



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



**Sudan University of Science and Technology**

**College of Graduate Studies**

**Assessment of Plasma Levels of Magnesium and Zinc in Sudanese  
Patients with Renal Failure under Hemodialysis in Khartoum State**

**تقويم مستويات المغنيسيوم والزنك في بلازما الدم لدى مرضى الفشل الكلوي**

**السودانيين الذين يخضعون للغسيل الدموي بولاية الخرطوم**

A dissertation submitted in partial fulfillment for master degree in  
Medical laboratory science (clinical chemistry)

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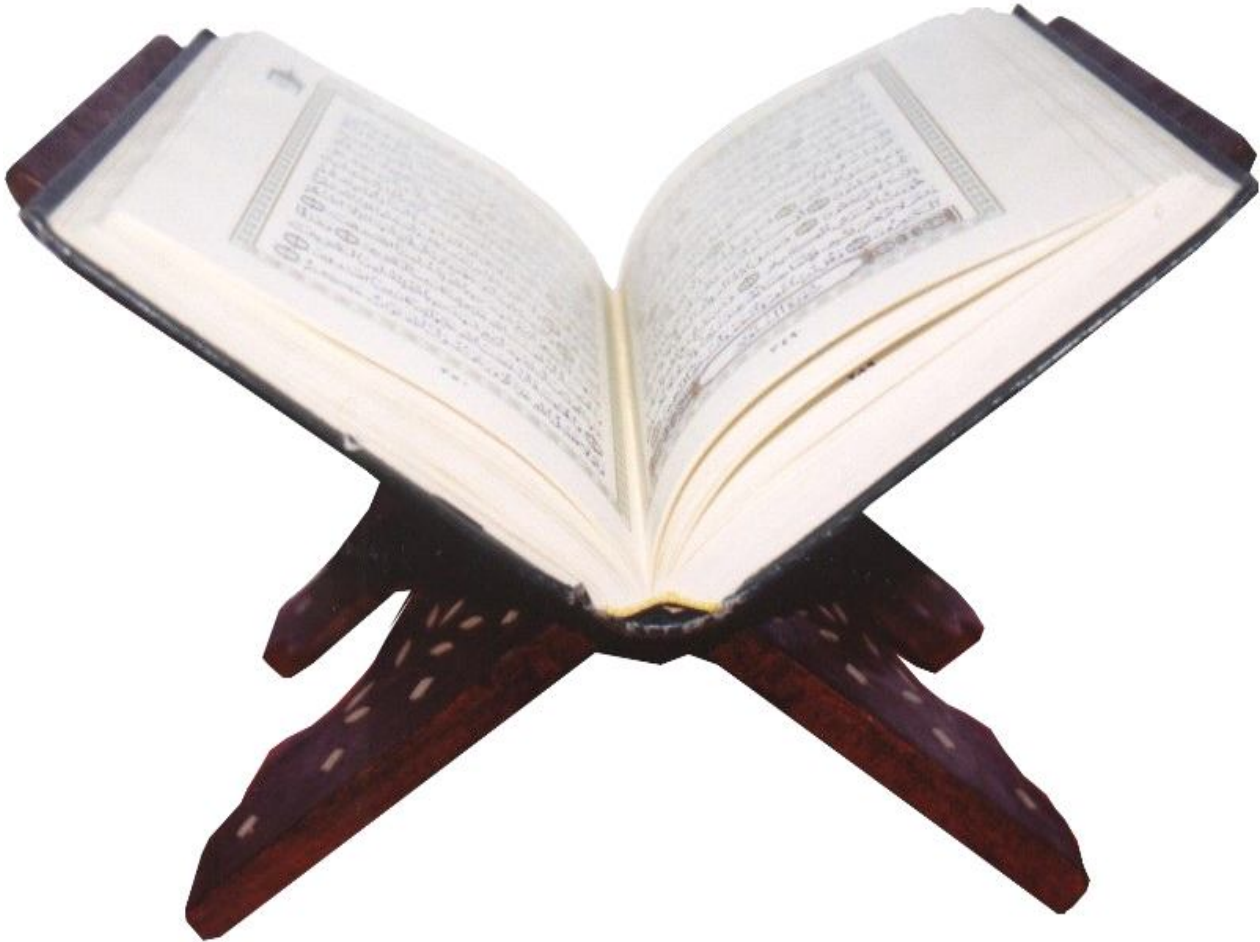
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اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ ﴿١﴾ خَلَقَ الْإِنْسَانَ مِنْ عَلَقٍ ﴿٢﴾ اقْرَأْ وَرَبُّكَ  
الْأَكْرَمُ ﴿٣﴾ الَّذِي عَلَّمَ بِالْقَلَمِ ﴿٤﴾ عَلَّمَ الْإِنْسَانَ مَا لَمْ يَعْلَمْ ﴿٥﴾

صدق الله العظيم

سورة العلق الآيات 1-5

## ***Dedication***

***To those who always believe on my efforts...***

***To my lovely parents who have been my  
constant source of inspiration ....***

***To my sweet sister for her understanding  
support ....***

***To all those who help me to proceed ahead ...***

***lana***

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## Abstract

This a case control study was carried out to measure plasma levels of the magnesium and zinc in patients with renal failure under hemodialysis. sixty samples were collected from patients in period between May to September 2015, chosen randomly from Sudanese Kidney Transplanted Association hospital and ALnaw teaching hospital, and thirty apparently, healthy individuals as controls, to assess the effect of hemodialysis on magnesium and zinc levels.

Measurement of plasma zinc was done by using Atomic Absorption Spectrophotometer Model 210 VGP Buck Scientific, and plasma magnesium by using Cobas-c311 autoanalyzer , and results were analyzed using statistical package of social sciences (SPSS), (T.test and Pearson correlation) computer program.

The study showed that the plasma zinc was significantly decreased, (p-value =0.00), in the Sudanese patients under hemodialysis group, and the plasma levels of magnesium were significantly increased, (p-value =0.00 in the patients under hemodialysis group

Mean  $\pm$  SD for controls versus cases

(.24033 $\pm$ .075514 versus .77267 $\pm$ .200154)mg/l for zinc

(2.729 $\pm$ .49397 versus 1.8400 $\pm$ .13025) mg/dl for magnesium

Results also showed a significant negative correlation between zinc level and duration of dialysis(p-value=0.003,r=-0.378).

Also there was a significant negative correlation between magnesium level and duration of dialysis.( p-value=0.005,r=-0.358).

Also showed there was insignificant negative correlation between zinc level and age ( $p\text{-value}=0.193, r=-0.170$ ).

Also there was an insignificant negative correlation between magnesium level and age. ( $p\text{-value}=0.703, r=-0.050$ ).

It is concluded that; the plasma level zinc was significantly decreased, in the patients with renal failure under hemodialysis, and the plasma levels of magnesium were significantly increased, in the patients with renal failure under hemodialysis. and there were no differences between plasma levels of both zinc and magnesium among the gender. Also there was negative correlation between plasma levels of magnesium, zinc and age, duration of hemodialysis.

## مستخلص الدراسة

اجريت هذه الدراسة لمقارنه مستويات معدني المغنسيوم و الخارصين في مرضي الفشل الكلوي الذين يخضعون للغسيل الدموي. ستون عينه اخذت من هؤلاء المرضى في الفتره مابين منتصف شهر مايو وحتى نهايه سبتمبر . تم اختيارهم بطريقه عشوائيه من مستشفى جمعيه زارعي الكلى السودانيه و مستشفى النو التعليمي, مع ثلاثون من الاصحاء كمجموعه تحكم "مجموعه ضابطه" لنقيس مدي تاثير الغسيل الدموي علي مستويات الماغنسيوم و الخارصين.

تم قياس مستوى الخارصين بواسطة جهاز الامتصاص الذري اصدار 210 , وتم قياس المغنيسيوم بواسطة جهاز كوباس سي 311 وتم تحليل البيانات بواسطه برنامج الحزمه الاحصائيه للعلوم الاجتماعيه.(معامل ارتباط برسون واختبار تي)

توصلت نتائج هذه الدراسة الي ان هناك انخفاض ملحوظ في مستويات الخارصين في المرضى الذين يخضعون للغسيل الدموي , كان الاحتمال الاحصائي للمقارنه 0.00. وان هنالك ارتفاع ملحوظ في الماغنسيوم وكان الاحتمال الاحصائي للمقارنه 0.00. وكانت النتائج كالآتي:-

"المتوسط+الانحراف المعياري عن مجموعته التحكم مقارنه بالمرضي"

0.0775514±0.24033 مقابل 0.20015±0.77267 مليجرام/لتر.للخارصين

0.49397±2.7295 مقابل 0.13025±1.8400 مليجرام/ديسيلتر .للمغنيسيوم

تحليل ارتباط برسون اظهر علاقة سلبية ذات دلالة احصائية بين معدل الخارصين و الفتره الزمنية للغسيل الدموي:(القيمه المعنويه= 0.003 ومعامل برسون للارتباط = -0.378)

كذلك اظهر علاقته سلبية ذات دلالة احصائية بين معدل المغنيسيوم و الفتره الزمنية للغسيل الدموي:(القيمه المعنويه= 0.005 ومعامل برسون للارتباط = -0.358).

تحليل ارتباط برسون اظهر علاقة سلبية بين معدل الخارصين و العمر:(القيمه المعنويه= 0.193 و معامل برسون للارتباط=-0.170) .

كذلك اظهر علاقته سلبية بين معدل المغنيسيوم و العمر:(القيمه المعنويه= 0.703 و معامل برسون للارتباط = -0.050) .

خلصت هذه الدراسة الي ان مستوى الخارصين يحدث به نقصان ملحوظ في مرضى الفشل الكلوي الذين يخضعون للغسيل الدموي. كما ان مستوى المغنيسيوم يحدث به زياده ملحوظه في مرضي الفشل الكلوي الذين يخضعون للغسيل الدموي. كذلك لا يوجد فرق في مستويات المغنيسيوم والخارصين بين الذكور والاناث وبين الأعمار. كما أن مستويات المغنيسيوم والخارصين لا تتأثر بالفترة الزمنية للغسيل الدموي.



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## Abbreviations

| Abbreviation | Full term                                 |
|--------------|---|
| ACR          | albumin:creatinine ratio                  |
| AKI          | Acute kidney injury                       |
| ATP          | Adenosine triphosphate                    |
| APD          | Automated peritoneal dialysis             |
| CAPD         | Continuous ambulatory peritoneal dialysis |
| CRD          | Chronic renal disease                     |
| CVD          | Cardiovascular disease                    |
| DNA          | Deoxyribonucleic acid                     |
| ESRD         | End stage renal disease                   |
| GFR          | Glomerular filtration rate                |
| GI           | Gastrointestinal                          |
| HD           | Hemodialysis                              |
| PD           | peritoneal dialysis                       |
| PTH          | Parathyroid hormone                       |
| RFTs         | Renal function tests                      |
| RNA          | Ribonucleic acid (RNA)                    |
| ROMK         | Renal outer medullary potassium channel   |
| WHO          | World health organization                 |