

Adverse Reactions to Food in Pediatrics

Essay

Submitted for Partial Fulfillment of Master
Degree in Pediatrics

Presented by

Fatemah Fathallah Abdelsamei
(M.B.B.Ch. Ain Shams University)

Supervised by

Prof. Dr. Sherein Mohamed Abdel Fattah

Professor of Pediatrics

Faculty of Medicine

Ain Shams University

Dr. Solaf Mohamed Elsayed

Assistant Professor of Genetics

Faculty of Medicine

Ain Shams University

Faculty of Medicine

Ain Shams University

2009

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

"قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا
عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ"

صدق الله العظيم

Acknowledgement

At first and for most thanks to "**ALLAH**" who give me the power to finish this work.

I find no words by which I can express my deepest thanks and gratitude to my honored **Professor Dr. Sherein Mohamed Abdel Fattah**, Professor of Pediatrics, Faculty of medicine, Ain Shams University, for the continuous kind encouragement, support and guidance, she gave me throughout the entire work.

I would like to express my gratitude and appreciation to **Dr. Solaf Mohamed**, Assistant Professor of genetics, Faculty of Medicine, Ain Shams University, for giving me the opportunity to work under her supervision, for giving me her precious time, her honest assistance and patience that made me truly thankful to her.

To my mother, my keen mother Professor **Dr. Ibtesam Bahi EL-Deen**, my husband, my beloved daughter "Nour", my whole family and to everyone who participated in a way or another in this work. I owe my thanks and appreciation.

Fatemah Fathallah Abdelsamei

List of Tables

	<i>Page</i>
Table (1): Recommended dietary allowance	12
Table (2): Estimated average requirements (K ⁺ , Na, Cl)	13
Table (3): Adequate intakes of selected vitamins	14
Table (4): Infant formula selection	24
Table (5): Recommended calorie distribution	25
Table (6): Infant feeding guide	27,28
Table (7): Nutritious choices within food groups	31
Table (8): Estimated daily calorie and protein needs for adolescents	34
Table (9): Vitamins deficiency and excess	66-78
Table (10): Recommended daily dose-ranges for treatment of vitamin-related diseases	80
Table (11): Characteristics of mineral deficiencies	81
Table (12): Prevalence of food allergies	155
Table (13): Representative food allergens class I	165

Table (14): Representative food allergens class II	166
Table (15): Food hypersensitivity disorders	182
Table (16): Examples of protein hydrolysate and amino acid based formulas	185
Table (17): Summary of gastrointestinal food hypersensitivities	200
Table (18): Summary of skin manifestations of food allergy	206
Table (19): Respiratory manifestations of food allergy	211
Table (20) Incidence of other food allergies in 100 children with CMA	213
Table (21): Recommendations for prophylaxis of food allergy	227
Table (22): Potential immunotherapeutic strategies for the treatment of food allergy	244

List of Figures

	<i>Page</i>
Figure (1): Methods for nutritional assessment	10
Figure (2): Nutritional schedule for the 1 st year of life	25
Figure (3): Optimized mixed nutrition	26
Figure (4): The (USDA) food guide pyramid	36
Figure (5): Tips for using the food guide pyramid to young children	37
Figure (6): Effects of pre and probiotics on human body	52
Figure (7): Selection of target functions for functional foods	55
Figure (8): Occurrence and daily requirement of vit. A	67
Figure (9): Occurrence and daily requirement of vit. D	68
Figure (10): Occurrence and daily requirement of vit. K	70
Figure (11): Occurrence and daily requirement of vit. B1	71
Figure (12): Occurrence and daily requirement of vit. B2	72
Figure (13): Occurrence and daily requirement of Niacin	73

Figure (14): Occurrence and daily requirement of folate	74
Figure (15): Occurrence and daily requirement of biotin	75
Figure (16): Occurrence and daily requirement of "pyridoxine" vit. B6	76
Figure (17): Occurrence and daily requirement of vit. B12	77
Figure (18): Occurrence and daily requirement of vit. C	78
Figure (19): Occurrence and daily requirement of Iron	81
Figure (20): Occurrence and daily requirement of Copper	82
Figure (21): Occurrence and daily requirement of Zinc	83
Figure (22): Occurrence and daily requirement of Selenium	84
Figure (23): Occurrence and daily requirement of Chromium	84
Figure (24): Occurrence and daily requirement of Iodine	85
Figure (25): Occurrence and daily requirement of Calcium	87
Figure (26): Occurrence and daily requirement of Phosphorus	88

Figure (27): Occurrence and daily requirement of Magnesium	89
Figure (28): Occurrence and daily requirement of Potassium	90
Figure (29): Occurrence and daily requirement of Manganese	92
Figure (30): Basic components of Foods	98
Figure (31): Factors affecting food choices	99
Figure (32): Steps of food exposure to additives	145
Figure (33): Artificial sweeteners	148
Figure (34): (Nitrate/ nitrite)-metabolism	151
Figure (35): Sources of different chemical food contaminants	154
Figure (36): Primary sensitization after antigen exposure and subsequent response after 2 nd exposure	179
Figure (37): Summary of food induced allergic oesinophilic esophagitis	195
Figure (38): Immunological progression of atopic dermatitis	203
Figure (39): summary of adverse food reactions.....	268

List of Pictures

	<i>Page</i>
Picture (1): Respiratory epithelium and effect of vit. A deficiency	67
Picture (2): Symptoms/ signs of vit. A deficiency	67
Picture (3): Vit. D deficiency (rickets)	69
Picture (4): Extensive hemorrhage caused by vit. K deficiency	70
Picture (5): Vit. B1 deficiency "Beriberi"	71
Picture (6): Niacin-deficiency "Pellagra"	73
Picture (7): Folic acid-deficiency "Neural tube defect-spina bifida"	74
Picture (8): Biotin deficiency "Cheilosis"	75
Picture (9): EEG showing: vit. B6 "pyridoxine" deficiency	76
Picture (10): Vit. B12 deficiency "Megaloblastic anemia"	77
Picture (11): Typical extensive subcutaneous hemorrhage caused by vit. C deficiency	79

Picture (12): Iron deficiency anemia	81
Picture (13): Skin lesions caused by zinc deficiency	83
Picture (14): Iodine deficiency "goiter" + "critinism"	86
Picture (15): Osteoporosis caused by calcium deficiency	87
Picture (16): ECG changes caused by hyperkalemia	91
Picture (17): Atopic dermatitis	202

List of Abbreviations

	<i>Page</i>
AAP	American academy of pediatrics
AI	Adequate Intake
AIDS	Aquired immunodeficiency syndrome
AK	Applied kinesiology
BNBAS	Brazelton Neonatal Behavioral Assessment Scale
CMA	Cow's milk allergy
CNS	Central nervous system
DHA	Decosalhexaenoic acid
DRIs	Dietary Reference Intakes
EPA	Environmental protection agency of the United States
FAST	Fluorescent allergosorbent test
FDA	Food and Drug Administration
FOSHU	Foods for specific health use
GERD	Gastroeosophageal reflux disease
HIV	Human immunodeficiency virus
IBD	Inflammatory bowel diseases
IEM	Inborn errors of metabolism

INHIsoniazidehydrochloride

LCFAsLong chain fatty acids

UIL.....Upper intake level

MCTMedium chain triglyceride

OFCs.....Oral food challenges

OPOrganophosphorus

PEM.....Protein energy malnutrition

PKUPhenylketonuria

RASPRadioallergosorbent procedure

RASTRadioallergosorbent test

RDARecommended Dietary Allowance

SHSScientific hospital supplies

SIDS.....Sudden infant death syndrome

SPTSkin prick test

UNICEFUnited Nations International Children's
Emergency Fund

USDA.....United States Department of Agriculture

WHOWorld Health Organization

WICSpecial supplemental food program for women,
infants and children

Contents

	<i>Page</i>
• List of Tables	I
• List of Figures	III
• List of Pictures	VI
• List of Abbreviations	VIII
• Introduction and Aim of the Work	1
• Review of Literature:	
▪ Chapter (1): Normal food composition	4
- <i>Nutritional assessment</i>	<i>4</i>
- <i>Feeding of Infants (0: 6months old): Breast feeding formula feeding</i>	<i>15</i>
- <i>Feeding of Infants (6months - 2years old):</i>	
- Introduction of solids and different nutritional requirements	<i>26</i>
- <i>Feeding of (Children > 2 years old):</i>	<i>29</i>
- <i>Feeding of adolescents:</i>	<i>33</i>
- <i>Organic foods and children</i>	<i>38</i>
- <i>Pre & probiotics</i>	<i>49</i>
▪ Chapter (2): Unbalanced Diet	56
- (A) Deficiency: total energy deficiency: under nutrition, marasmus, "kwashiorkor"	57

- (B) <i>Excess: Total energy excess: obesity</i>	62
- (C) <i>Vitamins deficiency and excess:</i>	65
- (D) Unbalanced quantity and quality: Fast food "Junk food" - adolescents eating habits	93
▪ Chapter (3): Food contamination	111
a) <i>Microbial food contamination</i>	111
b) <i>Chemical (industrial food contamination)</i>	142
▪ Chapter (4): Host problems (Food allergy)	155
- Most common food causing allergy, pathogenesis of allergy clinical picture, diagnosis, treatment, prevention	
▪ Chapter (5): Host problems (Food intolerance)	251
- Types of food intolerance, pathogenesis, clinical picture diagnosis, treatment, prevention	
• Summary	269
• Recommendations	275
• References	279
• Arabic Summary	__

Introduction and Aim of the Work

The dramatic growth of infants during the first year of life and continued growth in childhood through adolescence impose unique nutritional needs for growth. Those are superimposed on relatively high maintenance needs incident to the higher metabolic and nutrient turnover rates of infants and children versus adults. Because the rapid rates of growth are accompanied by marked developmental changes in organ function and composition; failure to provide adequate nutrients during this time is likely to have serious adverse effects on growth as well as development (*Heird, 2004*)

Food security concerns the amount and the quality available for consumption by individual. Expressed by unit of body weight, the normal infant requires approximately three times more energy than the adult including higher proportions of protein for essential amino acids and cystien, sufficient carbohydrates to prevent ketosis or hypoglycemia and enough fat to provide essential fatty acids and long chain polyunsaturated fatty acid requirements, also adequate intakes of most minerals, vitamins and water is recommended for achievement of optimal nutrition (*Heird, 2004*)

Cumulative evidences suggests that deficiency of certain nutrients (i.e. malnutrition) or in total amount (under nutrition)