PRODUCTION OF SOME SPECIAL FOODS FOR THE PREVENTION OF VASCULAR DISEASES.

By

SALWA FAROUK MOHAMMED HASSANIEN

B.Sc. Home Ec. (Food Science), Al-Azhar University, 1999

M.Sc. Agric. Sc. (Food Science and Technology), Ain Shams University, 2007

A thesis submitted in partial fulfillment

of

The requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Agricultural Science

(Food Science and Technology)

Department of Food Science

Faculty of Agriculture

Ain Shams University

2012

Approval sheet

PRODUCTION OF SOME SPECIAL FOODS FOR THE PREVENTION OF VASCULAR DISEASES.

By

SALWA FAROUK MOHAMMED HASSANIEN

B.Sc. Home Ec. (Food Science), Al-Azhar University, 1999
M.Sc. Agric. Sc. (Food Science and Technology), Ain Shams University, 2007

This thesis for Ph.D. degree has been approved by:

Dr. Zakaria Ahmed El-Shamy ……
Prof. Emeritus of Food Science and Technology, Faculty of Agriculture, Suez Canal University

Dr. Magda Habeb Allam ……
Prof. Emeritus of Food Science and Technology, Faculty of Agriculture, Ain Shams University

Dr. Ibrahim Mohamed Hassan ……
Prof. Emeritus of Food Science and Technology, Faculty of Agriculture, Ain Shams University

Dr. Manar Tawfeek Ibrahim ……
Prof. of Food Science and Technology, Faculty of Agriculture, Ain Shams University

Date of Examination: / / 2012

PRODUCTION OF SOME SPECIAL FOODS FOR THE PREVENTION OF VASCULAR DISEASES.

By

SALWA FAROUK MOHAMMED HASSANIEN

B.Sc. Home Ec. (Food Science), Alazhar University, 1999

M.Sc. Agric. Sc. (Food Science and Technology), Ain Shams University, 2007

Under the supervision of:

Dr. Ibrahim Mohamed Hassan

Prof. Emeritus of Food Science and Technology, Department of Food Science, Faculty of Agriculture, Ain Shams University (Principal Supervisor)

Dr. Manar Tawfeek Ibrahim

Prof. of Food Science and Technology, Department of Food Science, Faculty of Agriculture, Ain Shams University

Dr. AL-Sayed Farahat AL- Sayed

Research of Food Science and Technology, Food Technology Research Institute, Agricultural Research Center

CONTENTS

ABSTRACT

Salwa Farouk Mohammed Hassanein: Production of Some Special Foods for the Prevention of Vascular Diseases. Unpublished Ph. D. Thesis, Department of Food Science, Faculty of Agriculture, Ain Shams University, 2012.

Herbs and spices namely clove buds (*Syzgium aromaticum*), rosemary (*Rosmarinus officinalis*), ginger *(Zingiber officinale)* and curcuma *(curcuma longa)* were extracted by using water extraction at two temperatures (50 and100 ^{o}C) and hydrodistillation to obtain essential oil (EOs).The yields of hot water extracts were determined. For hydrodistillation extraction the yield of EOs were 7.00, 1.08, 0.80 and 0.63g/100g dry plant for clove buds, rosemary, ginger and curcuma, respectively. The total phenolic content of EOs was high for both clove buds (210± 0.5 mg GAE/ml) and ginger (211.8± 0.9 mg GAE/ml) followed by curcuma (88.9±1.6) and it was low in rosemary (36.4±0.8 mg GAE/ml). An increase in radical scavenging activity (RSA) was observed with increased concentration and heating temperature from 50 to 100 ^{o}C. Clove EOs showed the highest RSA at different concentrations from 5 to 150µl/ml followed by ginger and curcuma EOs. The reducing power of the EOs of the four tested plants was higher than that of the compared standards (BHT, tocopherol and ascorbic acid). The highest reducing power was found in clove buds followed by rosemary and ginger and the least was that of curcuma.

The major aroma constituents of the hydrodistilled fraction of the EOs of the tested plants were identified by GC analysis.

Biological evaluation of the EOs was carried out in albino rats by following the changes in body weight, organs weight, blood lipid profile, total antioxidant capacity and lipid peroxidation as well as liver and kidney functions.

The histopathological alterations induced in heart, brain, liver, kidney, spleen and testes of the control group, hypercholesterolaemic group and hypercholesterolaemic groups treated by oral administration of

50 and 100mg /kg BW of the EOs of clove buds, rosemary, ginger and curcuma were studied in details after 30 and 60 days. In many cases, oral administration of EOs succeeded in reducing histopathological changes occurred as a result of feeding rats hypercholesterolaemic diet.

Sensory assessment was carried out on cake and biscuit samples supplemented with 0.1, 0.2 and 0.4% of clove buds powder or 2, 4 and 8% rosemary or ginger or curcuma powder.

Key words: Essential oil, Clove buds, Rosemary, Ginger, Curcuma, Total phenol compound, Antioxidant activity, Atherosclerosis, Histopathology, Cake, Biscuit.

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 **Prof. Dr. Ibrahim Mohamed Hassan,** Professor of Food Science and Technology, Food Sci. Dept., Fac. of Agric., 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.

My thanks are due to **Prof. Dr. Manar Tawfeek Ibrahim,** Professor of Food Science and Technology, Food Sci. Dept., Fac. of Agric., Ain Shams University for her direct supervision careful guidance, willing cooperation, and valuable assistance as well as continuous encouragement throughout the time of this study.

I would like to express my deepest thanks to **Prof. Dr. Al-Sayed Farahat AL- Sayed** Professor of Food Science and Technology, Special Food and Nutrition Dept., Food Technology Research Institute, Agriculture Research for his supervision , valuable help throughout this work , excellent guidance and kind encouragement during preparing this thesis.

Thanks are also extended to all staff members and colleagues of Food Sci. Dep., Fac. of Agric., Ain Shams University and to my colleagues in Food Technology Res. Ins., Agricultural Research Center. Ministry of Agriculture and land Reclamation.

LIST OF TABLES

LIST OF FIGURES