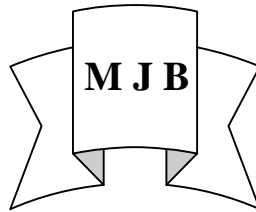


## Changes in creatine kinase values in the serum of mothers of Duchenne muscular dystrophy patients

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### Abstract

Duchenne Muscular Dystrophy(DMD) is a sever x-chromosome linked degenerative disease of muscles affect boys due to mutations at a specific locus on the short arm of the X-chromosome. In the early stages of disease the affected young boys show loss of strength in their proximal muscles leading to waddling gait, to difficulty in standing up and eventually to very sever weakness.

Serum creatine kinase (CK) levels were measured in nineteen women who are mothers of DMD patients and compared with another serum CK of nineteen women with negative history of DMD(control group). The results indicate that serum CK levels of patient 's mothers are significantly higher than serum CK values of control group, and the serum CK values have markedly increased in52.1% of the patient's mothers, this lead to conclusion that 52.1% of these patient's mothers are carriers for disease and 47.9% are due to new mutations which may caused by the environmental factors.

### الخلاصة

مرض الاعتلال العضلي هو واحد من الامراض الخطيرة المرتبطة وراثيا بكموسوم- أكس والذي يؤثر على الذكور خاصة بسبب طفرة بموقع خاص بالذراع القصير لكموسوم - أكس . هذا المرض يظهر بوقت مبكر من العمر وعادة يكون بفقدان القوة بعضلات الاطراف مما يؤدي الى خلل في المشي وصعوبة في الوقوف واحيانا الى درجة عالية من من الضعف.

في هذه الدراسة تمت مقارنة مستوى إنزيم كرياتين كازينيز في امصال امهات الاطفال المصابين بهذا المرض ومقارنتها مع أمصال امهات لاطفال عاديين غير مصابين بهذا المرض فوجد زيادة ملحوظة في مستوى الامهات للاطفال المصابين وعند معاينة النتائج في مستوى هذا الانزيم عند الامهات للاطفال المصابين وجد ان هنالك زيادة كبيرة في هذا الانزيم بنسبة 52.1% وهذا يقودنا الى احتمالية ان 52.1% في هؤلاء الامهات هم حاملين للمرض و 47.9% هو نتيجة طفرة جديدة قد تكون بسبب عوامل بيئية عديدة.

### Introduction

**D**uchenne muscular dystrophy(DMD) is the most common childhood form of muscular dystrophies(1).Early signs of DMD which usually occur between the ages of 2 and 6 years, include frequent falling, difficulty getting up from a sitting or lying position and awaddling gait(2).Another hallmark is the apparent enlargement of the calf muscle and sometimes other muscles which is really due to an accumulation of fat and connective tissue in the muscles.More over,a blood sample shows a very high level of serum

creatine kinase (SCK)(3), This enzyme catalyses the reversible transfer of a phosphate group from creatine phosphate to adenosine diphosphate forming creatine and adenosine triphosphate.The most likely explanation for high SCK levels in DMD is that the enzyme originates in muscles and escape into the serum.Breathing becomes affected during the later stages of DMD.Sever respiratory and heart problems mark the disease's final stages (4).

In 1986 the researches identified a rod-shaped protein(dystrophin) which was absent or mutated in DMD

patients(1).Antibodies used to study the dystrophin localization in muscles,it appear to be located in the sarcolemma of normal muscles and was absent or markedly deficient in the patients with DMD (5,6).

The traditional clinical criteria for identifying a manifesting Duchenne carrier are positive family history, proximal limb weakness, calf hyperatrophy, high serum CK(7). Cardiomyopathy is often found in patient with DMD, and female carriers of DMD can develop symptomatic skeletal myopathy alone or combined with dilated cardiomyopathy(8).

### **Materials and method**

Blood samples were collected from (19)women(mothers of DMD patients) and from other (19)women with negative history of DMD as the control group for serum creatine kinase values.

### **Methods**

Principle of the test:CK utilizes creatine phosphate and ADP as substrate to act as initial catalyst for a series of reaction resulting in the formation of NADPH as outlined in the coupled enzyme assay.The NADPH produced is proportional to CK activity and it is used to reduce into blue/violet color of diformazan which its absorption at 560nm.A reaction stopped by the addition of HCL as show in the following equations.

### **Results**

Comparisons between serum CK levels of DMD patient s mothers and control group by using Student's paired t-test. A p-value<0.05 was considered statistically significant(10). The results indicate the serum creatine kinase levels of patient's mothers are significantly higher than serum CK levels of control group(p<0.05)(figure 1) , and there are high increase in the levels of the serum CK in52.1% of patient's mothers which were ranging from 180 to 700 IU/L,while the normal values are 30-150 IU/L for female(11),table(1).

Table(1):Serum creatine kinase levels in DMD patient's mothers and control group.

### **Discussion**

There were high increase in serum CK levels of DMD patient's mothers in comparison with control group and there

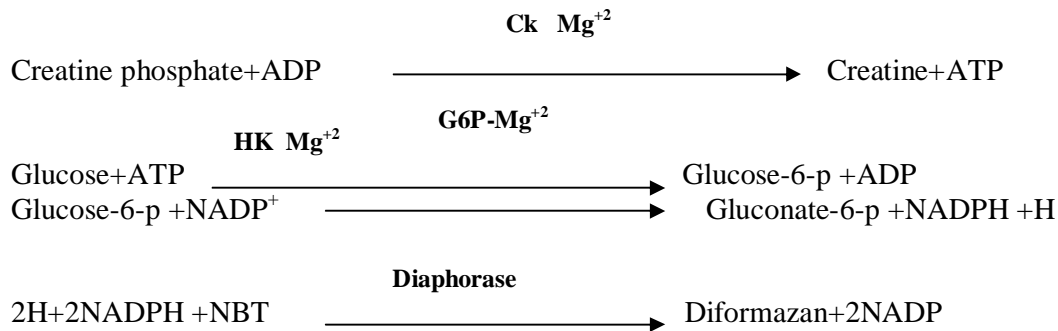
was high increase in the levels of serum CK in52.1% of mother sof DMD patients while 47.9% of mothers of DMD patients were within the normal range.CK is normally found in healthy muscles but if the muscles are diseased or damaged like DMD so large amounts of CK leak into the blood(11).Serum CK levels in carriers affected by genetic factors(13,14), so serum CK level can be used for detecting carriers of DMD(7).

The normal levels of serum CK in 49.9% of patient's mothers probably indicate that there were new mutations in the gene which is responsible for dystrophin production in the short arm of the x-chromosome, and this high rate of mutations because of the gene coding for dystrophin is one of the largest human genes recognized to date(2300KB) which helps explain the observation that approximately half of the cases of DMD are new mutations due to several mutagens which are found in our environment(14).

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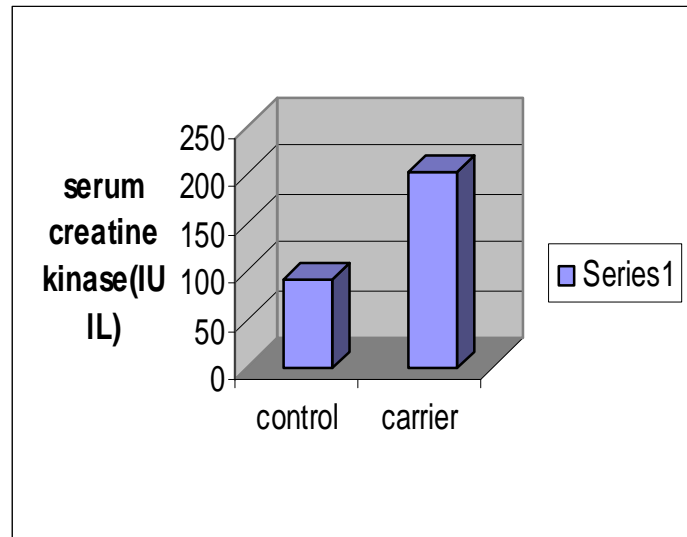


The procedure summarized in the following table:

	sample	standard	Reagent blank	Sample blank
Color reagent solution	0.5ml	0.5ml	0.5ml	0.5ml
Incubate for 3minutes at 37c°				
sample	0.05ml	0.05ml	0.05ml	-
Incubate for 10 minutes at 37c°				
0.1N HCL	5ml	5ml	5ml	5ml
sample	-	-	-	0.05ml
Measures the absorbance at 560nm				

CK activity(U/L)=(absorbance sample/absorbance standard)×standard concentration (9).

Serum CK levels of DMD patient s mothers(IU/L)	Serum CK levels of control group(IU/L)
255	110
210	60
190	130
180	90
100	140
80	70
510	50
50	60
220	80
700	60
210	150
280	80
60	40
110	120
90	90
140	50
120	140
185	100
125	120



**Figure(1) Comparison between serum CK levels of control group and DMD patients mothers.**