CORD BLOOD LIPID HETEROGENEITY AND NEONATAL ANTHROPOMETRY

Thesis

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List of Abbreviations

ACTH	Adrenocarticotropic hormone
AGA	Appropriate for gestational age
BMI	Body mass index
CE.....	Cholesterol esters
CH	Cholesterol
CHD	Coronary heart disease
cm	Centimeters
CNS	Central neruous system
CVD	Cardiovascular diseases
dl	deciliter
E2.....	Estradiol
ELBE	Extremely low birth weight
FELIC.....	Fate of early lesions in children
GH.....	Growth hormone
gm.....	Gram
HDLC	High low density lipoprotein cholesterol
HDL-R.....	High low density lipoprotein receptor
HDL-SM	High density lipoprotein-sphingomyelin
IDL	Intermediate density lipoproteins
IGF-1.....	Insulin life growth factor-1
IHD.....	Ischemic heart diseases
IMT	Intima-media thickness
IUGR	Intrauterine growth retardation

List of Abbreviations (Cont…)

Kcal	Kilo calories
Kg	Kilograms
L	Length
LBW	Low birth weight
LCAT	Lecithin-cholesterol acyltransferase
LDL	Low density lipoprotein
LDLC	Low density lipoprotein cholesterol
LDL-R	Low density lipoprotein receptor
LGA	Large for gestational age
LPL	Lipoprotein lipase
m	Meters
MDA	Mediterranean diet adherence
MEN	Multiple endocrine neoplasia
mg	Milligrams
mm	Millimeters millimeters
PCSK9	Proprotein convertase subtilisin/kexine type 9
PE	Preeclampsia
SD	Standard deviation
SGA	Small for gestational age
SHS	Second hand smoke
TBF	Total body fat
TC	Total plasma cholesterol
TG	Triglycerides

List of Abbreviations (Cont…)

TS ..... Tricipital skinfold

VLBE..... Very low birth weight

VLDL..... Very low density lipoprotein

W ..... Weight

Wk..... week

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INTRODUCTION

Several maternal and fetal factors, such as hypertension, diabetes, obesity, and low or high birth weight, can influence fetal plasma lipids***(Kherkeulidze et al., 2004).***

Low birth weight (LBW) is associated with increased incidence of CVD, hypertension, and type II diabetes***(Baker et al., 1993)***.

Changes in blood lipids in LBW newborns with relative insulin intolerance can increase the risk of CVD in adulthood. LBW is a risk of later atherosclerotic diseases that is equal to smoking or hypertension at puberty***(Mi et al., 2000).***

On the other hand, high birth weight is associated with increased insulin-like growth factor-1 (IGF-1) that could change lipoprotein composition and concentration at birth, and could increase the risk of CVD***(Lombardi et al., 1997).***

The cord blood lipid profile may be associated with lifelong changes in the metabolic functions of the individual***(Kelishadi, 2007).***

The correlation of cord blood lipid profile in neonates with their anthropometric data and their predictive role as

markers for adulthood diseases is still not completely explored***(Nayak et al., 2013).***

Among children, Levels of lipidsare strongly related to subscapular and triceps skinfold thicknesses. Adverse levels of cardiovascular disease risk factors and dyslipidemia are associated with specific estimates of body fatness obtained from skinfold thicknesses***(Steinberger et al., 2005).***

In the present study we hypothesized that high levels of lipids in cord blood might also be correlated withthe neonatal anthropometric measurements, as the case in children, and accordingly those anthropometric measurements could be considered an easy non invasiveway in neonates to predict dyslipidemia and cardiovascular diseases intheir adulthood and so take preventive measures as early as possible.

AIM OF THE STUDY

The primary aim of this work is to studycord blood lipid profile and its relation toneonatal anthropometry.

The secondary aim is to detect the influence of maternal obesityand maternal age on cord blood lipid profile.

CORD BLOOD LIPOPROTEINS AND PRENATAL INFLUENCES

1.The composition of cord lipids:

The concentration of lipids in cord blood serum is considerably lower than that found in adults. Cord total cholesterol (TC)is 68 mg/dl***(Neal, 2007)*** which is approximately one-third (33–38.2%) that of adult levels***(Nagasaka et al., 2002)***, LDL is 29 mg/dl***(Neal, 2007)*** which is also one third (31.9%) of adult levels ***(Nagasaka et al., 2002)***, whileHDL and triglycerides are 35 mg/dl, 34 mg/dl respectively***(Neal, 2007)***which isabout half (50.5% and 46.2%, respectively) of adult levels. VLDL is also present at lower concentrations***(Nagasaka et al., 2002***).

The majority of neonatal cholesterol is carried by HDL particlesand makes up 44% of the total lipoproteins in cord serum, compared with 14% and 40% for VLDL and LDL, respectively. Thus, in contrast to adults, total cholesterol in newborns is highly correlated with both HDL and LDL and distributed almost equally between them ***(Peticca et al., 2013).*** This low LDL: HDL ratio has been attributed in part to a reduced transfer of esterified cholesterol from HDL to other lipoproteins, and the decline in LDL near term to increased LDL utilization by fetal adrenals. However, there does not seem to be

a generalized increase in LDL receptor activity towards late gestation***(Bastida et al., 1996; Loughrey et al., 2000).***

LDL composition is richer in triglycerides and poorer in cholesterol esters compared with that of adults, whereas HDL composition is similar to that in adult blood. Some studies have reported VLDL in cord blood to be significantly richer in cholesterol esters and poorer in triglycerides compared with adults***(Bansal et al., 2005).***

Every apolipoprotein apart from apoE has been reported to be lower in cord than adult serum, with apoB and apoD most reduced, apoB between 25 and 31%and apoD 37% of adult levels. ApoAII and apoCIII are thought to be 49% and 45% of adult values, respectively, while apoAI and apoCII are closer to adult levels (63.4% and 73.3%)***(Averna et al., 1991).***

ApoE concentrations are similar to adult values, but in contrast to adults, more than 80% of apoE is associated with HDL]. This is compatible with HDL providing a source of cholesterol for growing tissues, the apoE rich HDL being taken up by LDL receptors, a situation not unlike that in many adult mammalian species in which HDL remains the dominant circulating lipoprotein. Interestingly, this situation persists in the human nervous system inadulthood ***(Bansal et al., 2005).***