بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

Oral Lactoferrin versus Ferrous Sulphate for the Treatment of Iron Deficiency Anemia during Pregnancy

Thesis

Submitted for Partial Fulfillment of Master Degree in Obstetrics & Gynaecology

By

Samar Gaafar Abd El Aleem Ragab
M.B.B.Ch., Faculty of Medicine – Ain Shams University (2013)
Resident Ob / Gyn, Menouf General Hospital (Menoufya Gov.)

Under supervision of

Prof. Dr. Karam Mohamed Bayoumy
Professor of Obstetrics & Gynecology
Faculty of Medicine - Ain Shams University

Dr. Nermeen Ahmed Mostafa Elghareeb
Lecturer of Obstetrics & Gynecology
Faculty of Medicine - Ain Shams University

Faculty of Medicine
Ain Shams University
2020

سورة البقرة الآية: ٣٢

Acknowledgment

First and foremost, I feel always indebted to ALLAH, the Most Kind and Most Merciful.

I'd like to express my respectful thanks and profound gratitude to ***Prof. Dr. Karam Mohamed Bayoumy,*** *Professor of Obstetrics & Gynecology Faculty of Medicine - Ain Shams University for his keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.*

I am also delighted to express my deepest gratitude and thanks to ***Dr. Nermeen Ahmed Mostafa Elghareeb,*** *Lecturer of Obstetrics & Gynecology Faculty of Medicine - Ain Shams University, for her kind care, continuous supervision, valuable instructions, constant help and great assistance throughout this work.*

Samar Gaafar

List of Contents

List of Tables

List of Figures

List of Abbreviations

Abb.	Full term
ACOG	American College of Obstetricians and Gynecologists
AI	Anemia of inflammation
BDNF	Brain-derived neurotrophic factor
CBC	Complete blood count
CDC	Centers for Disease Control and Prevention
CF	Cystic fibrosis
DEX	Dexamethasone
DMT-1	Divalent metal transporter 1
Fe^{3+}	Ferric iron
HBV	human hepatitis B virus
HCV	Human hepatitis C virus
HIP	Heme iron polypeptide
IUGR	IntraUterine Growth Restriction
LF	Lactoferrin
MCV	Mean corpuscular volume
OR	Odds ratio
OVX	Ovariectomized
PIC	Polysaccharide iron complex
RBC	Red blood cell
rhLf	Recombinant human lactoferrin
ROS	Reactive oxygen species
TSAT	Testing of the transferrin saturation
VAP	Ventilator associated pneumonia
WBC	White blood cell
WHO	World Health Organization

INTRODUCTION

Nutritional iron deficiency is the most widespread nutritional deficiency disorder, affecting more than 2 billion people worldwide. Although pregnant women and infants from developing countries are at higher risk, it frequently occurs not only in underdevelopment countries but also in developed ones ***(Silla et al., 2013).***

World Health Organization (WHO) data showed that anemia's global prevalence is at 14%. Iron deficiency anemia (iron deficiency anemia) in pregnant women has a prevalence of 17.4% in industrialized countries, whereas in underdeveloped countries, it goes close to 60%. Most of the anemic pregnant women were already anemic antecedent to conception ***(Khalafallah and Dennis, 2012).***

Iron deficiency anemia in women brings extensive consequences to the individual's health. Iron deficiency anemia leads to poor pregnancy outcomes, decreased educational performance, and reduced work capacity and productivity and other socioeconomic vulnerabilities. It is well established that the incidence of iron deficiency and iron deficiency anemia in infants born to mothers who are anemic is higher ***(Khalafallah and Dennis, 2012).***

Both iron deficiency and iron deficiency anemia in pregnant women are associated incremented risks of developing

preeclampsia, low birth weight, prematurity, perinatal mortality, delayed fetal maturation, and irreversible compromise to infant neurocognitive development and motor capacity ***(Zhou et al., 2007).***

Animal model studies consistently evidenced that inadequate iron intake during pregnancy would lead to permanent changes in the offspring's brains (structure and function wise) ***(Basu et al., 2018).***

This body of evidence initiates the idea that the prevention and treatment of iron deficiency anemia in pregnant women would lead to the prevention iron deficiency anemia in infancy and its severe repercussions ***(Biroulet et al., 2015).***

The prevention and treatment of iron deficiency and iron deficiency anemia in pregnancy in many countries is commonly done with routine iron supplementation (IS) through different routes i.e. oral, intravenous infusion and intramuscular, once the iron obtained from diet usually does not reach the recommended daily intake levels ***(Biroulet et al., 2015).***

Even though routine IS in pregnancy is widely practiced, its effects on both pregnancy and infants are uncertain, and currently, experts worldwide diverge on whether IS should be a routine during pregnancy ***(Khalafallah and Dennis, 2012).***

The oral route is the first choice to replace iron stores as this allows the normal mechanism of absorption to be used, in addition to being an inexpensive and effective treatment ***(Rosas et al., 2015).***

Lactoferrin is a glycoprotein from transferrin family. It is presented in high concentrations in milk of humans and other mammals. It is also synthesized in most exocrine secretions and neutrophils in inflammation and infection sites. Lactoferrin has two times higher affinity for iron than serum transferrin. It reversibly chelates two Fe+3 ions per molecule ***(Baker and Baker, 2005).***

Another potential mechanism is permitting iron export from tissues to the blood by interplaying with ferroportin and hepcidin which are key proteins of systemic iron homeostasis ***(Fleming and Bacon, 2005).***

Unlike ferrous sulphate, lactoferrin was superior in that it did not provoke adverse gastrointestinal side effects ***(Paesano et al., 2006).***

This study will evaluate the effectiveness, safety and acceptability of lactoferrin in comparison to ferrous sulphate for the treatment of iron deficiency anemia.

Aim of the Work

To compare lactoferrin to ferrous sulphate regarding side effect, acceptability and effectiveness for the treatment of iron deficiency anemia during pregnancy.

Chapter 1

ANEMIA WITH PREGNANCY

Anemia in pregnancy is a global health problem. While some degree of dilutional anemia is part of normal pregnancy physiology, iron deficiency anemia can have serious adverse health consequences for the mother and child. Thus, it is critical to distinguish iron deficiency anemia from physiologic anemia, as well as to identify other less common causes of anemia that may require treatment ***(ACOG, 2017).***

Definition of anemia:

Definitions of anemia are different in pregnant women compared with non-pregnant women, and the lower limit of normal for the hemoglobin concentration may vary in different populations. However, it is helpful to have a threshold for determining the presence and severity of anemia ***(ACOG, 2017).***

The World Health Organization (WHO) and the American College of Obstetricians and Gynecologists (ACOG) define anemia in pregnancy as follows: *(ACOG, 2017)*

- First trimester: Hemoglobin <11 g/dL (approximately equivalent to a hematocrit <33 percent)
- Second trimester: Hemoglobin <10.5 g/dL (approximate hematocrit <31 or 32 percent)