SOMESEED SPROUTING USING SALINE WATER AND THEIR BIOCHEMICAL EFFECTS ON ALBINO RATS

By

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B.Sci.Agric.Fac. Agric., Cairo Univ., 2010

A Thesis Submitted in Partial Fulfillment

Of

The Requirements for the Degree of

MASTER OF SCIENCE
in
Agricultural Sciences
(Advanced Agricultural Systems for Arid Lands)

Arid Land Agricultural Graduated Studies and Research Institute
Faculty of Agriculture
Ain Shams University

2019

Approval Sheet

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ABSTRACT

Hanaa Mahmoud Abd El-Hamid Amer.Some seed sprouting using saline water and their biochemical effects on albino rats.Unpublished M.Sc. Thesis, Department of Arid Land Agricultural Graduated Studies and Research Institute.Faculty of Agriculture, Ain Shams University, 2018.

Canola (*Brassica juncea L.*) and mustard (*Sinapis alba L.*) seed sprouts using tap water (TWS) and saline water (SWS) for sprouting were used to study the effect of seed sprouting on sprout characters. Using low NaCl concentration recorded the tallest canola and mustard sprouts lenth. Canola and mustard sprouts dry weight decreased as the sprouting NaCl concentration increased. Canola and mustard were used to study their hypoglycemic properties against diabetes- induced rats. The rats were distributed into 6 groups, 1-normal control with standard diet, 2-diabetic control with standard diet, 3-diabetic with SWS of canola semi-modified stander diet, 4-diabetic with TWS of canola semi-modified stander diet, 5-diabetic with SWS of mustard semi-modified stander diet, 6-diabetic with TWS of mustard semi-modifiedstander diet each group of 6 rats. Diabetes was induced by streptozotocin (STZ) injection (60mg/kg body weight). STZ- induced diabetic rats showed significant increase in the levels of blood glucose, cholesterol, triglycride, LDL-c, VLDL-c, and urea as well as ALT and ALK-Ph activities, also relative kidneys and hart weights with mustered sprout. On the other hand, body weight gain (BWG), PLT levels, WBCs total counts, were decreased compared to normal control rats. The addition of SWS and TWS of canola and mustard sprout at 10% to diabetic rats diet as semi- modified diet rsulted significant decrease in blood glucose of about 56.8% and 54.6% respectively. The increase and decrease values by STZ-diabetic were improved by canola and mustard semi-modified diet. From these results, it may be concluded that TWS and/or SWS of canola and mustard as semi-modified diet has the potential to alleviate hyperglycemia in cases

where diabetes are present and to serve in the primary prevention of diabetes mellitus. Also TWS and SWS of canola and mustard semi-modified diet appears to be essentially; non-toxic in doses given to rats in this study over 6 weeks period.

Key words: Canola, Diabetic, Hematology, Mustard, Nutrient, Liver, Seed sprouts, Streptozotocin, Kidneys.

ACKNOWLEDGRMRNT

First of all, I am praising**ALLAH**, beneficent, the merciful for his great gencrous and for guiding me to carry out this work.

Special thanks to **Prof.Dr.MamdouhMohamed FawzyAbdallah,** professor Emeritus of Vegetable, Horticulture Dept. Faculty of Agriculture, AinShams University, for his supervision, reviewing the manuscript and fruitful discussion during this work. He is an excellent supervisor, he always kept eyes on the progress of my work, gave me stimulating suggestions and he was at all the time available when I need his help and advice. It a great honor to work under his supervision.

I would like to thank **Prof.Dr. Nagah El Shahat Ali**, Prof. of Biochemistry, Horticulture Dept., Biochemistry, Ain Shams University, for introducing me the research field, his supervision, kind support and for his every guidance.

Iam also grateful to **Dr. Karim Mostafa El Tobgy** Senior Researcher in medicinal and aromatic plant Research Departmentn, Horti culture Research Istitute, A.R.C his supervision, encouragement and support me during this work.

Many thanks**Dr. TahanyAbd-ElGhafar A. Aly.** Researcher in biochemistry. Regional Center for Food and Feed, ARC, for providing all the help to complete this study,and her much helpful advice, given freely at all times.

Especially grateful to all the members' stuff of Institute of Arid Lands, Faculty of Agriculture, Ain Shams University and the stuff of Horticulture Research Institute ARC for they help whenever asked for.

LIST OF ABBREVIATIONS

Abbreviation

Alk.Ph	Alkaline phosphatase
ALT/GPT	Alanine aminotransferase
Alb	Albumin
AST/GOT	Aspartate aminotransferase
β	Beta
BW	Body weight
BWG	Body weight gain
Bil	Bilirubin
CRP	C-Reactive protine
CPK	Creatine phosphkinase
EDTA	Ethylene diamine tetra acetic acid
FBG	Fasting blood glucose
h	Hour
Hb	Hemoglobin
HCT	Haematocrit
HDL-C	High Density Lipoprotein
LDL-C	low density lipoprotein
LDH	Lactate dehydrogenase
MCH	Mean corpuscular hemoglobin
MCHC	Mean corpuscular hemoglobin concentration
MCV	Mean cell volume
MM	Mustard mucilage
MUFA	Monounsaturated
NaCl	Sodium chlorite
Ppm	Parts per million
PLT	Platelet
PUFA	Polyunsaturated fatty acids
PCV	Level hematocrit percentage
RBCs	Erythrocytes (Red Blood Cell)

ROS	Reactive oxygen species
STZ	Streptozotocin
SFA	Saturated fatty acids
SWS	Salin water sprout
TWS	Tap water sprout
TP	Totalnprotin
TC	Cholesterol
TG	Triglycride
JRS	Japanese radish spprouts
VLDL-C	Very low density lipoprotein
WBCs	White blood cell

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HDL-C	High Density Lipoprotein
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LDH	Lactate dehydrogenase
MCH	Mean corpuscular hemoglobin
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INTRODUCTION

Diabetes mellitus is a systemic metabolic disease characterized by hyperglycemia hyperlipedemia, hyperaminoacidemia and hypoinsulinaemia, it leads to decrease in both insulin secretion and insulin action **(Altan. 2003).** It is caused by the abnormality of carbohydrate metabolism which is linked to low blood insulin level or insensitivity of target organs to insulin **(Maiti *et al*., 2004).**

The basic treatments for diabetes are dietary and exercise therapies with drug administration being necessitated by the severity of the diabetic symptoms. Available therapy acts by increasing insulin secretion; decreasing insulin resistance or delaying the absorption of glucose from the intestine. These synthetic drugs are associated with side effects, such as weight gain, hypoglycemia and peripheral edema. **(Sheikpour., 2011 and Sheikpour and Yaghmaei; 2012).** After some years, most of the subjects with type II diabetes need insulin treatment for control of hyperglycemia. Insulin treatment is expensive and troublesome for the patients, and also induces weight gain. In the latter treatment obtain medical plants and food materials have started to gain important as a source of hypoglycemic agents **(Raben *et al.*, 1994; Reader *et al*., 2002 and Mukesh and Namita 2013).**

The seeds of *Sinapis alba* L. (commonly called white or yellow mustard) have been used as a spice and as an herbal in alternative medicinal practices **(Court, 1986)**. Mustard seed and its components have been demon- strated to possess antineoplastic activity **(Manesh and Kuttan, 2003; Uhl *et al*., 2003).** A novel method used to isolate mustard mucilage (MM) from the bran fraction was reported by our group **(Cui *et al.*, 2001).** MM was shown to be composed of both neutral sugars and uronic acids **(Cui *et al*., 1993)**. The monosaccharides identified in mustard seeds were primarily glucose, arabinose, xylose, rhamnose, galactose and mannose **(Cui *et al*., 1993, 1996; Siddiqui *et al*., 1986; Theander *et al*., 1977; Vose, 1974).**

INTRODUCTION

Previous studies haveshown that diets with saturated fatty acids interfere with insulin action **(Azizi *et al*., 2013)**. A number of cross-sectional studies have shown that insulin resistance and type II diabetes are related with high level of C-reactive protine (CRP)**(De Rekeneire *et al*., 2006)**. In addition, it seems that insulin resistance and oxidative stees play important roles in the pathology of type II diabetes **(Smith *et al*., 2005, Hoy *et al* 2009 and Yu *et al*., 2002).**

During the diabetes disease, free radicals are pro- duced. Increased free radical and reduced antioxidant defense mechanisms damage cellular organelles and enzymes, which lead to the increase of lipid peroxidation and insulin resistance, damage and finally death of beta cells in diabetic patients **(Azizi *et al*., 2014).** Studies have shown that the changes in dietary fatty acids can play an important role in the prevention and treatment of coronary heart disease **(De Caterina., 2011),** and inflammatory responses **(Simopoulos., 2008).**

Canola is good sources of monounsaturated fatty acid (MUFA)**(Tarrago *et al*., 2006).** Canola contains 11% omega-3 polyunsaturated fatty acids (PUFA), 53-59% MUFA, 22% omega-6 PUFAs and 7.1% saturated fatty acids (SFA)**(Patade *et al*., 2008, Stark *et al*., 2000 and Gaziano *et al*., 1997),** and its ratio of omega-6 to omega-3 is appropriate **(Gaziano *et al*., 1997 and Quiles *et al*., 2006).**

Searching for new antidiabetic drugs from natural plant is still attractive because they contain substances which demonstrate alternative and safe effects on diabetes mellitus. However despite many reports on the beneficial effects of natural products on diabetes mellitus, little information is availalble about the antidiabetic activity of seed sprouts.

Sprouts are forming from seeds during sprouting. Compared to the seeds it was established that the sprout due to its transformed protein content which is of higher biological value, the higher polyunsaturated fatty acid content, higher vitamin content and the better utilization of minerals has a higher nutritional value. As the sprouts are consumed at