Effect of Honey on Complement Hemolytic Activity 50 (CH50) During Nutritional Rehabilitation in Infants and Children with Protein Energy Malnutrition

Thesis

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List of Abbreviations

Alk.Ph: Alkaline phosphatase

ALT: Alanine transaminase

AST: Aspartate transaminase

BF: Breast feeding

BUN: Blood urea nitrogen

C(n): Complement; n=number of complement

Ca: Calcium

CBC: Complete Blood Count

CD(n): Cluster of differentiation

CH50: Complement hemolytic activity 50

Cm: centimeter

Creat.: Creatinine

C1 INH: Complement1 inhibitor

ECG: Electrocardiography

EEG: Electroencephalogram

GN: Glomerulonephritis

Hb: Hemoglobin level

HC: Head circumference

HCT: Hematocrite

Ht: height

IgA: Immunoglobuline A

IgG: Immunoglobuline G

IgM: Immunoglobuline M

IM: Intramascular

K: Potassium

Kg: kilogram

KWO: Kwashiorkor

LDL: Low density lipoprotein

Lymph.: Lymphocytes

MAC: Midarm circumference

MASP: MBL associated serine proteases

MBL : Mannose binding lectin

MCHC: Mean corpuscular hemoglobin concentration

MCV: Mean corpuscular volume

MKWO: Marasmus Kwashiorkor

Na: Sodium

P: Phosphorus

PEM: Protein Energy Malnutrition

Plat: Platelet count

PNL: Neutrophiles

RBCs: Red blood cells

SCU: Severe childhood undernutrition

SLE: Systemic lupus erythrematosus

Tbsp: Table spoon

TLC: Total Leucocytic Count

USDA: United State Department of Agriculture

WBCs: White blood cells

WHO: World Health Organization

Wt: weight

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Introduction and Aim of the Work

Protein energy malnutrition (PEM) constitutes a major pediatric problem in most of the developing countries. In Egypt, the syndrome is quite common. It stands as a major threat to Infant's health, growth and development **(Gabr et al., 1984).**

Epidemiologic studies have shown a relationship between nutritional deficiencies and heightened risk of morbidity and mortality due to infectious diseases. These observations led to studies that examined the effect of protein-energy malnutrition on immunocompetence. Protein – energy malnutrition is associated with a significant impairment of cell-mediated immunity, phagocyte function, complement system, secretory immunoglobulin A antibody concentration, and cytokine production **(Chandra, 1992).**

The complement system plays an important role in host defense against infection and in most inflammatory processes. The standard 50% hemolytic complement (CH50) assay is the most commonly used method of screening patient sera for functional activity of the classical complement pathway **(Jaskowski et al, 1999).**

Availability of complement components is restricted by malnutrition, thereby affecting the capacity of professional phagocytes to engulf and eliminate pathogens **(Schaible et al,2007).**

Haller et al., (1978) found that the plasma levels of CH50, C3, C9 and factor B were decreased; without a concomitant decrease of C4 and C5; in patients with protein energy malnutrition.

Honey is a source of "natural" sugars, there are several reports of the effectiveness of honey in gastrointestinal disorders, wound healing and as an antimicrobial, anti-inflammatory agent. The composition of a particular sample of natural honey will depend upon the composition of the nectar and where it originates. Honey is composed mainly of fructose, dextrose, maltose, sucrose and moisture with other trace components. The main sugars in honey, fructose and glucose are absorbed directly into the blood; provide a rapid source of energy without the need of digestion **(Naguib et al, 2001).**

Honey can stimulate the release of tumor necrosis factor- ∝ and cytokines in monocytic cells **(Tonks et al., 2001, 2003),** It also increases the proliferation of B-and T-lymphocytes and neutrophils in vitro **(Abuharfeil et al., 1999).** In addition, honey has been demonstrated to stimulate antibody production during primary and secondary immune responses against thymus-dependent and thymus – independent antigens **(Al-Waili and Haq, 2004).**

In the study done by **Abdul Rhman (2007)**; he found that the Bee honey nebulization is an effective and safe treatment for mild and moderate acute attacks of asthma in infants and children.

There is another study done on using the honey in the treatment of infantile gastroenteritis in infants and children aged 8 days to 11 years, the honey was used instead of glucose in oral rehydration solution ,the dose of honey was 50 gm pure honey per liter of ORS and infants and children with mild to moderate dehydration were given 50-100 ml/Kg body weight of ORS over 4 hours **(Haffejee and Moosa,1985 and Bhutta ,2008).**

The aim of this work was evaluate the effect of honey intake during the nutritional rehabilitation of patients with PEM on complement hemolytic activity 50 (CH50).

Protein Energy Malnutrition

Introduction:

The World Health Organization defines malnutrition as "***the cellular imbalance between supply of nutrients and energy and the body's demand for them to ensure growth, maintenance, and specific functions***." Malnutrition is globally the most important risk factor for illness and death, contributing to more than half of deaths in children worldwide. Protein-energy malnutrition (PEM), first described in the 1920s, is observed most frequently in developing countries **(Grigsby, 2006).**

The long-term effects of nutritional deficiencies in early life depend on the severity and duration of the deficiency, the stage of the children's development, the biological condition of the children and the socio-cultural context **(Grantham-McGregor et al., 2000).**

Definition:

Deficiency of a single nutrient is an example of undernutrition or malnutrition, but deficiency of a single nutrient usually is accompanied by a deficiency of several other nutrients. Protein-energy malnutrition (PEM) is manifested primarily by inadequate dietary intakes of protein and energy, either because the dietary intakes of these 2 nutrients are less than required for normal growth or because the needs for growth are greater than can be supplied by what otherwise would be adequate intakes. However, PEM is almost always accompanied by deficiencies of other nutrients. For this reason, the term **severe childhood undernutrition** (SCU), which more accurately describes the condition, is preferred **(Heird, 2008).**

The terms primary malnutrition and secondary malnutrition refer, respectively, to malnutrition resulting from inadequate food intake and malnutrition resulting from increased nutrient needs, decreased nutrient absorption, and/or increased nutrient losses. Both primary and secondary malnutrition occur in developing as well as developed countries; malnourished children often present with gastroenteritis or pneumonia **(Heird, 2008).**

Types of PEM

Primary PEM results from a diet that lacks sufficient sources of protein and/or energy. Secondary PEM is more common in United States, where it usually occurs as a complication of AIDS, cancer, chronic kidney failure, inflammatory bowel disease, and other illnesses that impair the body's ability to absorb or use nutrients or to compensate for nutrient losses. PEM can develop gradually in a patient who has a chronic illness or experiences chronic semi-starvation. It may appear suddenly in a patient who has an acute illness **(Gale Research, 1999).**

PEM applies to a group of related disorders that include marasmus, Kwashiorkor (KWO), and intermediate states of marasmus Kwashiorkor (MKWO) **(Lin et al., 2003).**

Marasmus (Non-edematous Form of PEM):

The term marasmus is derived from the Greek word marasmos, which means withering or wasting. Marasmus involves inadequate intake of protein and calories and is characterized by emaciation **(Lin et al., 2003).**

A child is defined as suffering from Marasmus if his weight is below 60% of the expected weight (fiftieth centile) for his age **(Axton, 1990).** Marasmus is the most common form of PEM. It is due to severe caloric depletion and is diagnosed in the presence of clinical muscle wasting,