%) from groups B and C were diabetic respectively. It was revealed that waist circumference has the highest validity with an area under the curve (AUC) of 0.869, indicating a strong ability to differentiate between normal and high BMI, with a cut-off value of >90 cm, 82.95% sensitivity, and 79.41% specificity (p < 0.0001).

Conclusion: The significant risk factors for pre-diabetes and DM that are prevalent in the population, particularly among males, have been identified in our study. BMI and waist circumference, Homeostatic Model Assessment for Insulin Resistance (HOMA IR), fasting insulin, and HDL (High Density Lipoprotein) are statistically significant predictors of pre-diabetes and diabetes.

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Key words: Egyptian men; diabetes; obese; overweight; pre-diabetes.

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Corresponding author: Sherif Sabry Ayoub, Endocrinology Freelance Doctor, Cairo Egypt. Tel: +201006438647 E-mail: sherifmedical2017@gmail.com

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INTRODUCTION

Diabetes mellitus (DM) is a significant public health issue that is characterized by impaired carbohydrate metabolism, protein, and fat because of unstable insulin resistance, insulin secretion, or both. Various projections indicate that the global diabetes prevalence will increase from 422 million to 642 million by 2040 [1].

Body mass index (BMI) can be employed to predict the occurrence of pre-diabetes; an individual who appears to be in good health but has a BMI of 25 kg/m^2 or higher is considered to have pre-diabetes [2]. The American Diabetes Association (ADA) recommends screening at any age. Testing should be considered in adults with BMI of 25 kg/m^2 or more who have one or more of the following risk factors; first-degree diabetes relative, high-risk race/ethnicity, hypertension (140/90 mmHg or on hypertension therapy), a cardiovascular disease history, a triglyceride level >250 mg/dL (2.82 mmol/L), an HDL cholesterol level <35 mg/dL (0.90 mmol/L), women with polycystic ovary syndrome, physical inactivity and other clinical conditions associated with insulin resistance [3].

In 2014, the diabetes prevalence was indicated to be 8.5% among adults aged 18 and older, a significant increase from the previous three decades, remarkably in low- and middle-income countries [1].
So, the present study was designed to determine the pre-diabetes and type 2 DM prevalence in the adult

population that is overweight or obese as well as the relationship between the obesity indices and blood sugar parameters in obese and overweight males.

PATIENT AND METHODS

Study design &population:

A cross-sectional comparative study was carried out on 211 apparently healthy adult males attending the primary care clinic of Beverages and Snacks plants in Egypt, aged from 30-60 years with no history of diabetes for the last 6 months ending in September 2023. This study was conducted in compliance with Helseinki's declaration, and the approval of the ethics committee of Al-Azhar University of medicine for girls. Informed written consent was obtained from the participants.

Exclusion criteria:

- Adult males under 30 years or above 60 years
- Adult females
- History of diabetes or pre-diabetes, or secondary cases of DM such as pancreatitis and glucocorticoid intake.

All participants were subjected to: history taking and demographic data collection (age, sex), anthropometric measurements [height, Body weight, BMI (body weight (kg)/ height (m^2)), and waist circumference], and laboratory workup.

They were divided into three BMI-based groups to assess the prevalence of pre-diabetes and diabetes. Group A (BMI < 25 kg/m². Group B (BMI 25-29.9 kg/m²) Group C (BMI ≥ 30 kg/m²).

Venous blood was collected via venipuncture and analyzed for FBS that was measured after a period of fasting ranging from 6-8 hours and glycated hemoglobin: serum creatinine, and fasting insulin were also measured. Homeostatic Model Assessment for Insulin Resistance (HOMA-IR) was evaluated regarding the formula: fasting insulin (microU/L) x fasting glucose (nmol/L)/22.5 (https://www.omnicalculator.com).

Another sample was taken the next day 2h postprandial for 2 hours postprandial: level <140 mg/dL was considered normal, 140-199 mg/dL indicated impaired glucose tolerance, and ≥200 mg/dL detected diabetes. Sample blood was taken the next day after 12 h fasting for lipid profile. (s. TC, s.TG, s. low-density lipoproteins (LDL), high-density lipoprotein (HDL).

Statistical analysis

Statistical analysis was performed using SPSS v28 (IBM Co., Armonk, NY, USA). Quantitative variables were expressed as means and standard deviations (SD). For comparisons between the three groups. One-way ANOVA test was utilized, followed by post hoc analyses to determine specific group differences where applicable. Pearson’s correlation coefficient (r) was calculated to estimate the correlation degree between two quantitative variables. Multivariate logistic regression analysis was conducted to identify factors associated with the development of pre-diabetes and type 2 diabetes among the participants. A p-value of less than 0.05 was considered statistically significant. Statistical significance was determined by a p-value that was less than 0.05.

RESULTS

There was a significant elevation in group C compared to group B, and group A regarding weight, BMI, waist, FBS, 2hpp glucose, HbA1c, fasting insulin, HOMA IR, and TG (P < 0.05), but a significant increase in group A compared to group C, and group B regarding HDL (P < 0.05), while there was insignificant difference among three groups regarding eGFR, age, TC, serum creatinine, and LDL (table 1)

Table (1): Comparison between the mean values of all studied parameters among three groups

Variable	Group A (n=35)	Group B (n=95)	Group C (n=81)	Stat. test	p-value
Age (yrs.)	41.8 ± 7.82	41.89 ± 6.21	43.72 ± 8.46	F=8.432	0.214
Weight (Kg)	67.6 ± 8.16	84.29 ± 8.31	102.4 ± 13.87	F=27.077	<0.0001*
BMI (Kg/m²)	22.7 ± 1.84	27.7 ± 1.35	33.66 ± 3.09	F=50.193	<0.0001*
Waist circumference (cm)	85.85 ± 8.32	97.23 ± 9.17	108.64 ± 12.5	F=13.067	<0.0001*
FBS (mg/dL	85 ± 8.64	89.82 ± 13.09	96.08 ± 35.51	F=126.10	0.0101*
2hpp glucose (mg/dL)	88.23 ± 20.46	102.71 ± 31.76	111.16 ± 54.74	F=48.122	0.0224*
HbA1c (%)	5.34 ± 0.37	5.54 ± 0.55	5.78 ± 0.96	F=47.692	0.0061*
Fasting Insulin (µIU/mL)	6.91 ± 2.55	11.6 ± 6.55	12.34 ± 6.94	F=30.030	0.0180*
HOMA (IR)	1.47 ± 0.55	2.62 ± 0.78	3.05 ± 0.29	F=85.937	0.0043*
Serum creatinine (md/dl)	0.87 ± 0.12	0.87 ± 0.14	0.94 ± 0.55	F=175.37	0.329
eGFR (mL/min/1.73 m²)	108.8 ± 12.99	108.88 ± 12.76	105.49 ± 12.96	F=6.276	0.0673
TC (mg/dL)	180.31 ± 32.93	184.74 ± 43.76	189.91 ± 41.08	F=3.634	0.4756
TG (mg/dL)	108.46 ± 49.07	127.64 ± 78.04	155.73 ± 82.55	F=11.122	0.0043*
HDL (mg/dl)	46.6 ± 12.53	42 ± 9.37	38.75 ± 7.33	F=15.101	0.0002*
LDL (mg/dL)	111.8 ± 31.16	184.74 ± 43.76	122.21 ± 36.88	F=1.422	0.3585

F: One-way ANOVA, BMI: Body mass index FBS: Fasting blood sugar, 2hpp: 2 hours postprandial, HbA1C: Hemoglobin A1c, HOMA IR: Homeostasis Model Assessment of insulin Resistance, eGFR: Estimated Glomerular Filtration Rate, LDL: Low- density lipoprotein, HDL: High-density lipoprotein, TG: Triacylglycerol, TC: Total Cholesterol, *: Significant p-value (< 0.05).

Table (2): Frequency of prediabetic and diabetic patients in each group

	Prediabetic no. (%)	Diabetic no. (%)
Group A (35 cases)	6 (17.1%)	0 (0%)
Group B (95 cases)	29 (30.5%)	4 (4.2%)
Group C (81 cases)	36 (44.4%)	5 (6.2%)

Percentage of positive cases in each group.

For group A. there were 6 (17.1%) prediabetic patients (lower prevalence), and no diabetic patients, for group B. there were 29 (30.5%) prediabetic patients, and (4 (4.2%) diabetic patients (moderate prevalence), and for group B. there were 36 (44.4%) prediabetic patients, and (5 (6.2%) diabetic patients (highest prevalence) (table 2).

There was a significant positive correlation in all studied subjects between FBS with BMI, and waist circumference (p =0.04, 0.028, respectively), between 2hpp with weight, BMI, and waist circumference (p<0.001, <0.001, 0.013, respectively), and between HBA1C with weight, BMI, and waist circumference (p = 0.029, <0.001, 0.017, respectively) (table 3).

The multivariate logistic regression analysis provides valuable insights into the factors associated with diabetes development. The findings suggest that BMI, LDL, TG, and TC are important predictors of diabetes risk with significant P values of 0.001, 0.028, 0.018, and 0.006, respectively. Individuals with higher BMI and LDL levels, as well as those with elevated TG levels, may be at a greater risk of developing diabetes. Nevertheless, the relationship between TC and diabetes risk is more complex, with higher TC levels potentially associated with a slightly decreased risk. No significant P value was observed regarding age, weight, height, waist circumference, fasting insulin, Homa IR, S. creatinine, and eGFR (table 4).

Table (3): Correlation between FBS,2hpp and HBA1Cwith weight, BMI, and waist circumference

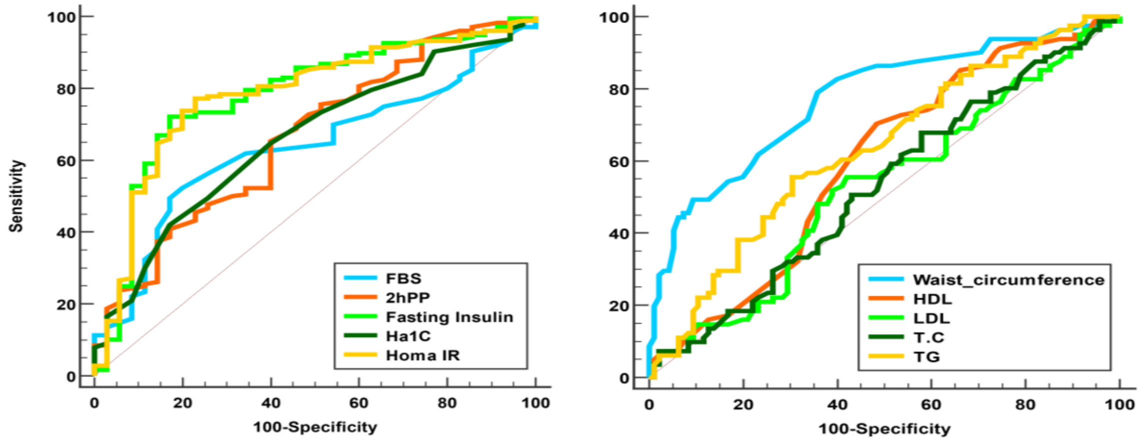
Variables	All subjects n=211	
	r	p-value
FBS:		
Weight (Kg)	0.13	0.06
BMI (Kg/m^2)	0.137	0.047*
Waist circumference (cm)	0.152	0.028*
2hpp:		
Weight (Kg)	0.182	<0.001*
BMI (Kg/m^2)	0.22	<0.001*
Waist circumference (cm)	0.172	0.013*
HBA1c:		
Weight (Kg)	0.165	0.029*
BMI (Kg/m^2)	0.204	<0.001*
Waist circumference (cm)	0.18	0.017*

FBS: fasting blood glucose, HB: haemoglobin, *: Significant p-value (< 0.05).

Table 4. Multivariate Logistic regression for predictive risk factors of diabetic patients

Variables	p-value	OR	CI Lower 95%	CI Upper 95%
Age (yrs.)	0.853	1.034	0.723	1.48
Weight (Kg)	0.566	0.933	0.738	1.181
Height (m)	0.493	0.992	0.969	1.015
BMI (Kg/m^2)	0.001*	1.648	0.642	2.655
Waist circumference (cm)	0.790	0.966	0.753	1.240
Fasting Insulin (µIU/mL)	0.706	1.047	0.826	1.327
HOMA (IR)	0.532	0.882	0.595	1.308
Serum creatinine (md/dl)	0.638	0.465	0.019	11.289
eGFR (mL/min/1.73 m^2)	0.969	1.003	0.872	1.153
LDL (mg/dL)	0.028*	1.135	1.014	1.27
HDL (mg/dL)	0.396	1.067	0.918	1.24
TG (mg/dL)	0.018*	1.026	1.004	1.047
TC (mg/dL)	0.006*	0.882	0.807	0.964

OR: Odds Ratio, CI: coefficient interval, , eGFR: Estimated Glomerular Filtration Rate, LDL: Low- density lipoprotein, HDL: High-density lipoprotein, TG: Triacylglycerol, TC: Total Cholesterol, *: Significant p-value (< 0.05).

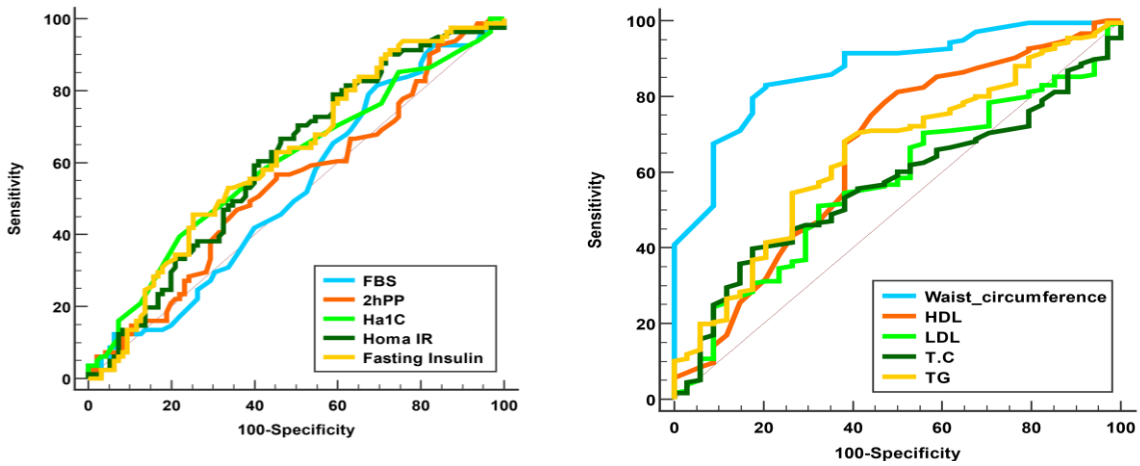


(A) **(B)**

Figure 1:ROC curves of (A) diabetes profile, and (B) lipid profile and waist circumference for discrimination between normal and high BMI groups

Waist circumference exhibited the highest validity in differentiating between normal and high BMI groups, with an AUC of 0.869, a cut-off of >90 cm, 82.95% sensitivity, and 79.41% specificity ($p < 0.0001$). Fasting blood sugar (FBS) showed moderate validity with an AUC of 0.637, a cut-off of >89 mg/dL, 49.43% sensitivity, and 82.86% specificity ($p = 0.0026$). Both the 2-hour postprandial glucose (2hPP) and HbA1c tests demonstrated similar moderate validity with AUCs of 0.665 and 0.66, respectively ($p < 0.001$). Fasting insulin and HOMA-IR indicated strong validity with AUCs of 0.781 and 0.782, respectively ($p < 0.0001$). In contrast, LDL and total cholesterol were not significant differentiators, with AUCs of 0.573 and 0.566 ($p > 0.05$). HDL showed moderate validity (AUC = 0.652, $p = 0.0267$), while triglycerides (TG) also displayed moderate validity with an AUC of 0.634 ($p = 0.0017$) (figure 1).

Waist circumference demonstrates the highest validity with an AUC of 0.772, a cut-off value of >100 cm, 79.01% sensitivity, and 64.21% specificity ($p < 0.0001$). FBS shows low validity with an AUC of 0.524, a cut-off >81, 81.48% sensitivity, and 30.53% specificity ($p = 0.585$). The 2-hour postprandial glucose (2hPP) also has low validity with an AUC of 0.54 ($p = 0.3662$). HbA1c shows moderate validity with an AUC of 0.596, a cut-off >5.7, 39.51% sensitivity, and 77.89% specificity ($p = 0.0266$). Fasting insulin and HOMA-IR have moderate validity with AUCs of 0.615 and 0.607, respectively, both significant ($p = 0.0067$ and $p = 0.0117$). LDL and T.C are not significant differentiators with AUCs of 0.528 and 0.529, respectively ($p > 0.05$). HDL shows moderate validity with an AUC of 0.595 ($p = 0.0267$). TG has moderate validity with an AUC of 0.632, a cut-off >131, 55.56% sensitivity, and 69.47% specificity ($p = 0.0017$) (figure 2).



(A) **(B)**

Figure 2: ROC curves of (A) diabetes profile, and (B) lipid profile and waist circumference for discrimination between overweight and obese groups

DISCUSSION

The rationale for focusing on the prevalence of pre-diabetes and diabetes among overweight and obese males, as opposed to females or the general population, can be substantiated based on gender-specific differences in disease manifestation and risk factors. Overweight and obesity are well-established risk factors for diabetes, but the metabolic responses and associated health outcomes can vary significantly between males and females [4]. Previous studies suggest that males tend to accumulate more visceral fat, which is more strongly associated with insulin resistance and type 2 diabetes, compared to the subcutaneous fat distribution commonly observed in females [5, 6]. This distribution of fat in males may contribute to a higher risk of metabolic disorders, including impaired glucose tolerance and diabetes [7].

In the current study, there was an insignificant difference between the three groups regarding age. This is valuable to exclude the effect of age on studied parameters. A significant difference was indicated between the three groups regarding BMI, weight, and mean waist circumference. Our results agreed with those reported by Komaroff [8].

In the current study mean FBS was 85 ± 8.64, 89.82 ± 13.09, and 96.08 ± 35.51, mean 2hpp was 88.23 ± 20.96, 102.71 ± 31.76 and 111.16 ± 54,74, and mean HbA1C was 5.34 ±0.37, 5.54 ± 0.55 and 5.78 ± 0.96. for the normal, overweight, and obese respectively which were significantly greater in the obese groups than overweight also, they were greater in overweight than normal. These findings agreed with Chaudhari et al. [9] who found that blood sugar levels and HbA1c were significantly higher in obese than non-obese subjects.

Our result showed that mean fasting insulin was 6.91 ± 2.55, 11.6 ± 6.55, and 12.34 ± 6.94, and HOMA IR mean was 1.47 ±0.55, 2.62 ± 0.78 and 3.05 ± 0.29 for the normal, overweight, and obesity groups, respectively, with a statistically significant increase (P<0.001) in group C as compared to group A and B. The current study showed that TG was significantly increased in group C versus other groups A and B. Also, HDL was significantly decreased in groups B and C as compared to group A. Conversely, there was no significant difference between the three groups regarding LDL and TC for the normal, overweight, and obese groups. These results agreed with Zhang et al. [10] who stated that obese participants had a greater TG level and a lower HDL-C level contrasted with non-obese participants.

Our results showed insignificant differences between the three groups regarding serum creatinine and eGFR. As regards the prevalence of pre-diabetes and diabetes among our cases, it was greater in the overweight and obese groups compared to normal and higher in the obese versus the overweight group. These results agreed with Al Mansour and Abdullah [11], who found that the prevalence of type 2 DM was 34.6% in increased body weight subjects. Also, in accordance with Kamseh et al. [12], who investigated that obese and overweight adults were more likely to develop diabetes compared to those with a normal BMI. Moreover, Kamseh found out that age and BMI are incrementally associated with a significant elevation in the diabetes and pre-diabetes risk, while higher physical activity is protective. These modifiable risk factors are the main diabetes prevention programs target.

In the overweight and obese groups, our results showed no significant correlations between FBS and the anthropometric measures (weight, BMI, and waist circumference) these results agreed with Bae et al. [13]. On the other hand, our results disagreed with Khan et al. [14] who found an association between FBS and anthropometric parameters. Alzahrani et al. [15] discovered a notable association between FBS and anthropometric measurements, such as BMI and waist circumference in overweight, that contradicts the results of this study.

In the overweight group, the correlation between 2hPP glucose and the anthropometric measures revealed a positive significant correlation with the waist circumference and no correlation with weight and BMI. While in the obese group, the correlations between 2hPP glucose and the anthropometric measures were insignificant, these results agreed with Boye et al. [16]. On the contrary, our results disagreed with Bala and Aggarwal. [17] who discovered no statistically significant link between 2hPP glucose levels and BMI.

In the overweight group, our results indicated a significant positive correlation between HbA1c and waist circumference. However, there were insignificant correlations between BMI and weight regarding Hb A1c. In the obese group, insignificant correlations were found between HbA1c and the anthropometric measures. These findings agreed with Yu et al. [18], Bala and Aggarwal [17], Khan et al. [14], and Li et al. [19] and disagree with Bae et al. [13] who showed a statistically insignificant association between BMI and HbA1c levels.

The current study revealed that waist circumference showed the best level of accuracy in all subjects with an AUC of 0.869. The cut-off value was set at greater than 90 cm, with a specificity of 79.41% and a sensitivity of 82.95%. The statistical significance was very strong, with a p-value of less than 0.0001. This demonstrates a robust capacity to distinguish between individuals with normal BMI and those with high BMI. Our results align with existing research highlighting the importance of waist circumference as a reliable indicator of central obesity, demonstrating a significant correlation with various metabolic risks. This emphasizes the necessity of considering waist circumference in clinical assessments of obesity-related health issues [20].

The FBS demonstrated moderate validity, with an AUC of 0.637. The cut-off value for FBS was set at greater than 89, with a specificity of 82.86% and a sensitivity of 49.43% (p= 0.0026). The limited differentiation potential of FBS is consistent with research that acknowledges the fluctuation of FBS levels caused by factors such as food intake and stress levels [21].

The 2hPP and HbA1c demonstrated comparable and moderate validity, with AUCs of 0.665 and 0.66, respectively. Both measures exhibited substantial distinction ($p < 0.001$). These results agreed with Boye et al. [16], who similarly observed notable associations between 2-hour postprandial glucose, HbA1c, and BMI.

The fasting insulin and Homa IR measures showed high validity, with AUC values of 0.781 and 0.782, respectively. Both values were statistically significant ($p < 0.0001$). The measures mentioned are widely recognized as metabolic syndrome and insulin resistance markers, conditions commonly found in individuals with a high BMI [22, 23]. In contrast, there was low validity in total cholesterol and LDL levels, with AUCs of 0.573 and 0.566, respectively. This suggests that these measures have limited usefulness in discriminating between individuals with normal and high BMI. This agrees with certain research that proposes lipid profiles alone may not sufficiently indicate metabolic health state. [24].

The accuracy of the examined criteria was also evaluated for distinguishing between overweight and obese groups. The waist circumference once again showed the highest validity, with an AUC of 0.772. The cut-off value for waist circumference was determined to be more than 100 cm, with a specificity of 64.21% and a sensitivity of 79.01% ($p < 0.0001$) and this result agreed with Mendes et al., [25].

The FBS demonstrated poor validity, as indicated by an AUC of 0.524, a cut-off greater than 81, a sensitivity of 81.48%, a specificity of 30.53%, and a p-value of 0.585. The limited validity of FBS in distinguishing between overweight and obese patients is also supported by Abolhasani et al.,[26] .

The 2hPP likewise showed poor validity, with an AUC of 0.54 ($p = 0.3662$). This is consistent with the findings of Bala and Aggarwal [17], who identified comparable difficulties in using 2hPP glucose levels as a standalone marker.

The HbA1c test demonstrated moderate validity, with an AUC of 0.596. The cut-off value for HbA1c was set at >5.7, with a sensitivity of 39.51% and a specificity of 77.89% ($p = 0.0266$). These results agreed with the findings of Yu et al. [18], who also observed strong correlations between HbA1c levels and BMI.

The fasting insulin and HOMA-IR measurements demonstrated moderate validity, with AUC values of 0.615 and 0.607, respectively. Both values were statistically significant ($p = 0.0067$ and $p = 0.0117$). The findings agreed with the research by Erfan et al., which emphasizes the efficacy of these factors in detecting insulin resistance and distinguishing between various levels of obesity [27].

The LDL and total cholesterol had low validity, with AUCs of 0.528 and 0.529, respectively ($p > 0.05$), indicating their limited usefulness in this context. The HDL demonstrated moderate validity, with an AUC of 0.595 ($p = 0.0267$). TG also showed moderate validity, with an AUC of 0.632. The cut-off for TG was set at >131, with a specificity of 69.47%and sensitivity of 55.56% ($p = 0.0017$). The results agreed with the study by Nur Zati Iwani et al., who revealed that levels of TG and HDL can serve as valuable indicators of metabolic syndrome and cardiovascular risk in those who are obese [28].

CONCLUSION

The significant risk factors that are prevalent within the population, particularly among males, have been identified by our research. In our study, the statistically significant predictors of pre-diabetes and diabetes were BMI and waist circumference, HOMA IR, fasting insulin, and HDL. The exceptions were age, height, eGFR, and creatinine, which were not significant. Lastly, the Egyptian populace requires strategies and guidelines to prevent them from being exposed to the risks associated with this disease.

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الملخص العربي

مقدمات ما قبل داء السكري ومرض السكري لدى الرجال المصريين الذين يعانون من زيادة الوزن والسمنة

شريف صبري ايوب[1]، فاطمه كامل حماد[2]، مروه فكري السيد[2]، دعاء على عبدالفتاح[3]

[1] طبيب حر غدد صماء وايض، القاهرة، جمهورية مصر العربية.

[2] قسم الغدد الصماء والايض، كلية طب بنات، القاهرة ، جامعة الأزهر، جمهورية مصر العربية.

[3] قسم الباثولوجيا الأكلينيكية، كلية طب بنات، القاهرة ، جامعة الأزهر، جمهورية مصر العربية.

ملخص البحث:

الخلفية : يعد مرض السكري مشكلة صحية عامة مهمة تتميز بتدهور استقلاب الكربوهيدرات والدهون والبروتين نتيجة لمقاومة الأنسولين أو عدم كفاية إفراز الأنسولين أو كليهما.

الهدف: تقدير مدى انتشار مرض ما قبل السكري والنوع الثاني من داء السكري لدى الذكور البالغين ذوي الوزن الزائد والبدانة وكذلك العلاقة بين معايير السكر في الدم ومؤشرات السمنة بينهم.

طرق البحث : تم إجراء دراسة مقارنة مقطعية على 211 من الذكور البالغين الأصحاء ظاهرياً الذين يترددون على عيادة الرعاية الأولية لمصانع المشروبات والوجبات الخفيفة في مصر، تتراوح أعمارهم بين 30-60 عامًا، مع عدم وجود تاريخ مرضى للإصابة بالسكري خلال الأشهر الستة الأخيرة التي تنتهي في سبتمبر 2023.وقد تم تصنيف المرضى إلى ثلاث مجموعات وفقًا لمؤشر كتلة الجسم: المجموعة أ و تشمل 35 شخصا ذو وزن طبيعى (مؤشر كتلة الجسم < 25 كجم / م^2) . المجموعة ب و تشمل 95 شخصا ذو وزن زائد (مؤشر كتلة الجسم بين 25-29.9 كجم / م^2) 95 حالة)، المجموعة ج و تشمل 81 شخصا بدينا (مؤشر كتلة الجسم ≤ 30 كجم / م ^{2}).

النتائج: أظهرت النتائج أن ستة (17٪) من المرضى في المجموعة أ مصابين بما قبل السكري، بينما كان 29 (30.5٪) و 36 (44٪) من المجموعتين ب وج مصابين بما قبل السكري، على التوالي. كما أنه لم يكن هناك مصابون بالسكري في المجموعة أ بينما كان 4 (4.2٪) و 5 (6.17٪) من المجموعتين ب وج مصابين بالسكري على التوالي. كما لوحظ حدوث ارتفاع وانتشار السكري لدي المرضي ذوي الوزن الزائد والبدانه . كشف التحليل متعدد المتغيرات أن محيط الخصر لديه أعلى صلاحية مع مساحة تحت المنحنى AUCبقيمة 0.869، مما يشير إلى قدرة قوية على التمييز بين مؤشر كتلة الجسم الطبيعي والمرتفع، مع قيمة قصوى تزيد عن 90 سم، وحساسية تبلغ 82.95٪، ونوعية 79.41٪ .(p < 0.0001).

الأستنتاجات :أنه قد تم تحديد عوامل الخطر الهامة لما قبل السكري والسكري السائدة بين السكان، وخاصة بين الذكور، حيث يعد مؤشر كتلة الجسم ومحيط الخصر، ومؤشر مقاومة الأنسولين، والأنسولين الصائم، و HDL مؤشرات ذات دلالة إحصائية لما قبل السكري والسكري.

الكلمات المفتاحيه: الرجال المصريين، داء السكرى، السمنة، زيادة الوزن، ماقبل مرض السكرى.

الباحث الرئيسي:
الاسم: شريف صبري ايوب، طبيب حر غدد صماء وايض، القاهرة، جمهورية مصر العربية.
الهاتف: 01006438647
البريد الالكتروني:sherifmedical2017@gmail.com