



Assessment of the Status of Vitamin D Among Egyptian Pregnant Women

Thesis

Submitted for Partial Fulfillment of the Master
Degree in Obstetrics and Gynecology

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2018**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم الحكيم

صدق الله العظيم

سورة البقرة الآية: ٣٢



ACKNOWLEDGEMENT

First of all, thanks to **Allah** whose magnificent help was the main factor in completing this work.

No words could express my deepest thanks and appreciation to **Prof. Dr. Ahmed Mohamed Ibrahim Osman**, Professor of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for inspiring me with the idea of this work. His patience, precious advice and guidance enlightened my way throughout this work.

I want also to express my deepest thanks and appreciation to **Assist. Prof. Dr. Mohammed Saeed Eldin El Safty**, Assistant Professor of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for his patience, valuable advice and continuous help in completing this work.

I am also deeply indebted to **Dr. Rasha Mahmoud Medhat Abdel Hadi**, Lecturer of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for her kind help, guidance, useful advices, continuous encouragement and support all through my entire work.

Very special thanks to my family, my respected mother, and my beloved husband for their moral and economic support and assistance in every step of my life.

At the end I would also like to thank to my sweet kids, who suffered a lot with me in all this process.

Dedication

To

My Husband (Dr. Mahamat Oumar)

Who Helped Me a Lot and Pushed Me

Forward in Every Step of My Life



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List of Abbreviations

25(OH)D	: 25-hydroxyvitamin D
AAP	: American Academy of Pediatrics
AEDs	: Anti-epileptic drugs
ALP	: Alkaline phosphatase
APCs	: Antigen-presenting cells
Ca	: Calcium
CaBP	: Cytosolic calcium binding protein
CC	: Clomiphene citrate
CF	: Cystic fibrosis
CKD	: Chronic kidney disease
DBP	: D-binding protein
DCs	: Dendritic cells
DEXA	: Dualenergy X-ray absorptiometry
DM	: Diabetes mellitus
FHR	: Familial hypophosphatemia rickets
GCs	: Granulose cells
GDM	: Gestational diabetes mellitus
GH	: Growth Hormone
HAART	: Highly active antiretroviral therapy
hCG	: Human chorionic gonadotropin

List of Abbreviations

HIV	: Human immunodeficiency virus
IFNγ	: Interferon gamma
IGF-1	: Insulin-like growth factor 1
IL	: Interleukin
LVH	: Left ventricular hypertrophy
MS	: Multiple sclerosis
NHANES	: National Health and Nutrition Examination Survey
NKs	: Natural killer cells
pQCT	: Peripheral quantitative computed tomography
PTH	: Parathyroid hormone
RA	: Rheumatoid arthritis
RANKL	: Receptor activator of NF- κ B ligand
RDA	: Recommended Dietary Allowance
RXR	: Retinoic acid X receptor
SGA	: Small-for-gestational-age
USDA	: United States Department of Agriculture
UVB	: Ultraviolet-B
VDDR	: Vitamin D deficiency rickets
VDD	: Vitamin D deficiency

List of Abbreviations

VDI	: Vitamin D intoxication
VDR	: Vitamin D receptor
VDREs	: Vitamin D response elements

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Introduction

Vitamin D has known importance to bone health including calcium and phosphate homeostasis and appears to have a role in skeletal muscle health as well. Insufficient vitamin D plays a role in musculoskeletal pain, sarcopenia and myopathy (**Tanner and Susan, 2015**).

Vitamin D is active throughout the body not only to regulate calcium and bone metabolism but also to reduce the risk of chronic diseases including auto immune diseases, malignancies, cardiovascular and infectious diseases. It has been estimated that 1 billion people worldwide have vitamin D deficiency or insufficiency (**Holick, 2007**).

Vitamin D deficiency in pregnancy has been shown to lead to significant complications. Maternal complications include decreased weight gain, gestational diabetes, preeclampsia, infections, and caesarean section. In the newborn, maternal vitamin D deficiency has been linked to hypocalcemia, low birth weight, wheezing, type I diabetes, eczema, poor weight gain, impaired development and rickets (**Johnson et al., 2011**).

Women, including pregnant women, with a body mass index (BMI) greater than 30 are at increased risk of

vitamin D deficiency. Ethno-cultural factors; dark skin or concealing clothing, which may lead to limited exposure even though living in tropical areas where sun-exposure is adequate, can cause vitamin D deficiency **(El Rifai et al., 2013)**.

The guidelines recommended vitamin D supplementation to be considered for high-risk women especially during pregnancy, the decision making regarding vitamin D supplementation is based on the presence or absence of risk factors **(Ekeroma et al., 2015)**.

Aim of the Work

To assess the status of vitamin 25(OH) D3 among Egyptian pregnant women.

Research hypothesis:

Pregnant Egyptian women may suffer from vitamin D deficiency.

Research question:

Do Egyptian pregnant women suffer vitamin D deficiency?

Chapter (1)

Vitamin D Physiology

Vitamin D is a fat-soluble vitamin which is naturally present in very few foods and available as a dietary supplement. It is also produced endogenously when ultraviolet rays from sunlight strike the skin and trigger vitamin D synthesis (**Zhao et al., 2017; Allegra et al., 2018**).

Vitamin D promotes calcium absorption in the gut and maintains adequate serum calcium and phosphate concentrations to enable normal mineralization of bone. It is also needed for bone growth and bone remodeling by osteoblasts and osteoclasts (**Weaver et al., 2016**).

Vitamin D is important for general good health, and researchers now are discovering that vitamin D may be important for many other reasons outside of good bone health. Some of the functions of the body that vitamin D helps with includes:

- Immune system, which helps to fight infection
- Muscle function
- Cardiovascular function, for a healthy heart and circulation
- Respiratory system –for healthy lungs and airways
- Brain development
- Anti-cancer effects (**Feldman et al., 2011**)