

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال الله تعالى

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صدق الله العظيم

سورة طه الآية 114

# Dedication

## Dedication

To my dear family

And

To all diabetes Mellitus patients

# Acknowledgement

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## ABSTRACT

Atherosclerotic cardiovascular diseases (CVD) are the major causes of mortality in patients with diabetes mellitus. Both quantitative and qualitative abnormalities of lipoproteins were associated with the development of atherogenesis. In this study we concluded to essentially investigated apolipoprotein as a good diagnostic marker for atherosclerosis. A randomly selected 60 Sudanese diabetic patients (30 type1, 30 type2) visited Jabir Abu Alizz Diabetes Centre (Khartoum, Central Sudan) were enrolled in the study during July-September 2005. A total number of 30 healthy volunteered individuals as a control group. Blood specimens were collected from all groups (n = 90) and serum lipid, lipid profiles and Apolipoprotein were determined. Statistical analysis was done, using SPSS package descriptive and comparing different parameters between groups of patients and control.

According to assessment blood glucose was increased in patients compared to control ( $p < 0.05$ ), the level of total cholesterol in patients were: 8% (n = 5) a high level, 8% (n = 5) high normal and 84% (n = 50) had a normal level. However no significance in the assessment of triglyceride and VLDL in patients and controls, although there were 5% (n = 3) of patients had a high level of both. The study indicated a significance increased ( $p < 0.05$ ) the level of Apolipoprotein B, lipoprotein(a) and LDL cholesterol in patients group compared to controls, [about 15% (n = 9) of patients had a high normal level Apo B, 12% (n = 7) of patients had a high normal level LDL, and 73% (n = 44) [38% (n = 23) type1, & 35% (n = 21) type2], of patients had a high level of Lp(a) than controls]; where in the other hand the level of Apolipoprotein A1 and HDL cholesterol, were significantly increased in controls compared to patients group, [10% (n = 6) of patients were low normal HDL level and also 21% (n = 13) of Apo A1]. The study indicated that there were a significance correlation between apolipoprotein B, LDL cholesterol and Lp(a), and apolipoprotein A1 and HDL cholesterol ( $p < 0.01$ ). The study indicated that lipo(a) and Apo B were increased when compared within group of patients, and it increased in type1 DM compare to type2 DM. The study also concluded to that Lp(a), was increased proportionally with the age of patients.

In conclusion the study confirmed that Apolipoprotein is an important diagnostic marker that can be used for early detection of atherosclerotic cardiovascular disease (CVD) in diabetic patients and follow up of patients, particularly when such information cannot be obtained by use of routine lipid profiles examination.

## ملخص الدراسة

تعتبر أمراض تصلب الشرايين وأمراض القلب من أهم أسباب الوفاة عند مرضى السكري ، والتقدير النوعي والكمي للدهون يؤكد ذلك. وهذه الدراسة خلصت إلى ضرورة استعمال الابوليوبروتين كمؤشر جيد للتشخيص.

تم في هذه الدراسة اختيار مجموعة من 60 مريضا بالسكري يعالجون في مركز جابر أبو العز لمرضى السكر ، في الفترة من يوليو - سبتمبر 2005م ، و قد تم تقسيم المرضى إلى مجموعتين، مجموعة تضم 30 مريضا وتسمى مرضى السكر قسم 1 يعالجون بالأنسولين وأخرى تضم نفس العدد وتسمى مرضى السكر قسم 2 لا يعالجون بالأنسولين. كما أخذت عينات من 30 متطوعا أصحاء كعينات مرجعية لمقارنة النتائج. وقد تم اخذ عينات دم من كل المجموعات قيست فيها نسب الدهون ومشتقاتها والابوليوبروتين ، وباستعمال التحليل الاحصائي ((SPSS قورنت النتائج بين المجموعات.

وقد وجدت نسبة الجلوكون مرتفعة جدا عند المرضى مقارنة بالأصحاء عند احتمال احصائي ( $p < 0.05$ ) ، أما نسبة الكوليسترول وجدت أيضا مرتفعة عنده 8% (5) من المرضى، 8% (5) في أعلى المستوى الطبيعي و 84% (50) في المستوى الطبيعي. ولكن لم يوجد فرق كبير في نسبتي الدهون الثلاثية (triglyceride) والدهون ذات الكثافة القليلة جدا (VLDL) بين المرضى والأصحاء بالرغم من وجود 5% (3) من المرضى معدل للاثنين عندهم مرتفع. كما أثبتت الدراسة ان الابوليوبروتين (B)، الليوبروتين الصغير (Lp(a)) والليوبروتين ذو الكثافة الأقل (LDL) مرتفعة عند المرضى من المجموعتين مقارنة بالأصحاء بدلالة إحصائية ( $p < 0.05$ ) {حوالي 15% (9) من المرضى مستوى B مرتفع، 12% (7) LDL مرتفع و 73% (44)، 38% (23) قسم 1، 35% (21) قسم 2 [من المرضى مستوى Lp(a) اكثر من الاصحاء} . كما في الناحية الأخرى فان الابوليوبروتين (A1) والليوبروتين ذو الكثافة الأعلى (HDL) قد وجدت نسبته أعلى عند الأصحاء مقارنة بالمرضى {10% (6) HDL، و 21% (13) A1 من المرضى أقل من الاصحاء. وقد أشارت الدراسة لوجود علاقة ارتباط بين الابوليوبروتين (LDL)، (B) و (a). وأيضا بين كل من الابوليوبروتين (A1) و (HDL) بدلالة إحصائية ( $p > 0.01$ ) . وأشارت الدراسة لان متوسط الابوليوبروتين (B) والليوبروتين الصغير (a) مرتفع عند المرضى من قسم 1 مقارنة بالمرضى من قسم 2. وخلصت الدراسة أيضا لان معدل الليوبروتين الصغير (a) في المرضى يزيد طرديا بزيادة العمر.

وفي الختام تخلص الدراسة بصورة عامة إلى ان قياس الابوليوبروتين مؤشر مهم في تشخيص مرضى السكر بتصلب الشرايين وأمراض القلب في المراحل الأولية خصوصا عندما لا يستطيع تحليل الدهون الأخرى ومشتقاتها إثبات ذلك.

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### Abbreviations:

<b>LDL</b>	Low Density Lipoprotein.
<b>HDL</b>	High Density Lipoprotein.
<b>VLDL</b>	Very Low Density Lipoprotein.
<b>Apo A1</b>	Apolipoprotein A1.
<b>Apo B</b>	Apolipoprotein B.
<b>Lp(a)</b>	Lipoprotein(a).
<b>CVD</b>	Cardio Vascular Disease.
<b>CHD</b>	Coronary Heart Disease.
<b>DM1</b>	Diabetes Mellitus type one.
<b>DM2</b>	Diabetes Mellitus type two.
<b>IDDM</b>	Insulin Dependant Diabetes Mellitus.
<b>NIDDM</b>	Non Insulin Dependant Diabetes Mellitus.
<b>DKA</b>	Diabetic ketoacidosis.
<b>PVD</b>	Peripheral Vascular Disease.
<b>PLG</b>	Plasminogen.
<b>LCAT</b>	Lecithin - Cholesterol - Acyl Transferase.
<b>WHO</b>	World Health Organization.
<b>GOD</b>	Glucose Oxidase
<b>POD</b>	Peroxides.
<b>PAP</b>	Phenol 4-Amino Phenazone.
<b>O<sub>2</sub></b>	Oxygen.
<b>H<sub>2</sub>O<sub>2</sub></b>	Hydrogen Peroxide.
<b>TC</b>	Total Cholesterol.
<b>TG</b>	Triglyceride.
<b>n</b>	.number
<b>M</b>	Male
<b>F</b>	Female