

الآية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالى :

اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ ﴿١﴾

سورة العلق الآية 1

Dedication

To my mother

To my father

To my sisters

To my brothers

To my wife

To my friends

Acknowledgments

I would like to express my thanks to my supervisor

Dr. Ghada Abdelrahman Elfadil for her kind guidance and support and all through the process of this study. Thanks for the clinical chemistry staff in Sudan University of science and technology for their help and contribution, here I would love to express my gratitude to my parents for his Encouragement and support before and during my M.Sc Journey.

Last, but not least thanks to the asthmatic patients who Participate in this study.

Abstract

Background: Trace elements are essential micronutrients that exist in very low concentrations in the body, forming 0.01% of the total body weight. They play an important role in various physiological processes, and are crucial for proper functioning of the immune system.

Materials and methods: This cross sectional case control study was carried out to measure the levels of magnesium and copper in Sudanese asthmatic patients attending alshaab teaching hospital, Khartoum state, during the period from July to September 2017. Fifty Sudanese asthmatic patients, including 28 males (aged 8-65 years), and 22 females (aged 9-54 years), were enrolled in this study, also fifty matched healthy individuals to serve as control group. Three ml of venous blood were collected from each participant, the plasma obtained magnesium and copper levels were measured by using Mindary BA 88A.

Results: Statistical analysis of obtained results revealed that; mean of plasma levels of magnesium was insignificantly differ among asthmatic patients compared to control group magnesium P.value (0.072) mean \pm SD: (1.92 \pm 0.26 mg/dL versus 2.01 \pm 0.20 mg/dL). but the levels of copper was significantly increased compared to control group P.value(0.000) mean \pm SD: (23.82 \pm 5.05 μ mol/L versus 20.20 \pm 3.15 μ mol/L). In asthmatic patients plasma levels of magnesium and copper not influenced by age (r= -0.167, p-value= 0.246 for Mg)(r= 0.038, p-value= 0.793 for Cu) and duration of disease (r= -0.206, p-value= 0.151 for Mg) (r= 0.061, p-value= 0.675 for Cu). **Conclusion** plasma concentration of magnesium was insignificantly differ in asthmatic patients but plasma concentration of copper was significantly higher.

المستخلص

خلفية الدراسة: العناصر النزرة تعتبر من العناصر الاساسيه الدقيقه التي توجد بتراكيز قليله في الجسم تمثل %٠,٠١ من الوزن الكلي للجسم وهي تلعب دورا اساسيا في مختلف العمليات الفسيولوجيه وايضا نجدها اساسيه لعمل الجهاز المناعي بصوره مثلي .

المواد و الطرق: أجريت هذه الدراسة لقياس مستويات الماغنيزيوم والنحاس في بلازما الدم لدى السودانيين المصابين بمرض الربو (الأزمة) الذين يترددون على مستشفى الشعب التعليمي بولاية الخرطوم بالسودان في الفترة من يوليو حتى سبتمبر ٢٠١٧م. إشملت الدراسة على ٥٠ من المرضى المصابين بمرض الربو (الأزمة) ٢٨ منهم ذكور تتراوح أعمارهم ما بين ٨ إلى ٦٥ سنة و ٢٢ منهم إناث تتراوح أعمارهم ما بين ٩ إلى ٥٤ سنة. أيضا إشملت الدراسة على ٥٠ من مجموعة الأصحاء منهم ٢٨ من الذكور و ٢٢ من الإناث تتراوح أعمارهم ما بين ٨ إلى ٦٥ سنة. أخذت ٣ مل من الدم الوريدي وتم إستخلاص بلازما الدم وتحليلها لقياس عنصرى الماغنيزيوم والنحاس باستخدام جهاز مندرى .BA 88A

النتائج: بعد التحليل الإحصائي لهذه النتائج وجد أن متوسط مستويات الماغنيزيوم لايتاثر بالمقارنة مع مجموعة الأصحاء بمستوى معنوية (٠,٠٧٢, متوسط مستوي الماغنيزيوم \pm الانحراف المعياري = ١,٩٢ \pm ٠,٢٦), بينما هنالك إرتفاع ذو دلالة معنوية في متوسط مستويات النحاس بمستوى معنوية (٠,٠٠٠, متوسط مستوي النحاس \pm الانحراف المعياري = ٢٣,٨٢ \pm ٥,٠٥). من هذه الدراسة وجد أن مستويات الماغنيزيوم والنحاس لا تتأثر بإختلاف العمر بقوة ارتباط (٠,١٦٧) مستوى المعنوية للنحاس (٠,٧٩٣) الماغنيزيوم قوة الارتباط (٠,١٦٧) ومستوي المعنويه (٠,٢٤٦) والفترة الزمنية للمرض بقوة ارتباط (٠,٦١) مستوى المعنوية للنحاس (٠,٦٧٥) قوة الارتباط (٠,٢٠٦) مستوى المعنوية للماغنيزيوم (٠,١٥١) .

الخلاصة: مستوي الماغنيزيوم في بلازما الدم لايتاثر بتاثير ذو دلالة احصائيه في المرضى المصابين بالربو, لكن مستوي النحاس يزيد زيادة ذات دلالة احصائيه.

List of contents

No	Topic	Page
	Verse content of Quran	I
	Dedication	II
	Acknowledgments	III
	English abstract	IV
	المستخلص	V
	List of contents	VI
	List of tables	IX
	List of figures	X
	List of abbreviations	XI
Chapter one		
Introduction, Rationale, Objective		
1.1	Introduction	1
1.2	Rationale	2
1.3	Objectives	2
1.3.1	General objectives	2
1.3.2	Specific objectives	2
Chapter two		
Literature review		
2.1	Bronchial asthma	3
2.1.1	Anatomy of bronchial asthma	3
2.1.2	Signs and symptoms of bronchial asthma	5
2. 1. 3	Causes of bronchial asthma	5
2. 1. 4	Environmental factors of bronchial asthma	5
2.1.5	Complications of bronchial asthma	6
2.1.6	Pathophysiology of bronchial asthma	7
2.1.6.1	Airway inflammation	7
2.1.6.2	Airflow obstruction	9
2.1.7	Diagnosis of Bronchial Asthma	9
2.1.7.1	Spirometry diagnosis of asthma	10
2.1.7.2	Other methods of diagnosis of asthma	10
2.1.8	Asthma classification	11
2.1.9	Medications of asthma	11
2.2	Trace elements	13
2.2.1	Copper	13
2.2.1.1	Biological role of copper	14

2.2.1.2	Dietary needs of copper	15
2.2.1.3	Copper-based disorders	15
2.2.2	Magnesium	16
2.2.2.1	Dietary sources of magnesium	16
2.2.2.2	Magnesium Physiology	16
2.2.2.3	Absorption ,Transport ,and Excretion of Magnesium	17
2.2.2.4	Hypomagnesemia	18
2.2.2.4.1	Symptoms of hypomagnesemia	20
2.2.2.5	Hypermagnesemia	21
2.2.2.5.1	Symptoms of hypermagnesaemia	22
2.2.3	Trace elements and bronchial asthma	23
Chapter three		
Materials and methods		
3.1	Study design	24
3.2	Study area	24
3.3	Study population	24
3.4	Inclusion criteria	24
3.5	Exclusion criteria	24
3.6	Ethical consideration	24
3.7	Data collection	24
3.8	Sampling	24
3.9	Sample collection	25
3.10	copper measurement	25
3.10.1	Principle of the method	25
3.10.2	Procedure	25
3.11	Magnesium measurement	25
3.11.1	Principle of the method	26
3.11.2	Procedure	26
3.3	Quality control	26
3.4	Statistical analysis	26
Chapter four		
Results		
4.	Results	28
Chapter five		
Discussion, conclusions and recommendations		
5.1	Discussion	36
5.2	Conclusions	37
5.3	Recommendations	38

References		
	References	39
Appendices		
	Appendix I	46
	Appendix II	47
	Appendix III	48

List of tables

No	Title	Page
Table (4-1)	Comparison between means concentration of plasma magnesium and copper in patients and control groups	30
Table (4-2)	The means concentration of plasma magnesium and copper in male and female groups	31

List of figures

No	Title	Page
Figure(4-1)	Correlation between the level of plasma magnesium and age of asthmatic patients	32
Figure(4-2)	Correlation between the level of plasma copper and age of asthmatic patients	33
Figure (4-3)	Correlation between the level of plasma magnesium and duration of disease	34
Figure (4-4)	Correlation between the level of plasma copper and duration of disease	35

List of abbreviations

Abbreviation	Full term
ASM	Airway smooth muscle
CD	Cluster of differentiation
CO	Carbonic monoxide
COPD	Chronic obstructive pulmonary disease
FEV	Forced expiratory volume
GPx	Glutathione
IL	Interleukin
LABA	Long-acting beta agonists
MDIs	Metered-dose inhalers
PVC	Polyvinyl chloride
RNA	Ribonucleic acid
SOD	Sodium oxide dismutase
US	United state