# Early detection of first degree relatives to type-II diabetes mellitus

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## المستخلص:

**الهدف:** تهدف الدراسة إلى الكشف المبكر لأقرباء المريض بداء السكري- النوع الثاني من الدرجة الأولى من خلال الفحص المختبري $Hb_{A1c}$ وOGTT. إيجاد العلاقة بين الكشفِ المبكّرِ لداء السكّري- النوع الثّاني والصفات الديموغرافية.

**المنهجية:** أجريت دراسة وصفية للكشف المبكر للشخص ذي العلاقة من الدرجة الأولى مع المريض المشخص بداء السكري- النوع الثاني، حيث تمّ جمع البيانات للمدة من الأول من شهر آب ٢٠٠٨ إلى نهاية شهر شباط ٢٠٠٩، من الأشخاص ذوي العلاقة من الدرجة الأولى مع المريض المصاب بداء السكري- النوع الثاني في كل من المركز الوطني للسكري/الجامعة المستنصرية، والمركز التخصصي لأمراض الغدد الصم والسكري/الكندي. شملت عيّنة البحث ٢٠٠ شخص، اختيرت بطريقة غرضية "غير إحتمالية" وحسب مواصفات العينة من عمر (٤٠– ٧٠) سنة.

**النتائج:** أظهرت الدراسة أنّ معدل العمر (٥٥,٧) سنة، وأنّ أغلب العيّنة من الرجال/من الدرجة الأولى للمرضى المصابين بداء السكري-النوع الثاني، من السكان الحضر، يتمتعون بتأريخ أسَريّ جيد، يمتلكون صفة البدانة، ذوي دخل إقتصادي متوسط، افتقار الثقافة الصحية والتغذوية. أثبتت نتائج الدراسة، وجود علاقة جيدة من الناحية التشخيصية المختبرية والناحية الجسمية والإجتماعية والإصابة بداء السكري- النوع الثاني.

**التوصيات:** أوصت الدراسة بضرورة إنشاء مراكز تخصصية للكشف المبكر لداء السكري في المحافظات، توفير المواد المختبرية الأساسية الخاصة بالكشف المبكر لتفادي تطور الحالة وتجنباً للمضاعفات، الفحص الدوري المستمر وفق برنامج يخصص لغرض تفادي الإصابة أو الحدّ من تفاقم المرض، كتيب يحمل في طياته العوامل المساعدة التي تسبب داء السكري، توعية المرضى الذين لديهم استعداد أسَريّ إيجابيّ لداء السكري تخص الأغذية وممارسة التمارين الرياضية، متابعة منتظمة تتضمن (فحوصات مختبريه خاصة بداء السكري وعامة ذات العلاقة بالتحري المسبق عن داء السكري)، برنامج وقائي للحدّ من الإصابة بالمرض والآثار الجانبية الناجمة عنه.

## Abstract:

**Objective(s):** The study aims to assess the early detection of early detection of first degree relatives to type-II diabetes mellitus throughout the diagnostic tests of Glycated Hemoglobin $A_{1c}$. ($HgbA_{1c}$), Oral Glucose Tolerance Test (OGTT) and to find out the relationship between demographic data and early detection of first degree relatives to type-II diabetes mellitus.

**Methodology:** A purposive "non-probability" sample of (200) subjects first degree relatives to type-II diabetes mellitus was selected from National Center for Diabetes Mellitus/Al-Mustansria University and Specialist Center for Diabetes Mellitus and Endocrine Diseases/Al-kindy. These related persons have presented the age of (40-70) years old. A questionnaire was constructed for the purpose of the study, it is composed of (3) major parts, and overall items, which are included in the questionnaire are (76) items. Reliability and validity of the questionnaire were determined through a pilot study which is carried out during the period of August, 1st, 2008 to February, 30th 2009. The study instrument and structured interview technique were used as means of data collection. The data were analyzed through the application of the descriptive statistical data analysis approach (Frequency and Percentage) and the inferential statistical data analysis approach Chi-square, Pearson correlation coefficient.

**Results:** The results of the study confirmed that the mean of age is (55.7) year, and the majority of the sample are male, first degree relatives with diabetes mellitus type-II are within positive bio-social aspect and laboratory screening had an effect on the incidence of diabetes mellitus type-II for first degree relatives to type-II diabetes mellitus.

**Recommendations:** The study recommends that the number of diabetes centers should be increased in Baghdad and Governorates, promote of HbA1c test from general hospitals laboratories, guide notebook about the predisposing factors of diabetes mellitus in his family, periodic screening for pre-diabetes and diabetes in high risk, asymptomatic, undiagnosed adults within the health care setting, prevention program to prevent and control on the predisposing risk factors for nondependent diabetes mellitus type-II and complication

**Keywords: Early detection, diabetes mellitus type-II**

## Introduction:

Insulin resistance is a major risk factor for the development of non-insulin dependent diabetes [1].

It is an important public health problem worldwide, more than 150 million adults worldwide, and this number is expected to double in the next 25 years. At present, approximately 15 to 17 million adults in the United States have diabetes, with 5 to 6 million unaware of their disease [2].

The American Medical Association (AMA) and the American Diabetes Association (ADA) estimate that in 1996, approximately 15 million people suffered from Type II diabetes in the United States, of whom approximately 7.5 million have been diagnosed with the disease. Another 21 million Americans are estimated to have impaired glucose tolerance, which is often a precursor to diabetes [3].

The first stage in type II diabetes is the condition called insulin resistance; although insulin can attach normally to receptors on liver and muscle cells, certain mechanisms prevent insulin from moving glucose into these cells where it can be used. Most type II diabetics produce variable, even normal or high, amounts of insulin, and in the beginning this amount is usually sufficient to overcome such resistance [4].

Diabetes mellitus is a chronic, hereditary disease of absolute or relative insulin deficiency or resistance. It is characterized by disturbances in carbohydrate, protein, and fat metabolism [5].

Most people with pre-diabetes go on to develop type II diabetes within 10 years, unless they intend to lose 5 to 7 percent of their body weight which is about 10 to 15 pounds for someone who weighs 200 pounds by making modest changes in their diet and level of physical activity [6].

We believe that screening for and detection of undiagnosed Type II diabetes is an important endeavor. In this review we provide evidence that diabetes is a condition that is appropriate for population screening and detection. These issues high light the need for a study to detect and investigate a relationship between sociodemographic, symptomatology, and laboratory screening [7].

The nurse who is in a more direct contact with patient and being part in the health items of patient care and her major role in helping the patient learn to care for her/himself effectively [8].

Finds herself in an excellent position to survey, assess, and detect early signs and symptoms of expected complication of diabetes mellitus.

## Methodology:

A descriptive study was conducted in order to assess the early detection of first degree relatives to type II diabetes mellitus. Through the application of an assessment approach for the period from August, 1st, 2008 to the February 30th, 2009.

Non-probability sampling was performed. A purposive sample of (200) subjects relative diabetes mellitus type II, from National Center for Diabetes Mellitus/Al-Mustansria University, and Specialist Center for Diabetes Mellitus and Endocrine Diseases/Al-kindy. These relative persons represent those who are between the ages of (40-70) years old. A questionnaire was constructed for the purpose of the study. It was composed of (3) major parts, and overall items, which were included in the questionnaire, were (76) items. Part I includes the demographic data of age, gender, marital status, education, occupation, residential area, socio-economic status (SES) was calculated as (S.E. Scale). High score was defined as SES = 121-150. Middle score = 90-120. Low score = 89 & less body mass index (BMI) was calculated as (BMI = weight kg/height square meter). Obesity was defined as BMI of 30 or greater. Overweight was BMI of 25 or greater, while the normal body weight was defined as BMI of 18.5 or greater, smoking cigarettes, drinking alcohol, exercise, maternity and obstructive characteristic, genetic factor, and family history. Part II the physical problems which were related to signs and symptoms. Part III dietary patterns and laboratory investigation which is related to screening for early detection of first degree relatives to type-II diabetes mellitus.

Reliability was determined through a pilot study which was carried out during the period of August 1st 2008 through February 30th 2009. The questionnaire and structured interview technique were used as mean of data collection.

The data were analyzed through the application of the descriptive statistical data analysis approach (Frequency and Percentage) and the inferential statistical data analysis approach Chi-square, Pearson correlation coefficient.

## Results:

**Table 1.** Distribution of demographic characteristics, and association between demographic data, and early detection of first degree relatives to type-II diabetes mellitus

| List | Age | Frequency | Percent |
|---|---|---|---|
| 1. | 40-49 | 79 | 39.5 |
| 2. | 50-59 | 56 | 38.0 |
| 3. | 60-69 | 38 | 19.0 |
| 4. | 70 > | 27 | 13.5 |
| | Total | 200 | 100.0 |
| $\chi^2$ obs. = 31.000 | df = 3 | $\chi^2$ crit. = 7.814 | P < 0.050 |
| List | Gender | F | % |
| 1. | Male | 116 | 58.0 |
| 2. | Female | 84 | 42.0 |
| | Total | 200 | 100.0 |
| $\chi^2$ obs. = 5.120 | df = 1 | $\chi^2$ crit. = 3.841 | P < 0.050 |
| List | Marital status | Frequency | Percent |
| 1. | Married | 185 | 92.5 |
| 2. | Single | 5 | 2.5 |
| 3. | Widowed | 5 | 2.5 |
| 4. | Divorced | 3 | 1.5 |
| 5. | Separated | 2 | 1.0 |
| | Total | 200 | 100.0 |
| $\chi^2$ obs. = 657.200 | df = 4 | $\chi^2$ crit. = 9.487 | P< 0.050 |
| List | Residential area | Frequency | Percent |
| 1. | Rural | 23 | 11.5 |
| 2. | Urban | 177 | 88.5 |
| | Total | 200 | 100.0 |
| $\chi^2$ obs. = 118.580 | df = 1 | $\chi^2$ crit. = 3.841 | P< 0.050 |
| List | Socio-economic status | Frequency | Percent |
| 1. | High score (150 – 121) | 59 | 29.5 |
| 2. | Middle score. (120 – 90) | 84 | 42.0 |
| 3. | Low score (89 and less) | 57 | 28.5 |
| | Total | 200 | 100.0 |
| $\chi^2$ obs. = 10.390 | df = 2 | $\chi^2$ crit. = 5.991 | P< 0.050 |

df= Degree of freedom; P-value= Level of Probability; χ2 crit. = Chi-square critical; χ2 obs. = Chi-square Observed

* The mean of age is (55.65).

This table indicates that the majority of the groups is (40-49) years old who are (39.5%) of the groups. Most of them is male (58%), married which (92.5%), frumentaceous (57.0%) they were living at urban areas who were (88.5%), the majority of the groups were middle score by the socio-economic status (42.0%). The table also shows the association between demographic data and early detection of early detection of first degree relatives to type II diabetes mellitus.

**Table 2.** Distribution of the cases by their BMI, exercise, genetic factor, relative with diabetes mellitus type-II, first degree, association between body mass index, exercise, genetic factor, and early detection of first degree relatives to type II diabetes mellitus

| List | Body mass index | Frequency | Percent |
|---|---|---|---|
| **1.** | Under weight (0-18.5) | 12 | 6.0 |
| **2.** | Normal weight (18.6-24.9) | 31 | 15.5 |
| **3.** | Over weight (25-29.9) | 83 | 41.5 |
| **4.** | Obese (30-40) | 61 | 30.5 |
| **5.** | Morbidity obese (40.1-70) | 13 | 6.5 |
| | Total | 200 | 100.0 |
| $\chi^2$ obs. = 97.100 | df = 4 | $\chi^2$ crit. = 9.487 | P < 0.050 |
| **List** | **Exercise** | **Frequency** | **Percent** |
| **1.** | Yes | 50 | 25.0 |
| **2.** | No | 150 | 75.0 |
| | Total | 200.0 | 100.0 |
| $\chi^2$ obs. = 50.000 | df = 1 | $\chi^2$ crit. = 3.841 | P < 0.050 |
| **List** | **Genetic factors** | **Frequency** | **Percent** |
| **1.** | Yes | 134 | 67.0 |
| **2.** | No | 66 | 33.0 |
| | Total | 200.0 | 100.0 |
| **$\chi^2$ obs. = 23.120** | **df = 1** | **$\chi^2$ crit. = 3.841** | **P < 0.050** |
| **List** | **Relative with diabetes mellitus type-II** | **Frequency** | **Percent** |
| **1.** | Father | 98 | 56.6 |
| **2.** | Mother | 22 | 12.7 |
| **3.** | Both parents | 31 | 17.9 |
| **4.** | Brother or sister | 18 | 10.4 |
| **5.** | Twin brother or sister | 4 | 2.3 |
| | Total | 173 | 100.0 |
| $\chi^2$ obs. = 156.162 | df = 4 | $\chi^2$ crit. = 9.487 | P < 0.050 |

**df= Degree of freedom; P-value= Level of Probability; χ2 crit. = Chi-square critical; χ2 obs. = Chi-square Observed**

This table shows that the item related with body mass index indicates that the majority of the groups were (25-29.9 k/$m^2$) over weight with frequency (41.5%), magority of the study sample did not do exercise accounted (75.0%). The table also shows the item related to genetic factor for diabetes mellitus type II (67.0%). Most of the groups were relative with diabetes (first degree was father) (56.6%). The table also shows the association between between body mass index, exercise, genetic factor, and early detection of first degree relatives to type-II diabetes mellitus.

**Table 3.** Mean of scores for items for the systems related with early detection of first degree relatives to type II diabetes mellitus

| List | Items | 3 | 2 | 1 | M.S | Sig. |
|---|---|---|---|---|---|---|
| | I suffer from problem of | Always | Sometimes | Never | | |
| 1. | digestive system | 1174 | 109 | 517 | 2.36 | S. |
| 2. | cardiovascular system | 543 | 35 | 422 | 2.10 | S. |
| 3. | urinary system | 531 | 38 | 231 | 2.37 | S. |
| 4. | ophthalmic system | 386 | 22 | 192 | 2.32 | S. |
| 5. | neurological system | 1009 | 105 | 286 | 2.51 | H.S. |
| 6. | genetically system | 422 | 38 | 119 | 2.4 | S. |
| 7. | dietary pattern | 1103 | 87 | 210 | 2.63 | H.S. |
| Total | | 5168 | 434 | 1977 | 1.66 | S. |

**HS= Highly significant; M.S= Mean of scores; S= Significant; Sig= Significance**

The table indicated that the mean of scores is highly significant on items (5, 7), and the remaining was significant on items (1, 2, 3, 4, and 6).

**Table 4**. The laboratory investigation of glycated hemoglobin $A_{1c}$ ($HbA_{1c}$) used primarily to identify the average plasma glucose concentration over prolonged periods of time for relative persons first degree with diagnosed patients.

| List | $HbA_{1c}$ (%) | Frequency | Percent |
|---|---|---|---|
| 1. | 5.1-5.5 | 13 | 6.5 |
| 2. | 5.6-6 | 38 | 19.0 |
| 3. | 6.1-6.5 | 93 | 46.5 |
| 4. | 6.6-7 | 56 | 28.0 |
| Total | | 100.0 | 100.0 |
| $\chi^2$ obs. = 67.960 | df = 3 | $\chi^2$ crit. = 7.814 | P < 0.050 |

**df= Degree of freedom; P-value= Level of Probability; χ2 crit. = Chi-square critical; χ2 obs. = Chi-square Observed**

**The mean of $HbA_{1c}$ (%) = 6.28; Standard deviation = 0.855**

This table indicates that the higher levels of Hb A1c are found in people with persistently elevated blood sugar, as in range (6.1-6.5%) accounted (46.5%), while a slighter range (5.1-5.5%) of Hb $A_{1c}$ values accounted (6.5%).

The laboratory investigation of glycated hemoglobin $A_{1c}$ ($HbA_{1c}$) used primarily to identify the average plasma glucose concentration over prolonged periods of time. It is formed in a non-enzymatic pathway by hemoglobin's normal exposure to high plasma levels of glucose and the association between $HbA_{1c}$ test and early detection of diabetes mellitus type II, and also shows that there is significant association between $HbA_{1c}$ test and early detection of first degree relatives to type II diabetes mellitus.

All the test stages depended on the venous plasma values according to the criteria of the World Health Organization (WHO) and the American Diabetes Association (ADA).

**Table 5**. Oral Glucose Tolerance Test (OGTT), include impaired fasting glucose (IFG) and the impaired glucose tolerance test (IGT), and association between glycated hemoglobin A1c, impaired fasting glucose test, postprandial test **[**impaired glucose tolerance test] and early detection of first degree relatives to type II diabetes mellitus

| Oral Glucose Tolerance Test (OGTT) | | | | | | |
|---|---|---|---|---|---|---|
| Impaired fasting glucose test (IFG) | | | | Impaired glucose Tolerance Test (IGT) | | |
| **List** | **Preprandial test** | **Frequency** | **Percent** | **Postprandial test** | **Frequency** | **Percent** |
| **1.** | 4.5-5 | 9 | 4.5 | 7.8-8.3 | 11 | 5.5 |
| **2.** | 5.1-5.5 | 29 | 14.5 | 8.4-8.9 | 33 | 16.5 |
| **3.** | 5.6-6 | 51 | 25.5 | 9.5-10 | 59 | 29.5 |
| **4.** | 6.1-6.5 | 66 | 33.0 | 10.1-10.6 | 51 | 25.5 |
| **5.** | 6.6-7 | 45 | 22.5 | 10.7-11.2 | 46 | 23 |
| Total | | 200 | 100.0 | Total | 200 | 100.0 |
| The mean of IFG = 6.0 SD = 0.56 | | | | The mean of IGT = 9.8 SD = 0.86 | | |
| $\chi^2$ obs. = 47.600 df = 4<br>$\chi^2$ crit. = 9.487 P < 0.050 | | | | $\chi^2$ obs. = 35.200 df = 4<br>$\chi^2$ crit. = 9.487 P < 0.050 | | |

**df= Degree of freedom; P-value= Level of Probability; χ2 crit. = Chi-square critical; χ2 obs. = Chi-square Observed**

This table indicates that the higher levels of impaired fasting glucose (IFG) are found in people with persistently elevated impaired fasting glucose, as in range (6.1-6.5%) accounted (33.0%), while a slighter range (4.5-5%) of impaired fasting glucose values accounted (4.5%). The higher level of postprandial test called impaired glucose tolerance test (IGT) are found in people with persistently elevated impaired glucose tolerance, as in range (9.5-10%) accounted (29.0%), while a slighter range (7.8-8.3%) of impaired glucose tolerance values (5.5%).

The table shows that there was significant association between glycated hemoglobin A1c, impaired fasting glucose test, postprandial test [impaired glucose tolerance] test and early detection of first degree relatives to type II diabetes mellitus.

The normal range of impaired glucose tolerance test (IGT) levels from 7.8 mmol/l (140 mg/dL) to 11.0 mmol/l (199 mg/dL), according to the criteria of the WHO and the American Diabetes Association (ADA).

**Table 6.** Pearson correlation between; HbA1c, IFG, IGT, and age, gender, residual area, marital status, socio-economic status, body mass index, genetic factor, relative diabetes mellitus (first degree) and exercise.

| Variable | | Age | Gender | Residual area | Marital status | Socio-economic status scale | Body mass index | Genetic factor | Relative DM. first degree | Exercise |
|---|---|---|---|---|---|---|---|---|---|---|
| **HbA1c.** | Co. | .866** | .745** | -.460** | -.429** | .136** | .791** | .159** | -.614** | .859** |
| | Sig. | C1 .000 | C2 .000 | C3 .000 | C4 .000 | C5 .000 | C6 .000 | C7 .000 | C8 .000 | C9 .000 |
| | N. | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| **IFG.** | Co. | .915** | .789** | -.469** | -.397** | .128** | .753** | .208** | -.741** | .879** |
| | Sig. | C10 .000 | C11 .000 | C12 .000 | C13 .000 | C14 .000 | C15 .000 | C16 .000 | C17 .000 | C18 .000 |
| | N. | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| **IGT.** | Co. | .899** | .837** | -.467** | -.401** | .121** | .781** | .236** | -.689** | .896** |
| | Sig. | C19 .000 | C20 .000 | C21 .000 | C22 .000 | C23 .000 | C24 .000 | C25 .000 | C26 .000 | C27 .000 |
| | N. | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |

**C = Cell ; Co. = Correlation coefficient; ($HbA_{1c}$) Glycated haemoglobin; (IFG) Impaired fasting glucose test; (IGT) Impaired glucose Tolerance Test; N. = Number of sample Sig. = Significant (2- tailed); (SES) Socio-Economic Status**

This table presents that the relationship in all of the cells.

(C2 It means relationship between HbA1c**.** and gender, C15 It means relationship between body mass index and IFG…etc.).

**[**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed)]**

**Table 7.** Pearson correlation between; HbA1c, IFG, IGT, and digestive system, cardiovascular system, urinary system, ophthalmic system, neurological system, genetic system, dietary pattern and HbA1c

| Variable | | Digestive system | Cardiovascular system | Urinary system | Ophthalmic system | Neurological system | Genetic system | Dietary pattern | HbA1c. |
|---|---|---|---|---|---|---|---|---|---|
| $HbA_{1c.}$ | Co. | .816** | .752** | .817** | .796** | .825** | .782** | .685** | 1.000 |
| | Sig. | C1 .000 | C2 .001 | C3 .000 | C4 .000 | C5 .000 | C6 .000 | C7 .001 | C8 .000 |
| | N. | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| IFG. | Co. | .777** | .815** | .768** | .773** | .762** | .779** | .712** | .899** |
| | Sig. | C9 .000 | C10 .000 | C11 .000 | C12 .000 | C13 .000 | C14 .000 | C15 .000 | C16 .000 |
| | N. | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| IGT. | Co. | .805** | .867** | .794** | .805** | .773** | .815** | .705** | .915** |
| | Sig. | C17 .000 | C18 .000 | C19 .000 | C20 .000 | C21 .000 | C22 .000 | C23 .000 | C24 .000 |
| | N. | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |

**C = Cell ; Co. = Correlation coefficient; ($HbA_{1c}$) Glycated haemoglobin; (IFG) Impaired fasting glucose test; (IGT) Impaired glucose Tolerance Test; N. = Number of sample Sig. = Significant (2- tailed);**

This table shows that the relationship in the all of the cells.

**Discussion:**

Table (1) indicated the findings of the study which revealed that age range between (40-70 >) years old, and that the age of persons relative diabetes mellitus type-II ranged from (40 to 49) years (39.5%) the mean of the age was (55.65) years, majority of the study was males accounted (58%). most of the patient well married, they constitute (92.5%). A distinct relationship to residential area, the majority (88.5%) of the study was urban more than rural (11.5%). Table also shows that there was a highly significant association between marital status, residential area, and a significant association between age, gender, socio-economic status, and early detection of first degree relatives to type-II diabetes mellitus.

The study stated the incidence of Type-II diabetes occurs most often after the age of 40 (although the American Diabetes Association says there is an alarming potentially lifestyle related increase in the number of people under age 40 now developing this kind of diabetes). It's estimated that millions of people have type-II diabetes and do not know it [(11)].

The standardized male to female ratio (M/F) of newly diagnosed diabetic aged 40–49 changed from 0.65-1.78. A similar but less dramatic change has occurred in the older age groups and the overall standardized sex ratio for newly diagnosed diabetes is now unity. Attention is drawn to the fact that in the last century diabetes was always regarded as being more common in men than women. Diabetic mortality rates also showed this and female mortality did not exceed the male, the recent apparent change towards the lifestyle pattern [(12)].

The number of urban residents with diabetes will increase 3.2 times from approximately 2.28 million to 7.21 million. The elderly will represent 21% of the total population with diabetes and urban residents will represent 82%. Rural populations with more traditional lifestyles exhibit lower rates of diabetes risk factors and diabetes, whereas urban populations, and particularly those of a higher socioeconomic status, have higher rates of both risk factors and diabetes [(11)].

During the assessment of (SES) Socio-Economic Status and Lifestyle, each participant completed a questionnaire assessing the family history of diabetes (is there anyone in your family who has diabetes), smoking habit and socio-economic status, including level of education and household income. Education level.
These symptoms typically worsen over days to weeks; about a quarter of people with hyperglycemia have developed some degree of insulin resistance. The screening of early detection for relative diabetes mellitus type II is recommended for many people at various stages of life depended on the several risk factors. The random blood glucose test, a fasting blood glucose test, a blood glucose test two hours after 75 gm. of glucose, or an even more formal glucose tolerance test. Many healthcare providers recommend universal screening for adults at age 40 or > 70, and often periodically thereafter. Earlier screening is typically recommended for those with risk factors such as obesity, family history of diabetes. Many medical conditions are associated with insulin resistance and warrant screening. All the test stages depended on the venous plasma values according to the criteria of the World Health Organization (WHO) and the (ADA) [(13)].

Table (4) shows the laboratory investigation of glycated hemoglobin $A_{1c}$ ($HbA_{1c}$) is used primarily to identify the average plasma glucose concentration over prolonged periods of time. It is formed in a non-enzymatic pathway by hemoglobin's normal exposure to high plasma levels of glucose and the Association between $HbA_{1c}$ test and early detection of first degree relatives to type II diabetes mellitus.

Table (5) indicates that the higher levels of impaired fasting glucose (IFG) are found in people with persistently elevated impaired fasting glucose, as in range (6.1-6.5%) accounted (33.0%), while a slighter range (4.5-5%) of impaired fasting glucose values accounted (4.5%). The higher level of postprandial test called impaired glucose tolerance test (IGT) are found in people with persistently elevated impaired glucose tolerance, as in range (9.5-10%) accounted (29.0%), while a slighter range (7.8-8.3%) of impaired glucose tolerance values (5.5%). The table shows that there was significant association between glycated hemoglobin A1c, impaired fasting glucose test, postprandial test [impaired glucose tolerance] test and early detection of first degree relatives to type II diabetes mellitus.

The participants were designated as "heavy" if their body mass index (BMI) as a scale was higher than the median for their age or "thin" if it was lower. BMI is an index of weight relative to height, and correlates with the amount of body fat in most people. The sample was not considered overweight until their BMI is at or above the 95th percentile for their age.
Between the 85th and 95th percentile, they are considered at risk for overweight. Thus, some of the heavy persons in this study would not be considered overweight by these established, stricter criteria [12].

Household income was estimated based on the number of valuable household items owned among a total of 12 items and classified into three groups: low score medium score and high score. This indirect way of evaluating household income has been shown was more practical for community surveys than directly asking about family income [14].

Table (2) indicated the distribution of body mass index indicates that the majority (41.5%) of the groups were (25-29.9 k/$m^2$) who are over weight.

in the abdominal region, increases the severity of insulin resistance, and has been associated with IRS. Loss of excess weight tends to improve insulin sensitivity (i.e., reduce insulin resistance), and this has been recently shown to be true for people with IRS as well. Weight loss also reduces many of the other health risk factors associated with IRS [1].

A distinct relationship to exercise for the groups, most of study sample (75%) were have no exercise.

Exercise improves overall health by improving blood flow and it decreases insulin resistance even without weight loss. Exercise also increases the body's energy level, lowers tension, and improves your ability to handle stress [15].

Regarding genetic factor for diabetes mellitus type II for relative persons first degree with diagnosed patients accounted (67.0%). Most of the groups were relative to diabetes patients (first degree were father) (56.6%).

Maturity-onset diabetes of the young (MODY) is a form of type II diabetes mellitus that affects many generations in the same family with an onset in individuals younger than 40 years. Some of the genes responsible can be detected by using laboratory test such as ($Hb_{A1c}$, OGTT.) available [6].

Table also shows that there was a highly significant association between body mass index, relative diabetes mellitus-first degree, and a significant association between genetic factor, exercise, and early detection of first degree relatives to type II diabetes mellitus.

Table (3) indicates that the mean of scores for systems related with early detection of first degree relatives to type II diabetes mellitus, shows that it is highly significant on items (5, 7), and the remaining was significant on items (1, 2, 3, 4, and 6).

The early detection of type II diabetes and many cases, is usually prompted by recent-onset symptoms of excessive urination (polyuria), excessive appetite (Polyphagia) and excessive thirst (polydipsia), and often accompanied by weight gain.

To observe the relationship of fasting plasma glucose (FPG), post challenge plasma glucose (PG) (30, 60, 90, and 120 min during an oral glucose tolerance test [OGTT], as well as maximal PG during an OGTT, post challenge glucose spikes [PGS], and glucose under the OGTT curve), and $Hb_{A1c}$ to intima-media thickness (IMT) as a marker of atherosclerosis. Researchers depended during our study on some measurement such as OGTT, ultrasound measurement of carotid IMT, and various atherosclerosis risk factors, such as family history of diabetes, obesity, and/or hyperlipoproteinemia, but without known diabetes, were analyzed in 582 individuals aged 40-70 years and at risk for type II diabetes. The conclusions of the study shows that the PG and PGS are more strongly associated with carotid IMT than FPG and $Hb_{A1c}$ level and modify substantially the risk for atherosclerosis, estimated by $Hb_{A1c}$ alone, in a cohort at risk for diabetes and in the early diabetes stage [(1)].

## Recommendations:

Based on the previously stated results, the researcher recommends that:

**1.** Screening to detect pre-diabetes (IFG or IGT) and diabetes should be considered in individuals ≥ 40 years of age, particularly in those with a BMI ≥25 kg/m2, overweight if they have another risk factor for diabetes. Repeat testing should be carried out at 3-year intervals.

**2.** Preparation of $HbA_{1c}$ test in general hospitals laboratories in Baghdad and Governorates.

**3.** The ministry of health should concentrate particularly on this issue, by capitalizing and creating requirements of early detection of diabetes mellitus.

**4.** Special session in TV (awareness program) by health consultants emphasize on the risk factors of suddenly reduction or overweight.

**5.** All the relative person first degree with positive family history for diabetes mellitus type-II must be educated and informed about sign and symptoms of insulin resistance syndrome associated with predisposing factors and the nature of diets.

**6.** Increase research project in this field of early detection of diabetes mellitus type-II.

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