Dedication

To my .....  
....... Parents.
....... Friends.
and to my teachers
I dedicate this work.

Shaza Adam
Acknowledgements

I would like to express my profound thanks to my supervisor,

Dr. Bader Eldien Hassan Elabid

For his fruitful guidance, unlimited assistance, encouragement and sustained interest throughout the course of this work.

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Also I am grateful to all people from whom samples were taken
Abstract

A cross-sectional comparative study, conducted during the period from January to July 2010, compared the plasma levels of magnesium, triglycerides and total cholesterol of 60 Sudanese patients suffering from type 2 diabetes mellitus as a diabetic test group; 30 of them were controlled diabetics (test group A) and 30 were uncontrolled diabetics (test group B) in addition to 30 apparently healthy volunteers as a control group. All Participants in this study were from Khartoum State. The test groups (A&B) and the control group were matched for age. The levels of the plasma magnesium, triglycerides and total cholesterol were determined in fasting blood samples using a spectrophotometer and reagents from Biosystem company.

The means of the plasma levels of total cholesterol and triglycerides were significantly raised but the mean of the magnesium levels was significantly reduced in both of the test groups (A&B) when compared to the control group (P.Value <0.05).

In reference to control of diabetes, the mean of the plasma levels of magnesium was significantly reduced in the test group (B) when compared to the test group (A) (P.Value = 0.00), whereas the two groups, showed no significant difference between the means of plasma triglycerides but the mean of total cholesterol was significantly raised in the test group (B) compared to test group (A).

In the diabetic test group (n= 60) the plasma levels of magnesium showed a significantly weak negative correlation, While total cholesterol and triglycerides showed insignificant week positive correlation with the duration of diabetes mellitus. The test group showed a significant weak negative correlation between the plasma total cholesterol and triglycerides with the plasma levels of magnesium and that of total cholesterol and triglycerides.
From the results of the present study it is concluded that: in Sudanese patients with type2 diabetes mellitus, the plasma levels of magnesium are reduced, whereas that of total cholesterol and triglycerides are raised. Uncontrolled diabetics are at a higher risk of hypomagnesaemia and Hyperlipidemia compared to controlled diabetics.
مستخلص الدراسة

أجرت هذه الدراسة المقطعية في الفترة من مارس إلى يوليو 2010 لمقارنة مستويات الماغنزيوم والكولسترول والثلاثي الجليسريد عند 60 من المرضى السودانيين المصابين بداء السكري من النوع الثاني، 30 منهم منظمين لمستوى السكر في الدم (المجموعة أ) و 30 غير منظم (المجموعة ب) بالإضافة إلى 30 من المتطوعين أصحاء طفّارة كمجموعة ضابطة. لا توجد أي فروق ذات دلالة معنوية بالنسبة للعمر بين المشاركين في الدراسة والذين تم اختيارهم من ولاية الخرطوم. تم قياس مستويات الماغنزيوم والكولسترول والثلاثي الجليسريد باستخدام جهاز اسبروفوتومنيتر من شركة بايوسيستم والمحاليل من شركة سبنراكت.

كان هناك ارتفاع ذو دلالة معنوية في المستويات الوسطى للهلسترول والثلاثي الجليسريد ولكن انخفاض ذو دلالة معنوية في المستويات الوسطى للماغنزيوم وذلك عند مقارنة المستويات الوسطى لمجموعتي الدراسة (أ،ب) بالمجموعة الضابطة. حيث كان الاحتمال الإحصائي للمقارنة أقل من 0.05.

بالرجوع إلى تنظيم مستوى السكر في الدم أظهرت المستويات الوسطى للماغنزيوم انخفاضاً ذو دلالة معنوية في مجموعة الدراسة ب عند مقارنة مع مجموعة الدراسة أ (الدالة المعنوية 0.000). ولم تظهر مجموعة الدراسة فرقاً ذو دلالة معنوية للمستويات الوسطى للثلاثي الجليسريد.

ولكن المستويات الوسطى للهلسترول ارتفعت في مجموعة الدراسة ب عند مقارنتها بمجموعة الدراسة أ عند مقارنة مستويات الكولسترول والثلاثي الجليسريد والماغنزيوم في مجموعة الدراسة (ن = 60) مع فترة الإصابة بداء السكري. أظهر الماغنزيوم علاقة سلبية ضعيفة جداً وذات دلالة معنوية في حين أن مستويات الكولسترول والثلاثي الجليسريد أظهرت ارتباط إيجابي ضعيف وذو دلالة غير معنوية. عند مقارنة مستويات الكولسترول والثلاثي الجليسريد في مجموعة الدراسة مع مستويات الماغنزيوم أظهرت علاقة سلبية ضعيفة جداً وذات دلالة معنوية.

وعلى نتة نتائج هذه الدراسة: أن هناك انخفاض في مستوى الماغنزيوم وارتفاع في مستويات الكولسترول والثلاثي الجليسريد عند المرضى السودانيين المصابين بداء السكري من النوع الثاني. المرضى غير منظمين لمستوى السكر في الدم أكثر عرضة للإصابة باختلال مستوى الماغنزيوم وارتفاع الدهون عند مقارنته بالمرضى المنظمين لمستوى السكر في الدم.
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Abbreviations

ADA                                      American Diabetic Association

CHD                                      Coronary Heart Disease

CHE                                      Cholesterol Esterase

CHOD                                     Cholesterol Oxidase

DCT                                      Distal Convoluted Tubule

FCH                                      Familial Combined Hyperlipoproteinemia

FPG                                      Fasting Plasma Glucose

GDM                                      Gestational Diabetes Mellitus

GPO                                      Glycerol-P-Oxidase

GK                                       Glycerolkinase

HbA\textsubscript{1c}                      Hemoglobin A\textsubscript{1c}

HDL                                      High-Density Lipoprotein

HPLC                                     High Performance Liquid Chromatography

IFG                                      Impaired Fasting Glucose

IGT                                      Impaired Glucose Tolerance

LDL                                      Low-Density Lipoprotein

LPL                                      Lipoprotein Lipase

OGTT                                     Oral Glucose Tolerance Test
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<tr>
<td>PTH</td>
<td>Parathyroid Hormone</td>
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<tr>
<td>POD</td>
<td>Preoxidase</td>
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<tr>
<td>VLDL</td>
<td>Very Low Density Lipoprotein</td>
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<td>WHO</td>
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