Relation of Breast Milk Adiponectin Level to Infant Growth

Thesis

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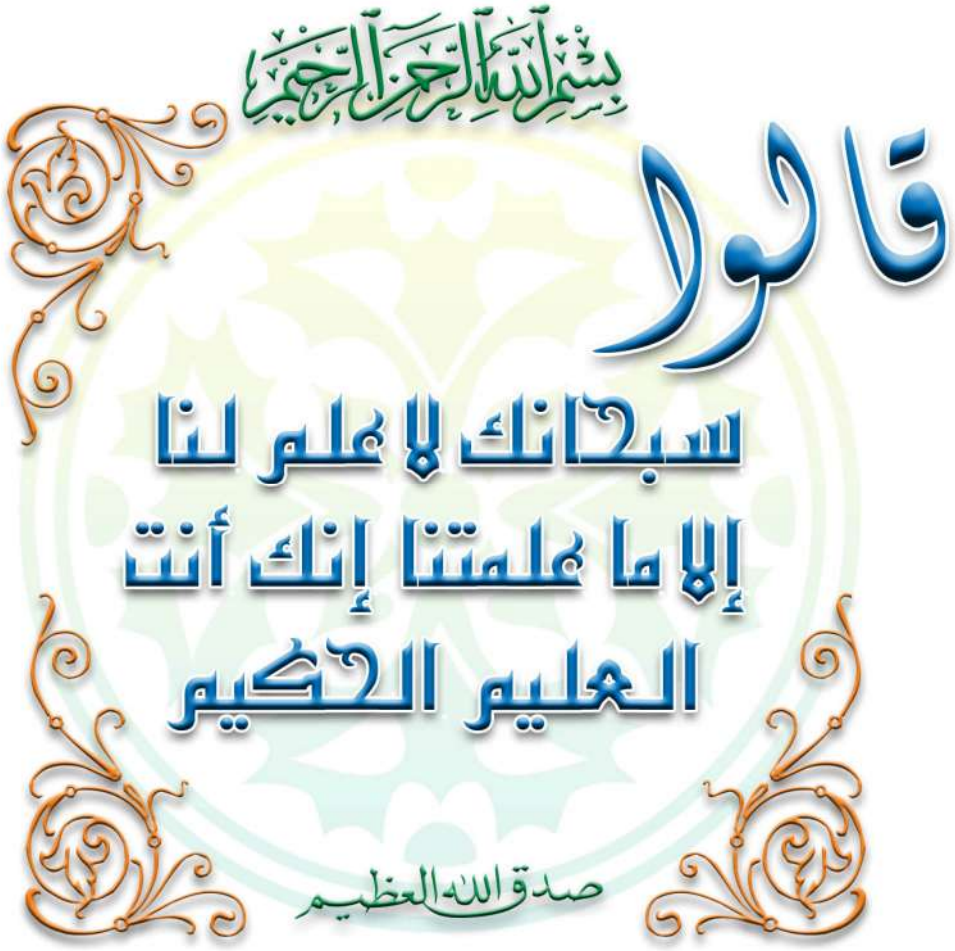

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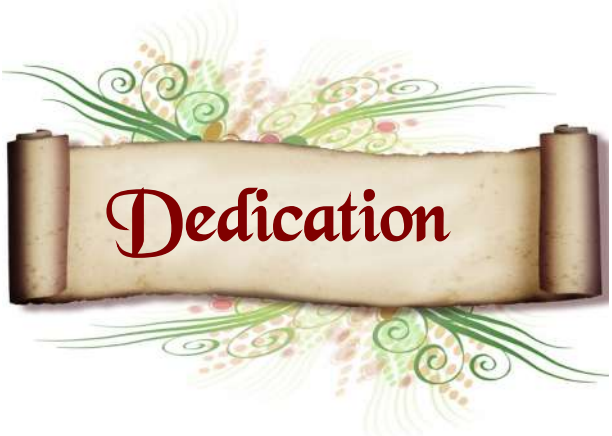

*"To my dear **Father** for his help and to my beloved **Mother** for her care and support*

*And to my dear **wife** who was and still supporting me in all my hard times and to my **Kids***

List of Contents

Title Page No.

List of Tables

List of Tables cont…

List of Figures

List of Abbreviations

Abb.	Full term
Acrp30	*Adipocyte complement-related protein 30*
AGA	*Appropriate-for-gestational age*
AMPK	*AMP-activated protein kinase*
apMl	*Adipose most abundant transcript l*
APN	*Adiponectin*
BL	*Body length measurement*
BM	*Breast milk*
BMI	*Body mass index*
BW	*Body weight measurement*
CDC	*Centers for Disease Control and Prevention*
COX-2	*Cyclo-oxygenase-2*
ELISA	*Enzyme-linked immunosorbent assay*
Gbp28	*Gelatin-binding protein 28*
GFP	*Green fluorescent protein*
GLUT-4	*Glucose transporter type 4*
HMW	*High. molecular weight*
IGFBPs	*IGF-binding proteins*
IOTF	*International Obesity Task Force*
JAK2	*Janus kinase 2*
NO	*Nitric oxide*
PGE2	*Prostaglandin E2*
PI3K	*Phosphatidylinositol 3-kinase*
PPAR-a	*Peroxisome proliferator-activated receptor-a*
PROBIT	*Promotion of Breastfeeding Intervention Trial*
PTP1B	*Protein tyrosine phosphatase 1B*
SD	*Standard deviation*
SGA	*Small-for gestational age*
SIDS	*Sudden infant death syndrome*

List of Abbreviations cont…

Abb.	Full term
SOCS-3	*Suppressor of cytokine signaling-3*
SP146	*Synthetic promoter-146*
SPSS	*Statistical Program for Social Science*
STAT3	*Signal transducer and activator of transcription 3*
T2DM	*Type 2 diabetes mellitus*

INTRODUCTION

Breast-feeding is recommended as the optimal source of nutrition for infants to support normal growth and development as well as long-term health ***(Agostoni et al., 2009).***

Breast milk composition varies with maternal diet, lifestyle, genetic determinants, and the duration of lactation ***(Koletzko et al., 2011).*** It also varies in composition within and between lactating women. Variation in composition of milk proteins over the course of lactation is due primarily to programmed changes in protein expression ***(Itoh et al., 2002).***

Variability in milk protein concentration among individuals has been attributed to genetic variation, maternal adiposity and other factors ***(Kelleher et al., 2005; Aral et al., 2002).***

While breast-feeding generally reduces the risk of weight gain and the development of obesity, high formula protein content has been shown to induce early weight gain as well as later obesity ***(Koletzko et al., 2009; Weber et al., 2014).***

Adiponectin, aprotein produced in adipose tissue, is apotent metabolic mediator that controls processes associated with obesity and inflammation. Serum adiponectin improves insulin sensitivity and fatty acid metabolism ***(Berg et al., 2002).***

Low serum levels of adiponectin are associated with obesity, type2diabetes, dyslipidemia and cardiovascular diseases ***(Weyer et al., 2001).***

In human milk, the concentration of adiponectin is more than 40 times that of other major adipokines of milk such as leptin or ghrelin ***(Martin et al., 2006).***

Higher adiponectin concentrations in human milk are associated with significantly lower weight and leaner body proportionality over the first 6 months of life in breastfed infants. Also, it may contribute toward the low risk of obesity and inflammatory disorders when infants are breastfed ***(David et al., 2010).***

AIM OF THE STUDY

The aim of the present study was to detect the relation between mother adiposity and adiponectin level in breast milk and their effect on infants growth.

Chapter One

BREAST FEEDING

Breastfeeding provides nutritional, immunological, and emotional benefits to infants and toddlers. Breast milk is the best food for healthy growth and development. Healthy term infants should be exclusively breastfed to six months of age and then continue to be breastfed with appropriate complementary feeding to years of age and beyond.

Recommend exclusive breastfeeding for the first six months of life.

Exclusive breastfeeding means that an infant is fed only breast milk. The infant receives no solids and no other liquids (not even water), with the following exceptions:

- Vitamin or mineral supplements medicines
- Oral rehydration therapy

(Bai et al., 2010)

Benefits for infants

Nutrition and digestion

Infants digest breast milk easily and efficiently. It supplies the best quantity, quality, and absorption of protein, fatty acids, iron, and zinc ***(Butte et al., 2002).***

As long as infants are getting enough breast milk and supplemental vitamin D exclusive breastfeeding will meet the energy and nutrient needs of infants to six months of age ***(Butte et al., 2002).***

However, infants who are small for their gestational age, or born to iron-defieient mothers or mothers with diabetes, are at increased risk of iron deficiency. They may benefit from iron supplements with continued exclusive breastfeeding ***(AAP, 2005).***

There is much to learn about the unique and complex composition of breast milk and colostrum. Bioactive components have been identified that aid digestion and the development of the lining of the infant's digestive tract. Other bioactive components may play a role in the development of the nerves and retina ***(WHO, 2009)***.

The immune system

The anti-infective properties of breast milk and colostrum reduce infant illness ***(WHO, 2009).*** For example, acute infections such as otitis media are less common and less severe in breastfed infants **than in** fomiula-fed infants. This is particularly true for those exclusively breastfed for more than three or six months ***(Ip et al., 2007)***.

Infants who are breastfed longer have less risk of respiratory and gastrointestinal infections than those breastfed for shorter