



**Sudan University of Science and Technology**  
**Collage of Graduate Studies**

**Assessment of Serum Albumin: Globulin ratio among**  
**Enteric fever Patients in Northern Sudan**

**تقدير معدل الزلال القلوبوليون في المرضى بالحمي المجهوله في ولايه  
الشماليه**

**By:**

**Mohi Aldeen Abd Alla Mohmed Bedry**

**B. Sc in clinical chemistry, Medical Laboratory Science,  
Sudan University of Science and Technology (2003)**

**Postgraduate Diploma in Medical Laboratory Science,  
Sudan University of Science and Technology (2013)**

**A Thesis submitted in partial fulfillment for the requirement of M. Sc.  
Degree in clinical chemistry**

**Supervisor:**

**Dr. Nagah Abd Elwahab**  
**Associate Professor Biochemistry**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال الله تعالى

قُلْ هَلْ نُنَبِّئُكُمْ بِالْأَخْسَرِينَ أَعْمَالًا { 103 } الَّذِينَ ضَلَّ سَعْيُهُمْ فِي الْحَيَاةِ  
الدُّنْيَا وَهُمْ يَحْسَبُونَ أَنَّهُمْ يُحْسِنُونَ صُنْعًا { 104 } أُولَئِكَ الَّذِينَ كَفَرُوا بِآيَاتِ  
رَبِّهِمْ وَلِقَائِهِ فَحَبِطَتْ أَعْمَالُهُمْ فَلَا نُقِيمُ لَهُمْ يَوْمَ الْقِيَامَةِ وَزْنًا { 105 }

صدق الله العظيم

سورة الكهف الآيات 103-105

## **ACKNOWLEDGMENTS**

It is pleasure to express my indebtedness, respect, scene thanks and deep gratitude to my supervisor Dr. Nagah Abd Elwahab for her valuable help and great assistances throughout my study. Also my thanks extended to the staff of clinical chemistry department, collage of medical laboratory science, Sudan university of science and technology.

My greatest debt of all is to my family for their kindness and unlimited assistance. Special thanks to my brother Dr. Kamal A/Alla Bedry, ARC, for his encouragement, continuous help and support.

I am greatly thankful available assistance to the staff of Karema and Merowe hospitals laboratories.

## **DEDICATION**

*To the soul of my mother, My father. To my lovely wife Ehlam.*

*To my sons Mohamed Elhabeeb, ABubeker, Omer and Osman and to my  
daughter Reham*

## TABLE OF CONTENTS

LIST OF TABLES.....	1
ABSTRACT.....	II
ARABIC ABSTRACT.....	111
CHAPTER ONE: INTRODUCTION.....	1
CHAPTER TWO: LITERATURE REVIEW.....	3
2.1. Endemic of typhoid.....	3
2.2. History and epidemiology of typhoid.....	5
2.3. Biochemical changes in typhoid.....	8
2.4. Pathogenesis.....	9
2.5. Diagnosis.....	11
2.6. Alteration of serum total protein due to typhoid infection.....	12
2.6.1. Protein contents.....	14
2.6.2. Purpose of total protein test.....	15
2.6.3. Total protein range .....	15
2.7. Serum albumin and globulin.....	16
2.7. 1.Clinical significance of Serum albumin .....	16
2.7.2. Serum Albumin nature.....	19
2.8. Globulin .....	21
2.9. Albumin Globulin ratio.....	21

CHAPTER THREE: MATERIELS AND METHODS.....	23
3.1. Materials.....	23
3.1.1. Study design .....	23
3.1.2. Study area.....	23
3.1.3. Study population.....	23
3.1.4. Ethical consideration .....	24
3.1.5. Data analysis .....	24
3.1.6. Methodology .....	24
3.1.7. Sampling .....	24
3.2. Estimation of biochemical parameters.....	24
3.2.1. Estimation of serum total protein.....	25
3.2.2. Estimation of serum albumin.....	26
3.2.3. Globulin calculation.....	27
3.2.4. Albumin: Globulin ratio.....	27
CHAPTER FOUR: RESULTS.....	28
4.1. Results .....	28
CHAPTER FIVE: DISCUSSION.....	32
CHAPTER SIX: REFERENCES.....	35
APPENDIX.....	41

## **LIST OF TABLES**

- Table 4-1. Comparison of estimated biochemical parameters between studied participants.
- Table 4-2. Comparison of biochemical parameters between different genders in typhoid positive participants.
- Table 4-3 Comparison study of estimated parameter regarding typhoid titers.
- Table 4-4 Correlation of typhoid titers against estimated parameters.

## **ABSTRACT**

This is descriptive analytical case control study was conducted in Merowe locality, Northern state, Sudan, during the period April to June 2014, the study aims to assess the effects of enteric fever on serum total protein, albumin, globulin and albumin: globulin ratio in typhoid males and females patients and to compare their results with healthy, and comparison between healthy and infected males and females using colorimetric method. The results reveal that, serum total protein and globulin were significantly increased in typhoid patients compared to healthy P. value =0.000. on the other hand, serum albumin and albumin: globulin ratio was significantly decreased in typhoid patients compared to healthy P. value =0.000 . No significant differences in serum total protein, serum albumin and serum globulin between males and females patients regarding the effects of the typhoid. Correlations between the titers and serum total protein, albumin and globulin were negative. The study concluded that, Enteric fever increases total serum protein and serum globulin and decreases serum albumin and albumin: globulin ratio irrespective of genders.



## ملخص الدراسة

هذه الدراسة اجريت فى محلية مروي، الولاية الشمالية ، السودان خلال الفترة من ابريل الى يونيو 2014 وتهدف الى تقدير اثر حمى التايڤويد على مصل الدم الكلى للبروتين والبيومين وغلوبولين

لمرضى التايڤويد من الرجال والنساء ومقارنة نتائجهم بالافراد الاصحاء .

اثبتت الدراسة ان مصل الدم الكلى للبروتين والغلوبولين تزيد زيادة معنوية لمرضى حمى التايڤويد مقارنة بالافراد الاصحاء من الرجال والنساء . كما اثبتت الدراسة ان مصل الدم للالبيومين والنسبة بين الالبيومين والغلوبولين تنخفض انخفاضاً معنوياً لمرضى حمى التايڤويد مقارنة بالاصحاء من الجنسين.

كما اثبتت الدراسة انه لا يوجد اختلاف معنوى فى مصل الدم الكلى للبروتين والبيومين وغلوبولين لمرضى التايڤويد من الرجال والنساء . كما اتضح ان العلاقة سالبة بين درجة الامراضية ومصل الدم الكلى للبروتين والبيومين وغلوبولين .