Ain Shams University
Faculty of Specific Education
Home Economy Department

Study of Functional and Nutrition properties of fortified healthy yoghurt by milk thistle seeds on experimental rats

By

Safaa Talaat Gohari Mohamed

B.Sc. Specific Edu. (Home Economic Dept.),
Ain Shams University., 2007

Athesis Submitted for Partial Fulfilment of the Requirements
of M.Sc. Degree in Home Economic Dept.,
(Nutrition & Food Science)

Under the supervision of:

Dr. Samah Mohamed Ismeal

Associate. Prof. of Food Sci.& Nutrition
Home Economic Dept , Fac of Specific Edu , Ain Shams University

Dr. Yaser Mahmoud Ebrahim
Associate. Prof. of Food Sci. & Nutrition
Hom Economic Dept
Fac. of Specific Education
Ain Shams University

Dr. Azza Mahmoud Farahat
Associate. Prof. of Dairy Sci. & Technology
Food Sci Dept
Fac. of Agriculture
Ain Shams University

2013

APPROVAL SHEET

Student Name: Safaa Talaat Gohari Mohamed
Title of thesis:

Study of Functional and Nutrition properties of fortified healthy yoghurt by milk thistle on experimental rats

Degree: M. Sc. in Specific Education- Home Economic
(Nutrition and Food Science)

This Thesis for Master Degree has been approved by:

Prof. Dr : **Dr. Atef El –Sayed Fayed**. Prof. of Dairy Sci. & Technology, Food Sci Dept , Fac. of Agriculture , Ain Shams University

Prof. Dr : **Dr. Samah Mohamed Ismael,** Associate. Prof., of Food science and Nutrition, Home Economic Dept., Fac. of Specific Education, Ain Shams University

Prof. Dr : **Dr. Azza Mahmoud Farahat** Associate. Prof. of Dairy Sci. & Technology, Food Sci Dept, Fac. of Agriculture ,Ain Shams University

Prof. Dr : **Dr. Yaser Mahmoud Ebrahim,** Associate. Prof., of Food science and Nutrition, Home Economic Dept., Fac. of Specific Education, Ain Shams University

Prof. Dr : **Dr. Abd El Rahman Ragb Abd El Rahman ,** Associate. Prof., of Food science and Nutrition, Home Economic Dept., Fac. of Specific Education, Ain Shams University

Committee in charge

Date: / / 2013

ACKNOWLEDGMENTS

First of all my obedience, devotion, deepest thanks and praise are due and fully extended-as always to ***Allah***, who has created us and bestowed upon us a lot of blessings which we cannot enumerate and thank enough.

I wish to express my grateful appreciation and deepest thanks to **Dr. Samah Mohamed Ismael,** Associate. Prof., of Food science and Nutrition, Home Economic Dept., Fac. of Specific Education, Ain Shams University for this investigation suggestion, direct supervision, greatest faithful, constructive criticism as well as valuable discussion, great help for all work and plentiful active for me to bring this investigation to its best shape.

Special thanks are due to **Dr. Azza Mahmoud Farahat** Associate. Prof. of Dairy Sci. & Technology, Fac. of Agriculture ,Ain Shams University for here guidance and continuous supervisor of the thesis. Her efforts, valuable guidance, and discussion are of great respect by the author. Her encouragement through all times and helping during practical work and in the final writing of my thesis.

My thanks are due to **Dr. Yaser Mahmoud Ebrahim,** Associate. Prof., of Food science and Nutrition, Home Economic Dept., Fac. of Specific Education, Ain Shams University for his direct supervision, careful guidance, willing cooperation, and valuable assistance as well as continuous encouragement throughout the time of this study and through

the experimental work. He really offered great support and to his I really offer my sincere appreciations**.**

I would like to thank all stuff members of home economic department , Faculty of specific education , Ain shams university .

Thanks also to every one who provided help or advise me to achieve this manuscript .

Study of Functional and Nutrition properties of fortified healthy yoghurt by milk thistle seeds on experimental rats

By

Safaa Talaat Gohari Mohamed

B.Sc. Spcific Edu. (Home Economic Dept.),
Ain Shams Univ., 2007

Athesis Submitted for Partial Fulfilment of the Requirements
of M.Sc. Degree in Home Economic Dep., (Nutrition & Food Science)

ABSTRACT

The aim of this thesis is to look forward for fortification of yoghurt by different levels of siylmarin (0.4, 0.6, 0.8%) that may increase the function properties and nutritional value of yoghurt using experimental rats by analyzing, evaluating and comparing. Results indicated that stirred yoghurt fortified with siylmarin 0.8% had significantly the highest total solids and Ash content than the others, stirred yoghurts fortified of 0.4% siylmarin had highest amount of protein compared to other tested yoghurt samples. While, there were lowest significantly different in protein content between other yoghurt samples. In acidity as lactic acid (TA %) and pH there are no significant different between yoghurt samples during storage periods compared to control sample. The presence of siylmarin resulted in increase lactic acid bacteria counts in stirred yoghurts.

A total phenol of silymarin was 39.5%. Moreover, Color of yoghurt samples had best value of total color (88.19%) in yoghurt fortified with silymarin 0.6% then the other samples. The microbiological examination showed that, all tested yoghurt samples fortified with different levels of silymarin fail in the same range compared with control group. Additionally, sensory evaluation of yoghurt fortified with silymarin 0.4% exhibited high specific value ranged from 46.6 to 34.00 than others in flavor in 3, 7, 10 and 14 days at 5±1°C, while yoghurt fortified with silymarin 0.6% in body and texture ranged from 40.0 to 27.6 in different storage periods at 5±1°C.

Biological evaluation of the investigated samples yoghurt fortified with silymarin (0.4, 0.6 and 0.8%) and infected with CCl_4 illustrated that experimental rats fed on commercial diet plus yoghurt (7g) exhibited less abnormal signs throughout the tested period (4 weeks). In addition, no apparent differences were observed in biochemical analysis of blood between rats fed on commercial diet and rats fed on diets yoghurt (7g).

Analysis of microscopic pathology data of liver, kidney, and spleen sections showed minor histopathological changes in rats fed on experimental diets and infected with CCL4 and treated with silymarin. The best result was the group treated with silymarin 0.8% and followed by 0.6% and 0.4% respectively.

Key words: Milk thistle; Silymarin; Stirred yoghurts; CCL_4, Albino Rats; Liver disease ; Kidney Functions; Liver Enzymes; Histopathology .

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOS

LIST OF ABBREVIATIONS

FI	Food intake
BWG	Body weight gain
FBW	Final body weight
IBW	Initial body weight
A.O.A.C	Official Methods of Analysis
ALT	Alanine transaminase
AST	Aspartate transaminase
GGT	Gamma glutamate transferase
CCl_4	Carbon tetrachloride
Fig	Figure
GPT	Glutamic pyruvic transaminase
GOT	Glutamic-oxaloacetic transaminase
ACE	Angiotensin converting enzyme
ST	Milk thistle
SIL	Silymarin
T1	Stirred yoghurt fortified with silymarin 0.4 %
T2	Stirred yoghurt fortified with silymarin 0.6%
T3	Stirred yoghurt fortified with silymarin0.8%
h	Hour
mg	Mailgram
ml	Mil
mmol	Millmol
APHA	American Public Health Association
LAB	Lactic acid bacteria
FDA	Code of Federal Regulation
EPS	Exopolysaccharides
LB	Lactobacillus

ST	Streptococcus
Hrs	Hours
HDL	High Density Lipoprotein
S.marianum	Silybum marianum
SC	Silychristin
SD	Silydianin
SA	SilybininA
SB	SilybininB
ISA	IsosilybininA
ISB	IsosilybininB
ALP	Serum Alkaline Phosphatase
GGT	Serum gamma glutamyl transferase
LDH	Lactate dehydrogenase
GSH	Cellulare glutathione
ATP	Adenosine triphosphate
HSCs	Hepatic Stellate Cells
TA	Titratable Acidity

INTRODUCTION

Over recent years the food industry has been undergoing major change. To meet growing variations in demand and increasingly specific requirements from consumers, the food industry needs to display a huge capacity for innovation. Nowadays food products must always be safe, must meet nutritional and sensory requirements and must offer more and more benefits to satisfy the needs created by our changing lifestyles. These four essential elements are health, taste, safety and convenience.

Consumers want to obtain ready-to-use products at the best possible price, whether they are purchasing catering services or simply buying for themselves. The health value of these various foods must also be guaranteed, by reconciling technological dictates (making products attractive to consumers) with good nutritional value. **(Linden and Lorient, 1999).**

Functional foods are diverse groups, including conventional foods, such as yoghurt, or they can be specifically enhanced, such as fortified yoghurt with probiotics and fruit **(Gonzalez *et al.*, 2011).** Yoghurt is known for its therapeutic, nutritional and sensory properties for a long time, and it is obtained by the lactic acid fermentation of milk by addition of homo-fermentative yoghurt starter culture. It is the most well-known and consumed fermented dairy product around the world **(Tamime and Robinson, 1999).**

Yoghurt is one of the traditional cultured milk products, best known in almost all countries of the world **(Khan *et al.*, 2008).** It plays an important role in human nutrition, health maintaining, therapeutic and dietetic functions.

Yoghurt and yoghurt-like products have been marketing and modifying successfully to meet consumers' demands **(Gonzalez *et al.*, 2011).** It is one of the most widely consumed dairy products because of its availability in different forms. In European countries, yoghurt consumption per person in a year is about 20 kg and this amount is reported as 36 kg per person per year in Turkey **(Hutkins, 2006).** The increasing yoghurt