Diabetes Risk Assessment among Adult Men in Baghdad City Using Finnish Diabetes Risk Score (FINDRISC)

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Abstract

Background: *Different risk models also known as risk scores have been developed to detect type 2 diabetic cases. Identifying individuals with undiagnosed T2DM can be an important approach in preventing or delaying complications. In this research we are using the Finnish Diabetes Risk Score (FINDRISC) questionnaire which is a screening tool to estimate risk of type 2 diabetes to assess the risk and for giving health education and preventive measures for those with highest risk score.*

Method: *A descriptive cross-sectional study was carried out, Study subjects enrolled 456 male participants from outpatient clinic of Al-Yarmouk teaching hospital in Baghdad in period of 2 months. Adult men aged from 18 years and above were recruited using a Finnish Diabetic Risk Score as questionnaire form.*

Results: *The results estimates 32% have a low risk to develop the disease, 34% have a slightly elevated risk, 18% have a moderate risk, 14% have a high risk and 2% have a very high risk. 55% were below 45 years, 42% were overweight, 60% of them were active and daily fruit and vegetables consumers, 34% have first degree diabetic relative.*

Conclusion: *Very small percentage (2%) have a very high risk while 14% have a high risk to develop DM, Almost two thirds do daily physical exercise and eat fruit and vegetables every day. One third of them had weight circumference below 94 cm, about 80% have no history of hypertension.*

Keywords: *FINDRISC, Diabetes, men.*

1. INTRODUCTION

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia (high blood sugar) resulting from defects in the secretion of insulin, its action, or both. Many pathogenic processes are involved in the development of diabetes. These range from autoimmune destruction of the β-cells of the pancreas with consequent insulin deficiency to abnormalities that lead to resistance to the action of insulin. [1]

There are two main types of diabetes, insulin-dependent diabetes mellitus (type 1 diabetes mellitus, T1DM) and non-insulin-dependent diabetes mellitus (type 2 diabetes mellitus, T2DM). T2DM is the most common form of diabetes mellitus (DM); it is about 90% to 95% of all diabetic patients and is expected to increase to 439 million by 2030. [2]

Type-2 diabetes is a major, non-communicable disease with increasing global prevalence. Type-2 diabetes results when the body does not make enough insulin or the body cannot use the insulin it produces. [3]

Individuals with type 2 DM are at a significantly higher risk for coronary heart disease, peripheral vascular disease and stroke, as well as microvascular complications that affect various organs including the eyes, kidneys and nerves. [4]

Iraq is considered as a developing country. Studies mainly concentrating on anthropometric association with diabetes. Cut-off values of body mass index (BMI) for association with type 2 diabetes mellitus and hypertension were 25.4 kg/m^2 and 24.9 kg/m^2, respectively, in men which is consistent with the current

definitions of overweight (BMI $\geq$25 kg/m^2) recommended by World Health Organization (WHO). [5]

The increased prevalence of type II diabetes can be attributed to many factors such as ageing population and rising incidence of obesity, besides other factors. The Middle East is predicted to have the greatest rate of rise, and as a country of the Middle-East, Iraq is affected by this epidemic. [6]

Certain lifestyle factors are known to be important to the development of type 2 DM. These are physical inactivity, sedentary lifestyle, obesity, cigarette smoking and alcoholism. Sedentary life style is one of the most important risk factors for type 2 DM, sitting for long periods of time (excluding sleeping) is known as a sedentary lifestyle and is associated with an increased risk of Type 2 diabetes. [7]

Researchers have shown a strong link between having a large waist circumference and an increased risk of developing T2 DM. A large study found that overweight people with a large waist (defined in this study as over 40 inches/102cm for men and over 34.5 inches/88cm for women) had a similar risk of developing diabetes to those who are clinically obese, this relationship was particularly strong in women. [8]

Although diet and nutrition are widely believed to play an important part in the development of Type 2 diabetes mellitus. Dietary recommendations to prevent Type II diabetes should focus more on the quality of fat and carbohydrate in the diet than quantity alone, in addition to balancing total energy consumption with expenditure to avoid overweight and obesity. [9]

Hypertension is common among diabetic patients, with the prevalence depending on type and duration of diabetes, age, sex, race, BMI, and other factors. Furthermore, hypertension is considered as a strong risk factor for atherosclerotic cardiovascular disease (ASCVD), ASCVD is the leading cause of morbidity and mortality for diabetic patients. According to studies, antihypertensive therapy reduces ASCVD events in people with diabetes. [10]

A family history of diabetes is a strong risk factor for the development of type 2 diabetes. This factor is likely to be mediated, in part, by both genetic and shared environmental components amongst family members, but the exact factors concerning this increase in risk are not well understood. [11]

Identifying individuals with undiagnosed T2DM can be an important approach in preventing or delaying T2DM complications. Different risk models, also known as risk scores, have been developed to detect T2DM cases. Some of them are useful to detect undiagnosed (prevalent) T2DM cases, whereas other ones predict the development of new (incident) T2DM cases.

In this research we are using The Finnish Diabetes Risk Score (FINDRISC) questionnaire which is a screening tool to estimate risk of type 2 diabetes. It takes into account the usual clinical characteristics, such as age, body mass index (BMI), waist circumference (WC), physical activity, and dietary consumption of fruits, vegetables, and berries, use of antihypertensive medication, history of high blood glucose, and family history of diabetes. FINDRISC can be a suitable tool to predict metabolic syndrome in a high-risk population and to identify undetected metabolic syndrome in clinical practice. [12]

Aims:

- To assess the risk for type 2 Diabetes mellitus by using Finnish Diabetes Risk Score (FINDRISC) questionnaire.

- To give health education to each participant about risk for future diabetes measures of prevention.

2. SUBJECTS AND METHOD

2.1. Study Design

The study was designed as a descriptive cross sectional study.

2.2. Study Subjects and Data Collection

Study subjects enrolled a convenient sample from outpatient clinic of Al-Yarmouk teaching hospital in Baghdad in period from February 2019 to March 2019. Adult men aged from 18 years and above were recruited.

The questionnaire used is, titled as "Type 2 Diabetes Risk Assessment Form". The Finnish Diabetes Risk Score (FINDRISC) was designed by Finnish diabetes association, which is one of the most frequently used instruments for assessing the risk of DM. After taking permission from each individual and explaining to them the purpose of study.

Each participant should have the following measures:

- Measure the weight in Kg and the height in cm

Weight was measured by a scale after shoes and heavy clothes were taken off. Height was measured by tape measure in centimeters with patients standing up against wall after footwear taken off.

Then we calculated the BMI by apply the formula of BMI=weight in kg/ (height in meter²)

- Measure the waist circumference in cm

Waist circumference was measured by tape measure by wrapping it in midway between highest point of iliac crest and the bottom of ribcage after removing clothes from this line.

Total Risk score of each participant was classified according to (FINDRISC) questionnaire

- Score Lower than 7: estimated 1 in 100 will develop disease (1%)

- 7-11 slightly elevated: estimated 1 in 25 will develop disease (4%)

- 12-14 Moderate: estimated 1 in 6 will develop disease (17%)

- 15-20 High: estimated 1 in 3 will develop disease (33%)

- Higher than 20 very high: estimated 1 in 2 will develop disease (50%)

Each study participant was made aware of his FINDRISC score, those having scores ≥12 were given health education about risk, and preventive measures for diabetes and participants were advised to carryout blood sugar tests wherever necessary.

The data entry was done using Excel; percentages were calculated and designed as suitable graph and table.

3. RESULTS

Total number is 456 participants

Table1. *Risk classification distribution according to variables*

| Variable	group	Low risk No (%)	Slight risk No (%)	Moderate risk No (%)	High risk No (%)	Very high risk No (%)	Total
Age	<45	123(84%)	80(51.6%)	27(33.75%)	15(23%)	0(0%)	245(55%)
	45-54	14(9.6%)	3220.6%)	21(26.2%)	16(24.6%)	3(27%)	86(19%)
	55-65	7(4.8%)	29(18.7%)	22(27.5%)	21(32.3%)	3(27%)	82(18%)
	>65	1(0.68%)	14(9%)	10(12.5%)	13(20%)	5(45%)	43(9%)
BMI	<25kg/m²	94(64.8%)	38(24.5%)	4(5%)	4(6%)	0(0%)	140(31%)
	25-30 kg/m²	49(33.79%)	87(56.1%)	33(41.2%)	18(27.6%)	5(45%)	192(42%)
	>30 kg/m²	2(1.37%)	30(19.35%)	43(53.75%)	43(66%)	6(54%)	124(27%)
WC	<94 cm	120(82.75%)	39(25.1%)	3(3.75%)	4(6.1%)	0(0%)	166(36.4%)
	94-102cm	19(13.1%)	75(48.38%)	24(30%)	13(20%)	2(18%)	133(29.2%)
	>102cm	6(4.1%)	41(26.45%)	53(66.25%)	48(73.8%)	9(81%)	157(34.4%)
Physical activity	Active	110(75.8%)	90(58%)	43(53.75%)	29(44.6%)	4(36.36%)	276(60.5%)
	Inactive	35(24.13%)	65(42%)	37(46.25%)	36(55.4%)	7(63.63%)	180(39.6%)
Healthy Diet	Yes	86(59.31%)	100(64.5%)	50(62.5%)	33(50.67%)	6(54.54%)	275(60%)
	No	59(40.68%)	55(35.4%)	30(37.5%)	32(49.23%)	5(45.45%)	181(40%)
Antihyper-tensive drugs	Yes	5(3.44%)	2414.4%)	18(22.5%)	35(53.84%)	7(63.63%)	89(20%)
	No	140(96.55%)	131(84.51%)	62(77.5%)	30(46.15%)	4(36.36%)	367(80%)
High Blood sugar test	Yes	0(0%)	13(8.38%)	9(11.2%)	24(37%)	11(100%)	57(12.5%)
	No	145(100%)	142(91.16%)	71(88.8%)	41(63%)	0(0%)	399(87.5%)
DM family history	No	74(51%)	61(39%)	20(25%)	3(4.6%)	0(0%)	166(36.4%)
	1st degree	45(31%)	40(26%)	19(24%)	19(29.6%)	2(18%)	133(29.2%)
	2nd degree	26(18%)	54(35%)	41(51%)	43(66%)	9(81%)	157(34.4%)
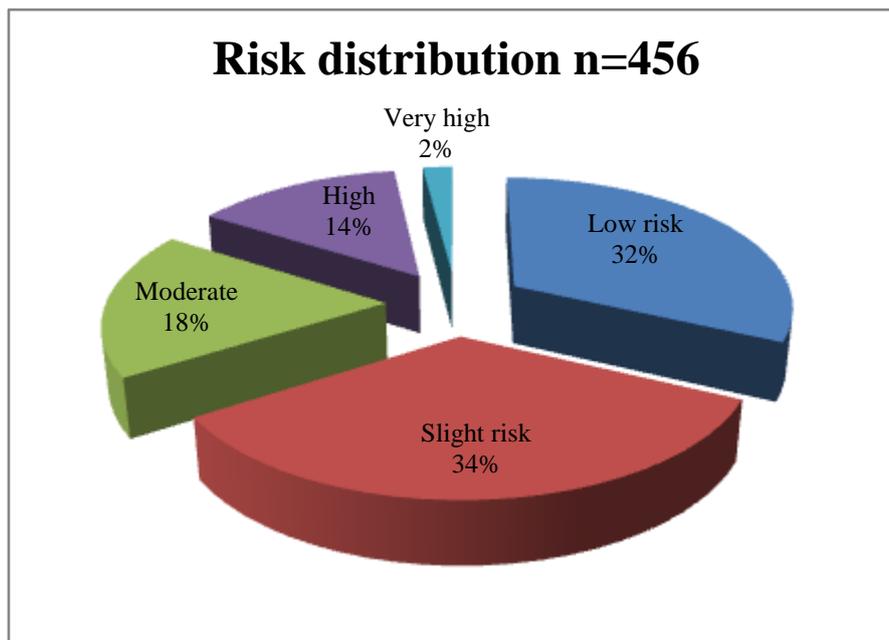
Figure1. *Pie chart: Risk classification distribution*

4. DISCUSSION

By using Finnish diabetic risk score for estimating the probability of a person to develop diabetes within the next years among adult males who lives in Baghdad. FINDRISC has been widely adopted as a low-cost screening tool in many European countries, USA, India, Oman, Jordan and KSA to enable early identification of individual risk of type 2 diabetes. [13]

Our sample is of 456 adult males who live in Baghdad with undiagnosed DM. the results estimates 32% have a low risk to develop the disease, 34% have a slightly elevated risk, 18% have a moderate risk, 14% have a high risk and 2% have a very high risk to develop DM (Pie graph).

Almost half of the adults (55%) in our sample were below the age of 45 years. most of the cases (84%) who are at low risk are under the age of 45 years, while only 1% are above the age of 64 and (45%) who are at a very high risk are above the age of 64 years of age (Shown in the table).

Recently, the BMI had been linked to the nutritional status and ethnic group, so they now consider the normal BMI for Asian population is between (18.5-22.9) kg\m^2, overweight is between (23-24.9) kg\m^2, while obesity is more than 25 kg\m$^{2.}$. [14]

As table the shows, the majority of the low risk cases (64.8%) have a BMI below the 25 Kg\m^2, most of the cases (66%) who are at high risk are obese, while the cases who are at very high risk 45% of them are overweight and 54% are obese. 42% of all cases are overweight and 27% of all cases are obese while male obesity prevalence among Iraqi adult according to WHO IN 2016 is 30.4% and estimates that Iraq is the 8th Arabic country highest in obesity(Shown in the table). [15]

The low risk case has 75.8% a physical activity for 30 min per day while 24.1% have a less physical activity. While 63.6 % of the very high risk cases have no daily physical activity.

60.5% of all the cases have a daily physical activity and 39.6% have no daily physical activity (Shown in the table) While a research in Oman estimates that 44.1 % of Omani adults have a daily physical activity and 55.9% have no daily physical activity. [15]

While a research in Oman in 2013 where the majority of the adults 90.3% were below 45 years, and the majority of them 87.1% were men estimates that 26.9% of them are overweight and 18.3% are obese .[16]

The majority (82.7%) of the low risk cases have a waist circumference lower than 94 while only 4.1% have a waist circumference more than 102. Most of Moderate risk cases (66.25%) have a

waist circumference above 102 cm. And most of the high risk cases (73.8%) are also above 102 cm, and cases that are of very high risk (81%) of them also above 102 cm, 34.4% of all cases have a high WC (Shown in the table). This indicates that abdominal obesity is a problem that is common and prevalent among over weight and obese males. While a research in Oman estimates that 45.4 % of Omani adults have a high WC. [16]

Around (81%) of very high risk cases and (66%) of high risk cases have a first degree relatives with DM, while only 18% of the low risk cases had a first degree relatives with DM , family history is one of the most important non modifiable risk factors for developing DM .

In general 63.6% of all cases had a family history of DM, of these 34% Had a first degree relatives with DM (Shown in the table) While a study in Oman estimates that 31.2% of Omani adult population had a family history of DM, of these 11.8 % had a first degree relatives with DM. [16]

About 40.6% of the low risk cases does not eat vegetables every day and Almost half of the cases that are at high risk (49.2%) and very high risk (45.4%) does not eat vegetables every. 40% of all cases does not eat vegetables every day (table 2) while a research in Jordan in 2017 among young student population ((with significant change in age (18-25), BMI (ONLY 31.3% are overweight and obese) ,WC (only 6.1% have a WC over than 102), 42.6% of them have no daily physical activity, only 1.7% are taking antihypertensive medication, and 50.1% have a second degree relatives with DM and 24.8% have a first degree relatives with DM)), estimates that 43.5% of young males does not eat vegetables every day. [17]

This indicates that Increase in WC and high BMI among Iraqi adult males were related to poor lifestyle, physical activity (poor insulin sensitivity, hyperinsulinaemia, dyslipidemia) and low consumption of vegetables and fruits among Iraqi adult males.

None of the low risk cases had a high blood glucose before while all of the very high risk case had a high blood glucose at a time, 63% of the high risk cases had a history of elevated blood sugar in their lives, 12.5% of all cases had

a history of an elevated blood sugar (Shown in the table), while a research in Jordan among young population estimate 4.1% of young males had an elevated blood sugar in their lives [4] while in Oman 26.9% of Omani adults have a history of an elevated blood sugar [17]

As the table shows, More than the half of cases that are at high risk (53.8%) and very high risk (63.6%) are taking medication for hypertension while only 3.4% of the low risk cases are taking medication for HT, 20% of all our cases are taking medication for HT while a research in India in 2017 estimates that 54.89% of the moderate risk cases, 85.21% of the high risk cases and 93.61% of the very high risk cases are taking medication for hypertension, as a total 23.33% of them are taking medication for HT (with significant change in gender (54% were females), age (48.84% of the low risk cases were between 55_64 years and only 23.9% are under 45 years while 20.3% of the very high risk cases are above 64 years), BMI (20.6% are overweight and 4.7% are obese) physical activity (only 3.5 % have less daily physical activity), and only 10% of them have a first degree family history of DM, only 12.6% have a WC more than 102). [18]

5. CONCLUSION

- Results estimates 32% have a low risk to develop the disease while 2% have a very high.

- Almost two thirds of adults included in our study do daily physical exercise best for 30 min and eat fruit and vegetables every day.

- One third of them had WC below 94 cm, and a first degree relative who have DM in

- The majority (about 80%) have no history of hypertension.

RECOMMENDATION

- The FINDRISC questionnaire is a simple, reliable, noninvasive and valuable screening tool to identify individuals who are at risk of developing type 2 DM and individuals with asymptomatic undiagnosed DM.

- Obesity, high waist circumference, dietary pattern and physical activity are factors that play a substantial role in the development of T2DM.

- Alteration of these risk factors will significantly reduce the risk assessment score.

- People with high risk should be encouraged to modify their life style through maintaining ideal body weight and consuming healthy food.

- They also should be encouraged to do physical activity.

- People at high age group or have hypertension or a family history of DM should be educated to attend PHC centers, hospitals and clinics to do periodic checks for blood sugar and blood pressures.

- Public education by the health care providers for early detection and prevention of complication of diabetes is a priority.

- The ministry of health is also urged to launch an early detection program for DM by using the social media to reach most people.

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