

Dedication

To my mother.....

Who is one of the most inspiring and strong women I ever know. She gave me and taught me unconditional love and acceptance.

To the soul of my father.....

Who have offered me everything without taking anything!

To my family.....

Who offered me unconditional love and support throughout the course of this thesis.

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Abstract

A prospective Study conducted during the period, May to October 2007, compared serum levels of calcium, phosphate and alkaline phosphatase activity of 50 known patients of long standing diabetes mellitus type 2 as a test group who were selected randomly from diabetic clinics of Jaber abu alizz, Bahri diabetes mellitus center and Alhikma clinic and 30 healthy non-diabetic as a control group, controls were selected randomly to be matched in age, sex and socioeconomic status with that of the diabetic group. Serum levels of calcium, phosphate and alkaline phosphatase activity were measured using A 25 autoanalyzer from Bio System's company, Barcelona (Spain).

The serum levels of calcium and phosphate were significantly reduced ($p < 0.05$) in the test group (diabetics), when compared to the control group. Mean \pm SD for control versus diabetic group were found to be:

(9.3 ± 0.6) versus (8.2 ± 0.8) mg/dL, for serum calcium.

(3.9 ± 1.0) versus (3.1 ± 0.7) mg/dL mg/dl; for serum phosphate.

The serum levels of alkaline phosphatase was found to be significantly raised ($p < 0.05$) in the test group compared to the control group.

(72.7 ± 18.1) versus (88.4 ± 24.8) u/L for serum alkaline phosphatase.

The study showed no correlation between the levels of serum calcium and the duration of diabetes mellitus, while there was a weak negative correlation between the levels of serum phosphate as well as a weak positive correlation in case of alkaline phosphatase activity and the duration of diabetes mellitus.

This study concluded that long standing diabetes type 2 is associated with reduced levels of serum calcium and phosphate, and increased levels of serum ALP activity. The duration of the disease has different effects on the levels of the phosphate and alkaline phosphatase activity as mentioned above.

المستخلص

أجريت هذه الدراسة التوقعية خلال الفترة من مايو حتى أكتوبر 2007. حيث تمت مقارنة مستويات الكالسيوم، الفوسفات وانزيم الفوسفاتيز القلوي عند 50 من مرضى السكري النوع الثاني تم تشخيصهم منذ فترة طويلة وتم اختيارهم عشوائياً من مركز جابر أبو العز للسكري بالخرطوم. و مركز بحري للسكري ومستوصف الحكمة و 30 من الاصحاء كمجموعة تحكم والتي تم اختيارهم عشوائياً بحيث يطابقون مرضى السكري في العمر و الجنس والحالة الاجتماعية والاقتصادية. قيس للمجموعتين مستويات الكالسيوم، الفوسفات وانزيم الفوسفاتيز القلوي في مصل الدم باستخدام جهاز A 25 من شركة بيو سيستم (اسبانيا).

كان هناك انخفاض ذو دلالة معنوية حيث كان الاحتمال الاحصائي للمقارنة اقل من 0.05 في كل من المستويات الوسيطة للكالسيوم والفوسفات و ذلك عند مقارنة المستويات الوسطي عند مرضى السكري مقارنة بالمجموعة الضابطة و كانت النتائج كالآتي:

(المستوى الوسطي + الإنحراف المعياري عند المجموعة الضابطة مقارنة بمجموعة مرضى السكري).

(9.3 ± 0.6 مقابل 8.2 ± 0.8 ملجرام / ديسلتر) بالنسبة لمصل الدم للكالسيوم .

(1.0 ± 3.9 مقابل 0.7 ± 3.1 ملجرام/ديسلتر) بالنسبة لمصل الدم للفوسفات.

المستويات لمصل الدم لانزيم الفوسفاتيز القلوي كانت مرتفعة احصائيا عند مرضى السكري مقارنة بمجموعة التحكم حيث كان الاحتمال الاحصائي للمقارنة اقل من 0.05

(18.1 ± 72.7 مقابل 24.8 ± 88.4 وحدة/ليتر) بالنسبة لمصل الدم لانزيم الفوسفاتيز القلوي.

مستويات مصلى الدم للكالسيوم في هذه الدراسة لا تتأثر بزيادة فترة المرض بينما في الفوسفات وانزيم الفوسفاتيز القلوي هنالك أثر واضح في نقصان الفوسفات وازدياد انزيم الفوسفاتيز القلوي بازدياد فترة المرض.

خلصت هذه الدراسة الى أن لمرض السكري النوع الثاني أثر واضح في نقصان الكالسيوم والفوسفات وزيادة مستوى انزيم الفوسفاتيز القلوي. وأن مدة المرض تؤثر بصورة مختلفة على مستوى الفوسفات وانزيم الفوسفاتيز القلوي كما ذكر أعلاه.

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List of abbreviations

ALP	Alkaline phosphatase
AMP	2-amino-methyl-1-propanol
CHD	Coronary heart disease
COPD	Chronic obstructive pulmonary disease
CVD	Cardiovascular disease
DKA	Diabetic ketoacidosis
ECF	Extracellular fluid
GDM	Gestational diabetes mellitus
HbA _{1c}	A _{1c} Hemoglobin
2hrPPG	Hours post prandial glucose Two
ICU	Intensive care unit
IDDM	Insulin-dependent diabetes mellitus
MODY	Maturity-onset diabetes of the young
NIDDM	Non insulin-dependent diabetes mellitus
OGTT	Oral glucose tolerance test
PTH	Para thyroid hormone
PTH-rP	Para thyroid hormone-related peptide
PVD	Peripheral vascular disease
r.p.m	Round per minute
TPN	Total parenteral nutrition