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Ain Shams University
Faculty of Medicine
Internal Medicine Department

Relation of Lactobacilli Acidophilus To Obesity in Egyptian Population

Thesis

Submitted for Partial Fulfillment of the Master Degree
in Internal Medicine

By

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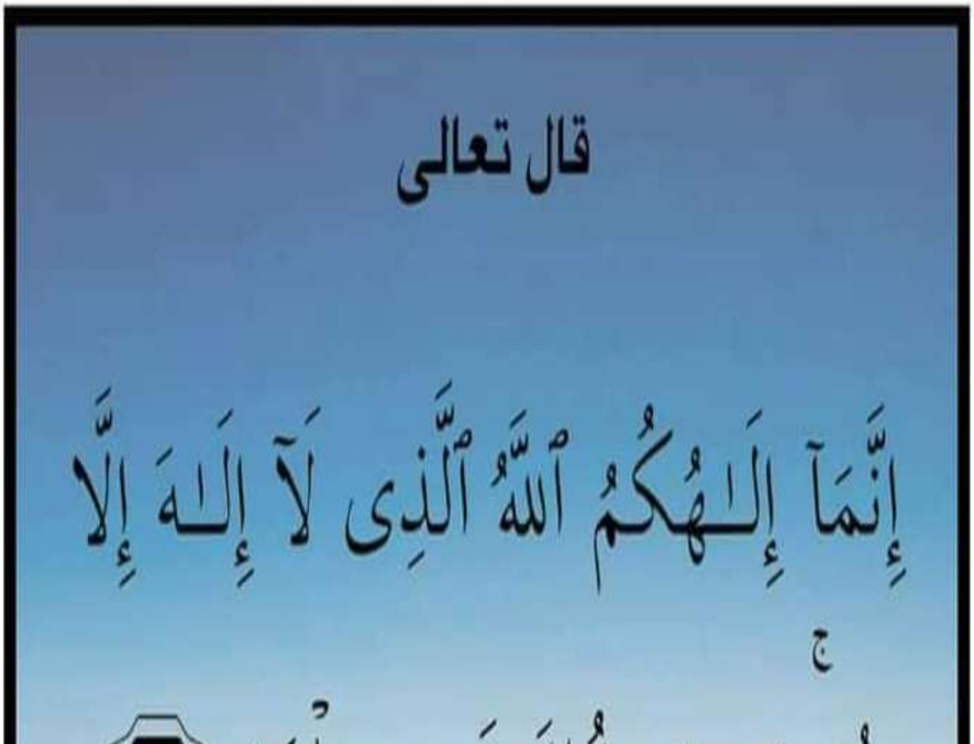
قال تعالى
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Hany Naser Abbas Hany
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List of Abbreviations

Abbrev.	**Full term**
4AAP	4-chlorophenol and 4-aminoantipyrine
ACVD	Atherosclerotic cardiovascular disease
ALT	Alanine aminotransferase
AMPk	Adenosine monophosphate kinase
ANOVA	Analysis of variance
ARC	Arcuate nucleus
ASD	Autism Spectrum Disorder
AST	Aspartate aminotransferase
AUC	Area under the curve
BAT	Brown adipose tissue
BBB	Blood-brain barrier
BMI	Body mass index
CART	Cocaine and amphetamine regulated transcript
CD	Crohn’s disease
CE	Cholesterol esterase
CHD	Coronary heart disease
ChREBP	Carbohydrate responsive element-binding protein
CKD	Chronic kidney disease
CLA	Conjugated linoleic acid
COX	Cholesterol oxidase
CRC	Colorectal cancer
ct	Cycle Threshold
CVD	Cardiovascular disease
DAP	Dihydroxyacetone phosphate
EASO	European Association for the Study of Obesity
ELISA	Enzyme-linked immunosorbent assay
EOSS	Edmonton Obesity Staging System
FIAF	Fasting induced adipocyte factor
FISH	Fluorescence in situ hybridization
FMO3	Flavin monooxygenases
FMT	Faecal microbiota transplantation

Abbrev.	Full term
FT3	Free serum tri-iodothyronin
GALT	Gut associated lymphoid tissues
GF	Germ-free
GHb	Glycosylated Haemoglobin
GI	Gastrointestinal
GWAS	Genomewide association studies
Hb A1c	Hemoglobin A1c
HC	Hip circumference
HFD	High-fat diet
HRP	Horseradish peroxidase
HTGL	Hepatic triglyceride lipase
IBD	Inflammatory bowel disease
IBS	Irritable bowel syndrome
IL- 6	Interleukin -6
IR	Insulin resistance
LCAT	Lecithin-cholesterol acyltransferase
LCP	Lactobacillus containing probiotics
LDL	Low density lipoproteins
LFY	low-fat yogurt
LMIC	Low and middle income countries
LPL	Lipoprotein lipase
LPS	Lipopolysaccharides
MRS	Man Rogosa Sharp agar
MS	Metabolic syndrome
NAFLD	Non-alcoholic fatty liver disease
NLR	NOD-like receptors
NPY	Neuropeptide Y
nTS	Nucleus tractus solitarii
OSA	Obstructive sleep apnoea
OTUs	Bacterial operational taxonomic units
PAMPs	Pathogen-associated molecular patterns
PCOS	Polycystic Ovarian Syndrome
PCR	Polymerase chain reaction
POMC	Pro-opiomelanocortin

Abbrev.	**Full term**
PRRs	Pattern recognition receptors
PY	Probiotic yogurt
qPCR	Quantitative PCR
rRNA	Ribosomal RNA gene
SCFAs	Short-chain fatty acids
SREBP1	Sterol regulatory element-binding transcription factor 1
T1DM	Type 1 diabetes mellitus
T2DM	Type 2 diabetes mellitus
TGs	Triacylglycerols
TLRs	Toll-like receptors
TMA	Trimethylamine
TMAO	Trimethylamine-N-oxide
TMB	Tetramethylbenzidine
TNF-α	Tumor necrosis factor-α
UC	Ulcerative colitis
VLDL	Very low density lipoproteins
WAT	White adipose tissue
WC	Waist circumference
WHO	World Health Organization
WHR	Waist-to-hip ratio
WHtR	Waist-to-height ratio

ABSTRACT

Background*:* Current considerations are existed about the sharing role of gut microbiota in the enhancement of obesity and its allied comorbidities

Objective: The aim of this observational case-control study was to assess the possible relation of *lactobacilli acidophilus* to obesity in a sample of Egyptian population by real-time PCR of *lactobacilli acidophilus* in stool.

Subjects and methods: The present study enrolled 20 healthy slim subjects and 40 subjects who had BMI >25 kg/m^2. Routine laboratory analysis and identification of stool *Lactobacillus acidophilus* by quantitative real time PCR technique was performed for all enrolled subjects.

Results: Lactobacillus *acidophilus* was expressed in 21 out of 40 (52.5%) faecal samples of obese cases and 16 out of 20 (80%) of faecal samples of non-obese cases. In rest of samples in both studied groups, the expression was below the detection limit. The results showed that the mean CT at which Lactobacilli were expressed in the obese cases was (38.89±2.57) compared to (36.08±4.63) in non-obese cases and this indicated that the expression of lactobacilli was statistically higher in non-obese subjects compared to obese cases (P =0.04).

Conclusion: *Lactobacillus acidophilus* was significantly lowered in obese Egyptian patients. The argument about the significance of correlation between imbalance in gut microbiota and obesity is considered one of the hottest open topics in medicine.

Key words: Obesity, Gut Dysbiosis, *Lactobacilli acidophilus***.**

Introduction

The prevalence of obesity has risen steeply over the past two decades, and it has become a significant global health issue ***(Arroyo-Johnson et al 2016)***.

The proper management of obesity is critical to prevent the development of obesity-associated metabolic disorders, including insulin resistance, diabetes, and cardiovascular disease, which increase patient mortality ***(Gallagher et al., 2015; Bastien et al., 2014).***

Lipid accumulation and increased systemic inflammation in obesity is known to trigger an imbalance of energy homeostasis and abnormal cellular responses to insulin, leading to insulin resistance and type 2 diabetes ***(Samuel and Shulman, 2012)***.

Although a number of therapies have been developed to treat them, the disease remains largely irreversible, with many patients failing to respond satisfactorily to treatment, underlining the importance of prevention at the early stages of obesity and insulin resistance ***(Alberti et al., 2007).***

The gut microbiome is composed of a thousand of bacterial species that are encoding approximately 3.3 million genes and largely shared 160 species individually ***(Arumugam et al 2010).*** It is also known to have a profound impact on host physiology and pathology. The diversity and stability of the gut microbiome in host organisms can, in turn, be affected by diverse environmental factors, including food consumption, which ultimately influences host metabolism ***(David et al., 2014)***.

Changes to the gut microbiota are associated with the development of obesity and type 2 diabetes. Furthermore, targeting the gut microbiome using