EFFECT OF HONEY INTAKE AS A PREBIOTIC ON FAECAL CALPROTECTIN DURING WEANING

Thesis

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Emad El Sayed Hegazy

LIST OF ABBREVIATIONS

AAP	*American Academy of Pediatrics*
BC	*Before Christ*
CAPE	*Caffeic acid phenethylester*
CD	*Crohn's disease*
CFR	*Code of federal regulations*
COX	*Cyclooxygenease*
E coli	*Echerchia coli*
ELISA	*Enzyme linked Immunosorbant Assay*
ESR	*Erythrocyte sedimentation rate*
FC	*Fecal calprotectin*
FOS	*Fructo-oligosaccharide*
GIT	*Gastrointestinal tract*
GOS	*Galacto – oligosaccharide*
HAZ	*Height for age z score*
HCZ	*Head circumference z score*
IBD	*Inflammatory bowel disease*
IDA	*Iron deficiency anemia*
IgA, IgG	*Immunoglobulin A and G*
IL-1	*Interleukin 1*

MUAC	*Mid upper arm circumference*
OD	*Optical density*
PI	*Prebiotic index*
RAST	*Radio-absorbent assay technique*
SCFA	*Short chain fatty acid*
WAZ	*Weight for age z score*
WHO	*World health organization*

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INTRODUCTION

Honey is a source of "natural" sugars. There are several reports of the effectiveness of honey in gastrointestinal disorders, wound healing and as an antibacterial, anti-inflammatory and antitussive agent. The composition of a particular sample of natural honey will depend upon the composition of the nectars and where it originates. Honey is composed mainly of fructose, dextrose 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. Administration of honey, Glucose fructose sucrose Mixture (GFSM), apple juice or water resulted in increases in residual Gastric Volume (RGV) without changes in the gastric pH ***(Naguib et al., 2001).***

A series of experiments were done to determine the prebiotic activity of honey and concluded that honey enhanced the growth, activity and viability of commercial strains of bifidobacteria and this effect was strain-specific ***(Kajiwara et al., 2002).***

Honey and its honey methanol extracts (HME) and honey ethyl acetate extracts have potent anti-inflammatory activites and are therefore potentially useful for all inflammatory conditions ***(Abdulazez and Yusoff , 2008).***

A study was done to assess the potential impact of probiotic/or honey supplements on intestinal permeability among Egyptian infants and children and concluded that honey supplements have the potential to restore the integrity of gut barrier function in children with higher intestinal permeability and lower absorption capacity ***(Mahmoud et al., 2007).***

Abdul-Rahman and Tayseer (2005) suggested that the previous recommendation not to give honey under one year should be reevaluated. The previous recommendation was based on the fact that honey is a cause of infantile botulism .The authors concluded that the small number of infants who developed the disease after feeding honey is not enough evidence to suggest that honey is responsible for botulism for instance swallowing spores from other sources as air should be excluded.

Calprotectin is a calcium-binding protein with in-vitro bacteristatic and fungistatic properties .It is found in abundance in neutrophils which account for 60% of protein in cytosol with lower concentrations in monocytes and macrophage. Measurement of faecal calprotectin would represent a marker of neutrophil influx into bowel lumen and in turn a marker of intestinal inflammation.It is a sensitive but non specific marker of intestinal inflammation ***(Gaya and Mackenzie, 2002).***

AIM OF THE WORK

This study was designed to assess effect of honey intake being a prebiotic on fecal calprotectin as a gastrointestinal tract inflammation marker in infants during weaning.

WEANING

Definitions:

The introduction to solid feeding and the gradual replacement of milk by solid food as the main source of nutrition is the process known as weaning While complementary feeding is the provision of any nutrient containing foods or liquids other than the breast milk and it includes solid food and infant formula ***(Foote and Marriotte, 2003).***

The term weaning is derived from the Anglo-saxon word wenian, which means "to be accustomed to something different." The Concise Oxford Dictionary says to wean is "to teach the suckling child to feed otherwise than from the breast." Weaning is often seen as the end of something. However, it is more appropriately viewed as a beginning. We misuse the word weaning in the context of stopping other activities or habits; weaning is not the cessation of breastfeeding but rather the .addition of new foods ***(Slome, 1960).***

Weaning is not a negative term. Weaning does not mean a loss, but rather a change from one relationship to another. Weaning means growing from one form of

nourishment to another when a child is fulfilled and ready for the transition ***(Ladewig et al., 2000).***

Figure (1): Mother-led weaning.

Weaning can be baby-led or mother-led. Baby-led weaning occurs when babies wean themselves from the breast by becoming less interested in feedings over time .It is easier to wean when you are not under a lot of stress. Gradual weaning is easier for mom and baby ***(Sears et al., 2003).***

Many families have different ways of weaning .Some continue to breastfeed until the baby shows an interest in weaning. Others choose to begin weaning earlier ***(Sears et al., 2003).***

There are two phases in weaning; withholding and substituting or replacing. As gradually withholding milk occurs, substitution of solid foods, other types of milks, and other forms of emotional nourishment begins ***(Rapley, 2006).***

The infant weaning also contributes more generally to infant development by encouraging tongue and jaw movements in preparation for speech, introducing new tastes and textures, and increasing social interaction with carers. Many "behavioral" eating problems have their origin in weaning mismanagement ***(Douglas, 1995).***

Targeted infant feeding programs education and support for families with regard to dental care is of importance to avoid an unnecessary amount of dental disease in young children ***(Davenport et al., 2004).***

History:

Long before the modern era some women chose not to accept their biological role as nursing mothers and societies failed to provide adequate support for nursing mothers. In ancient times both Eastern and Western women breastfed much longer than women do today. The Romans believed complete weaning should not occur until a child turned three (Galen) or had all his baby teeth (Soranus) ***(Huggins and Ziedrich, 1994).***

The Holy Koran provides the followers of Islam with special instructions regarding the duration of suckling, weaning and rearing of infants.

*والوالـدات يرضـعن أولادهـن حـولين كـاملين لمـن أراد أن يـتم الرضـاعة وعلى المولود لة رزقهن وكسوتهن بالمعروف لا تكلف نفس إلا وسعها لا

تضار والدة بولدها ولا مولود له بولده وعلى الوارث مثل ذلك فإن أرادا فصالاً عن تراض منهما وتشاور فلا جناح عليهما وإن أردتم أن تسترضعوا أولادكم فلا جناح عليكم إذا سلمتم ما أتيتم بالمعروف واتقوا الله واعلموا أن الله بما تعملون بصير *

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In medieval Europe, complete weaning typically occurred between one and three years of age. Nursing became the lot of the poor, as poor women had no choice but to nurse their own children. Though medical writers recommended breastfeeding for two years, most German and Italian mother had stopped by the thirteenth month and most English mothers by the eighteenth month. By the eighteenth century mixed at two to four months and the median age of complete weaning in the English educated classes was seven to eight months. At this time various feeding devices and artificial foods for babies were being developed. Artificial feeding became common first in Scandinavia and northern Europe and then in the American colonies, despite an awareness that artificially fed babies were likely to die ***(Brylin, 2001).***

Physiology of weaning

The physiological process of weaning is complex and involves microbiological, biochemical, nutritional, immunological, and psychological adjustments for both mother and child. During the weaning process the

composition of human milk adjusts to meet the needs of the growing child so that, although the volume is decreasing, an appropriate level of nutrients remains present and immunological protection is not compromised ***(Dewey, 2001).***

In the first year of life, infants undergo periods of rapid growth when good nutrition is crucial. In fact, nutrition in the early years of life is a major determinant of healthy growth and development throughout childhood and of good health in adulthood. Pediatricians and nutritionists have established nutritional guidelines to meet the specific needs of these early years ***(WHO, 2001).***

The composition of human milk has shown that when milk consumption falls below 400 millilitres per day, the level of sodium and other inorganic salts increases as the volume decreases. The fat, protein, and iron also increase while the calcium levels stay the same and zinc levels decrease. Milk produced during weaning also shows a decreasing concentration of lactose; fats increasingly replace lactose as the main source of calories. The calories provided by proteins remain stable. The concentration of immunological components is maintained during gradual weaning with a slight rise in the level of IgA, secretory IgA, lysozymes, and lactoferrin. Following abrupt weaning however, the concentration of these components rises dramatically. Lipases (enzymes essential for the digestion