

Dedication

This humble research is dedicated to my wife Nawal and my children who spared no effort to encourage me to complete this research ,and whom I hope it will be a motive for them to go forward in their education .

Acknowledgements

.I would like hereby to express my gratitude to my supervisor Dr. Mohammed Abdelrahim who has supervised this research and whose patience and constant willingness have largely contributed to completing and presenting this work in it's present from .

My gratitude goes to Mr. Ahmed Sidig the chief nurse of the malnutrition department in Ibrahim Malik Hospital and to Mr. Hashim Ali the chief nurse in Khartoum Teaching Hospital (malnutrition department) and Miss Sawsan a sister in Khartoum Pediatric Hospital and to the nursing staff of Ahmed Gasim Hospital (malnutrition department) and I would like to ensure that these people had offered all assistance , showing concern with every bit and point of this research.

I am also grateful to Mrs. Yahya and Yahya technologists in C15 lab and who placed the lab at my disposal

My whole hearted thanks are offered to everyone who has contributed , directly or indirectly to completing this research which I hope I have done satisfactorily.

Contents

Dedication	I
ACKNOWLEDGEMENTS	II
List of Figures	VII
List of Tables	IX
Abbreviations	XI
DECLARATION	XII
Abstract	XIII
الخلاصة	XIV
CHAPTER ONE	
INTRODUCTION AND LITERATURE REVIEW	
1-1 Malnutrition	1
1-1-1 Protein - Energy Malnutrition(PEM)	1
1-1-2 The types of malnutrition	12
1-1-2-1 Kwashiorkor	12
a-Etiology	13
b-Clinical Manifestations	17
c- Epidemiology	18
1-1-2-2 Marasmus	19
a - Etiology	19
b- Clinical picture	25
c- Pathological , physiological, and biochemical alterations	28
(1-1-2-3)Malnutrition	32
(1-1-2-4) Malnutrition of mild degree	32
(1-1-2-5) Arrested development	32
(1-1-2-6) Other protein calorie malnutrition	32
(1-1-2-7) Unspecified protein calorie malnutrition	32
1-1-3 People at grave risk from hunger	34
1-The Rural Poor	35
2-The urban poor	35
3-Children of poor Families	36
4-The elderly	36
5-Women	36
6-Refugees	36
1-1-4 Path physiology of malnutrition	37
1- Frequency	38
2- Internationally	38
3- Mortality / Morbidity	39
4-Age	40
5-History	40
6-Physical	42

7-Oral changes.	42
8-Abdominal findings.	42
9-Skin changes.	42
10-Nail changes:	43
1-1-5-Causes Malnutrition:-	43
1-1-6-Symptoms and Signs:-	44
1-1-7 Diagnosis	45
1-1-8-Differential Diagnosis	45
1-1-9- Diagnostic Criteria	46
2-Marasmus	47
1-1-10- Prevention	47
1-1-11-Treatment Objectives	49
1-1-12- Consultation	53
1-1-13- Diet	53
1-1-14-Follow up	54
1- Further Outpatient care:-	54
1-1-15-prognosis	55
1-1-16- Mal nutrition in children beyond infancy	56
1- Etiology	56
2- Clinical Manifestations	57
3-Treatment	58
1-1-17- Laboratory Assessment	59
1-1-18- Nutritional Anemia	62
1-1-19- Laboratory Data	63
1-1-20- Lab Studies	64
1-1-21 Additional diagnostic evaluation	65
1-1-22-Other tests	66
1-1-23- Overall Assessment	66
1- 2 objectives of the study	69
CHAPTER TWO	
MATERIALS & METHODS	70
2- 1 MATERIALS	70
2-1-1. the study groups	70
2-1-2. Sample collection	70
2-2-1 . Determination of serum total proteins	71
2-2-2 . Determination of serum albumin	73
2-2-3 . Determination of blood urea	75
2-2-4 Determination of serum iron	77
2-2-5 Determination of electrolytes	80
2-2-6 Method of haemoglobin determination	83
CHAPTER THREE	85
RESULTS	85
Age	85

Weight	85
Height (ht) cm	85
Head circumference (H.C)	86
CHAPTER FOUR	106
DISCUSSION	106
CHAPTER FIFE	112
CONCLUSION &RECOMMENDATION	112
Conclusion	112
Recommendation	112
CHAPTER SIX	114
REFERENCES	114
Appendix	123
TABLE (1) Function of Water – Proteins - Carbohydrates , and Fats	123
TABLE(2) Physiology and Sources of Nutritionally Important Minerals	124
Function and Metabolism	
Table (3a) food and nutrition board , national academy of sciences – national research council recommended the dietary allowances (fat soluble vitamins)	127
TABLE (3b) Food Nutrition Board, National Academy of Sciences – National Research Council Recommended Dietary Allowances Water – Soluble Vitamins minerals	128

List of TABLE

Topic	Page
Table (1) comparison of means of age (months) in the control and malnourished children	87
Table (2) Comparison of the means of the weight (wt) kg. in the control group and malnourished children	88

Table (3)comparison of the means of the height(ht) cm in the control group and malnourished children	89
Table (4)comparison the means of (head circumference) HC cm in the control group and malnourished children	90
Table (5) comparison of the means of the age (months) , weight (Kg) height (Cm) and Head circumference(Cm) between Males and Females malnourished children	91
Table (6)Comparison of the means of serum total proteins in the control group and malnourished children	96
Table (7)Comparison of the means of serum albumin in the control group and malnourished children	97
Table (8)Comparison of the means of serum globulins in the control group and malnourished children	98
Table (9) Comparison of the means of blood urea in the control group and malnourished children	99
Table (10)Comparison of the means of the serum total iron in the control group and malnourished children	100
Table (11)Comparison of the means of the serum electrolytes (Na +) in the control group and malnourished children	101
table (12) Comparison of the means of the serum electrolytes (K+) in the control group and malnourished children	102
Table (13) mean haemoglobin concentration in malnourished children And control children	103
table (14)correlation's coefficients of age , weight, height and head circumference	104
Table (15)Correlation's coefficients of serum total proteins (g/dl) , serum albumin(g/dl) , serum globulins serum(g/dl) totals iron (μ dl) serum electrolytes Na ⁺ (mmol/L) and serum electrolytes K ⁺⁺ (mmol/L)	105

List of figures

Topic	Page
Figure (1) show mean age (months) for control and malnourished children	87
Figure (2) show the mean weight (kg) for control and malnourished children	88

Figure (3) show the mean height (cm) for control and malnourished children	89
Figure (4) show the mean (HC) cm for control and malnourished children.	90
Figure (5a)Comparison of the means of the age (months) between Males and Females malnourished children	91
Figure (5b)Comparison of the means of the weight (Kg) between Males and Females malnourished children	92
Figure (5c)Comparison of the means of the height (Cm) between Males and Females malnourished children .	92
Figure (5d)Comparison of the means of the Head circumference(Cm) between Males and Females malnourished children	93
Figure (6)show the mean of serum total proteins test(g s/ dl) for control group and malnourished children	96
Figure (7)show the mean of serum albumin test (gms/ dl) for control and malnourished children	97
Figure (8)show the mean of serum globulins test (gms/ dl) for control and malnourished children	98
Figure (9)show the mean of blood urea test (mg / dl) for control and malnourished children	99
Figure (10)show the mean of serum total iron test (μ grm / dl) for control and malnourished children	100
Figure (11)show the mean of serum electrolytes (Na +) test (mmol/ L) for control and malnourished children	101
Figure (12)show the mean of serum electrolytes (K +) test (mmol/ L) for control and malnourished children	102
Figure (13) mean haemoglobin concentration in malnourished children And control children	103

Abbreviations

BCG: Bromo – Cresol Green

BMI : Body Mass Index

BUN : Blood Urea Nitrogen

CSF: Cerebra - Spinal Fluid .

DRG : Daily Rate Of Growth

E.D.T.A : Ethylene Diamine Tetra Acetic acid

FAO : Food And Agriculture Organization

HAC : Humanitarian Aid Commit Ion

H.C : Head Circumference

Ht: Height

MBBS: Bachelor Of Medicine And Bachelor Of Surgery

NGOs : None Governmental Organization

NHANESH : National Health And Nutrition

Examination Survey

PCM: Protein- calorie- Malnutrition

PEM : Protein- Energy – Malnutrition

UINESCO: United Nation Education Science Culture Organization

UNICEF : United Nation International Children

TPTZ: tripyridil Triazine

WHO : Word Health Organization

Emergency Funds

Wt: Weight

DECLARATION

The work prescribed in this thesis has been conducted by the undersigned in Omdurman Clinical Laboratory Center Elshuhada and Laboratory C 15 for Children in The Khartoum children's Emergency Hospital

Hereby I declare that :

I did all blood collection and plasma separation .

I performed all clinical investigations .

I also declared that this topic had not been submitted to any other university or research center before for any other degree .

candidate : Omar Abbas Mohammad
Supervisor : Dr. Mohammed Abd . Elrahim A/Alla

Abstract

This research focus with the effects of malnutrition on some biochemical factors specially , total protein , albumin , globulins , urea , serum iron and electrolytes in Sudanese children whose age range between two months and six years .

The research has covered 50 children, 40 of them has been already diagnosed as marasmus , kwashiorkor or marasmic kwashiorkor the other 10 children are normally growing children . The research has specifically been conducted for determining the impact of malnutrition on the above mentioned biochemical factors .

The obtained results revealed that there is no difference between the samples and controls except in the serum total iron . Serum potassium and haemoglobin where there is a significant difference between the controls and samples using t. test , where the p value in all cases is less than 0.05.

الخلاصة

هذا البحث يعني بالأثر الذي ينتج عن سوء التغذية علي العوامل الكيميائية بالدم وخاصة نسبة كل من البروتين الكلي, الزلالي , القلويولين البولينا , نسبة الحديد الكلية , نسبة الأملاح وخاصة الصوديوم والبوتاسيوم عند الأطفال السودانيين ذوي المدي العمري بين شهرين الي ستة سنوات البحث اشتمل علي خمسين طفل (50) أربعين (40) منهم قد تم تشخيصهم مسبقاً علي انهم أما ذوي نقص حاد في البروتين أو ذوي نقص حاد في النشويات أو ذوي حالات مزدوجة (نقص حاد في كل من النشويات والبروتينات معاً) إما الأطفال العشرة (10) الباقين فهم أطفال ذوي نمو سوي ولا يشكون من اي أمراض البحث اجري خصيصاً لمعرفة الأثر الذي يتركه سوء التغذية بأحواله الثلاثة للعوامل الكيماوية التي ذكرت سابقاً .

النتائج :-

النتائج التي تحصلنا عليها أثبتت انه لا يوجد فرق في نسبة هذه المواد بين الأطفال الأسوياء والأطفال المرضى الا في حالة نسبة الحديد الكلية وفي حالة نسبة البوتاسيوم والهيموقلوبين وذلك حسب ما ثبت بأجراء اختبار (t.) حيث ان قيمة (P) كانت في هذه الحالات اقل من 0.05