



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



MONA MAGHRABY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم



شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



MONA MAGHRABY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



MONA MAGHRABY

Human Intestinal Fatty Acid binding protein as a prognostic marker in premature Neonates suffering from Necrotizing Enterocolitis

A Thesis

Submitted for partial fulfillment of Master degree
in Pediatrics

By

Ghada Mahfouz Mostafa
M.B.B.Ch

Under Supervision of

Prof. Dr. Ibrahim Saad Abu Saif

Professor of Pediatrics and Neonatology
Faculty of Medicine, Ain Shams University

Dr. Mohamed Omar Abd El Aal

Lecturer of Pediatrics and Neonatology
Faculty of Medicine, Ain Shams University

Dr. Marwa Ali Abdel-Wahed

Lecturer of Clinical Pathology
Faculty of Medicine, Ain Shams University

**Faculty of Medicine
Ain Shams University
2021**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

لسببائك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

سورة البقرة الآية: ٣٢



Acknowledgments

*First and foremost, I feel always indebted to **Allah**, the **Most Beneficent** and **Merciful** who gave me the strength to accomplish this work,*

*My deepest gratitude to **Prof. Dr. Ibrahim Saad Abu Saif**, Professor of Pediatrics and Neonatology, Faculty of Medicine, Ain Shams University, Ain Shams University, for his valuable guidance and expert supervision, in addition to his great deal of support and encouragement. I really have the honor to complete this work under his supervision.*

*I would like to express my great and deep appreciation and thanks to **Dr. Mohamed Omar Abd El Aal**, Lecturer of Pediatrics and Neonatology, Faculty of Medicine, Ain Shams University, for his meticulous supervision, and his patience in reviewing and correcting this work,*

*I must express my deepest thanks to **Dr. Marwa Ali Abdel-Wahed**, Lecturer of Clinical Pathology, Faculty of Medicine, Ain Shams University, for guiding me throughout this work and for granting me much of her time. I greatly appreciate her efforts.*

*Special thanks to **Prof. Dr. Shaimaa Abd El-Sattar** and **Dr. Omnia Seyam**, from Radiology Department, Faculty of Medicine, Ain Shams University, for the their support and cooperation.*

*Special thanks to my **Parents**, my **Husband**, **daughters** and all my **Family** members for their continuous encouragement, enduring me and standing by me.*

 *Ghada Mahfouz Mostafa*

List of Contents

<i>Subject</i>	<i>Page No.</i>
List of Abbreviations.....	i
List of Tables.....	iii
List of Figures	ix
Introduction	1
Aim of the Work.....	3
Review of Literature	
Prematurity.....	4
Necrotizing Enterocolitis	52
Intestinal Fatty Acid Binding Protein	86
Patients and Methods.....	98
Results.....	108
Discussion	172
Summary and Conclusion	180
Recommendations	184
References	185
Arabic Summary	—

List of Abbreviations

<i>Abbr.</i>	<i>Full-term</i>
ABR	: Auditory brainstem response
A-FABP	: Adipocyte- Fatty acid binding protein
AMAS	: Analysis of multiply aligned sequences
ARP-1	: Apolipoprotein regulatory protein-1
AUC	: Area under curve
B-FABP	: Brain Fatty acid binding protein
CPAP	: Continuous positive airway pressure
CRP	: C-reactive protein
E-FABP	: Epidermal Fatty acid binding protein
EGF	: Epidermal growth factor
ELISA	: Enzyme linked immunosorbant assay
FABP	: Fatty acid binding protein
Fas	: Fatty acids
fFN	: Fetal fibronectin
HB-EGF	: Heparin-binding epidermal growth Factor-like growth factor
H-FABP	: Heart- Fatty acid binding protein
HFNC	: High flow nasal cannulae
I-FABP	: Intestinal fatty acid binding protein
I-FABP	: Intestine Fatty acid binding protein
IL	: Interleukin
II-FABP	: Ileal Fatty acid binding protein
LBW	: Low birth weight

LCFAs	: Long chain fatty acids
L-FABP	: Liver Fatty acid binding protein
M-FABP	: Myelin Fatty acid binding protein
NCBI	: National Center for Biology Information
NEC	: Necrotizing enterocolitis
NICU	: Neonatal intensive care unit
NIH	: National Institutes of Health
NOD-2	: NOD-like receptor 2
NPPV	: Positive pressure ventilation
PAF-AH	: Platelet-activating factor acetylhydrolase
PAMG-1	: Placental alpha microglobulin-1
PDA	: Patent ductus arteriosus
ROC	: Receiver operator curve
T-FABP	: Testis Fatty acid binding protein
TLC	: Total leucocytic count
TLR4	: Toll-like receptor-4
TLR9	: Toll-like receptor 9
TNFα	: Tumor necrosis factor alpha
WHO	: (World Health Organization WHO

List of Tables

Table No.	Title	Page No.
Table (1):	Weight, length and head circumference by gestational age for boys.....	22
Table (2):	Weight, length and head circumference by gestational age for girls	23
Table (3):	Degree of NEC severity	74
Table (4):	Complications and outcomes in patients with NEC	76
Table (5):	Comparison between the cases and the controls regarding gestational age, birth weight and some demographic data	108
Table (6):	Correlation between maternal disease and the occurrence of the disease	112
Table (7):	Correlation between respiratory support and the occurrence of NEC disease.....	113
Table (8):	Comparison between cases group and control group regarding TLC and CRP	115
Table (9):	Comparison between the cases group and the control group regarding the level of serum intestinal fatty acid binding protein (IFABP) at the time of diagnosis of NEC.....	116
Table (10):	Comparison between cases and control groups regarding thrombocytopenia and neutrophil count.....	119

Table (11):	Staging of cases according to modified Bell's criteria	121
Table (12):	Comparison between cases and control groups according to the final outcome among each group (either relief or death).	123
Table (13):	Hospital stay duration in days and severity classification among NEC patients in cases group.	123
Table (14):	Logistic regression analysis for factors associated with the disease	124
Table (15):	Correlation between the final outcome (either relief or death) of NEC patients in the cases group and some other factors.....	125
Table (16):	Correlation between respiratory support and the final outcome among patients in cases group	128
Table (17):	Correlation between TLC (total leucocytic count) and the CRP (C-reactive protein) and the final outcome with highly significant correlation in both.....	129
Table (18):	Correlation between the level of serum intestinal fatty acid binding protein at time of diagnosis and one week later with the final outcome among patients in the cases group	131
Table (19):	Correlation between platelet count and neutrophil count with the final outcome in cases group, with a statistically significant correlation with the platelet count.	131

Table (20):	Correlation between the staging of cases and their radiological findings with the final outcome among patients in the cases group	133
Table (21):	Correlation between hospital stay duration and the disease severity with the final outcome among patients in the cases group	134
Table (22):	Correlation between some demographic factors with the disease severity among patients in cases group.....	135
Table (23):	Correlation between respiratory support and disease severity among patients in cases group with no statistically significant correlation.....	136
Table (24):	Correlation between TLC and CRP with the disease severity among the cases group.....	137
Table (25):	Correlation between level of serum IFABP at time of NEC diagnosis and its level one week after NEC diagnosis with the disease severity among patients in cases group	138
Table (26):	Correlation between platelet count (thrombo-cytopenia) and neutrophil count with disease severity among patients in cases group.....	140
Table (27):	Correlation between the staging and different radiological findings with the disease severity among patients in cases group.....	143

Table (28):	Correlation between the hospital stay duration with the disease severity among patients in cases group.....	145
Table (29):	Comparison between mild to moderate cases and sever cases as regards different data in their history.....	146
Table (30):	Comparison between mild to moderate cases and severe cases as regards respiratory support.....	148
Table (31):	Comparison between mild to moderate cases and severe cases regarding TLC and CRP.....	149
Table (32):	Comparison between mild to moderate cases and sever cases as regards level of serum IFABP at time of diagnosing NEC and its level one week after NEC diagnosis.....	150
Table (33):	Comparison between mild to moderate cases and severe cases regarding platelet count and neutrophil count	152
Table (34):	Comparison between mild to moderate cases and severe cases regarding different radiological findings.....	154
Table (35):	Comparison between mild to moderate cases and severe cases regarding hospital stay duration and the final outcome	156
Table (36):	Univariate logistic regression analysis for factors associated with severe disease.....	157

Table (37): Comparison between serum IFABP level at time of NEC diagnosis and its level one week later regarding their correlation with different factors associated with the disease.	158
Table (38): Correlation between level of serum IfABP at time of NEC diagnosis and other factors (gender maternal disease, residence consanguinity, respiratory support, outcome and severity)	160
Table (39): Correlation between level of serum IfABP one week after NEC diagnosis and other factors (gender maternal disease, residence consanguinity, respiratory support, outcome and severity)	161
Table (40): Correlation between level of serum IfABP at time of NEC diagnosis and other factors (thrombocytopenia, staging of cases and different radiological findings)	162
Table (41): Correlation between level of serum IfABP one week after NEC diagnosis and other factors (thrombocytopenia, staging of cases and different radiological findings).....	164
Table (42): Comparison between the early stage cases (stage I and stage II) and late stage (stage III) cases and their correlation with different factors.....	167

Table (43):	Comparison between early stage cases and late stage cases regarding respiratory support and maternal disease	168
Table (44):	comparison between early stage cases and late stage cases regarding CRP, TLC, IFABP level at diagnosis of NEC, IFABP level one week after diagnosis of NEC	169
Table (45):	Comparison between early stage cases and late stage cases regarding outcome, severity and different radiological findings	170
Table (46):	Logistic regression analysis for factors associated with late stage	171