دراسات كيميائية حيوية على بعض الزيوت النباتية

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SUPERVISION SHEET

BIOCHEMICAL STUDIES ON SOME VEGETABLE OILS

M.Sc. Thesis

By

MONA AHMED EL SHARKAWY

B.Sc. Agric. Sci.(Food Science), Fac. Agric., Cairo Univ., 2002

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DEDICATION

I dedicate this work to whom my heart felt thanks ; to ***my parents, my husband and my sister*** *for all the support they lovely offered along the period of my post graduation, as well as to* ***all my family*** *for their full encouragement and help.*

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ABSTRACT

The effect of diets containing different oils; olive, sesame, palm, corn, apricot kernel and moringa oleifera on hyperlipidemic rats were studied. Physical and chemical characteristics ;refractive index, acid ,peroxide and iodine values ;and the fatty acid composition of the investigation oils were determined .The effect of diet containing different oils(mainly high –oleic acid content)being; corn oil (basal diet, control 1) , high fat diet (HFD, control 2), extra- virgin olive oil(G1),refined olive oil (G2), sesame seed oil (G3),palm olein (G4), apricot kernel oil(G5), moringa oleifera oil(G6), on hyperlipidemic rats was studied .It is clear that G1 fed on extra –virgin olive oil induced the higher decrease in cholesterol followed by G2, G5,G6, G3, and G4. It is clear that G1 fed on extra –virgin olive oil possessed higher decrease in triglycerides followed by G5, G6, G2, G3, and G4. Rats fed on different vegetable oils (control 2 and group 1 to 6) showed significant decrease in its HDL-cholesterol compared with control 1. Besides, there were no significant differences between the 6 groups under investigation compared with control 2. It is clear that there was a significant difference in LDL-cholesterol content between G1, G3 and G4 except that between G2, G5 and G6 with G3 and G4 and G1 with G2. Groups of rats (G1 to G 6) which fed on different vegetable oils caused a significant decrease in ALT activity compared to that of HFD .It was observed that the rats fed on apricot kernel oil had the highest decrease in ALT activity compared with control 2 and other oils. It is clear that oils under investigation (G1 to G6) caused a significant decrease in AST activity compared with that of HFD group.

Keywords: Extra-virgin olive oil, refined olive oil, corn oil, sesame seed oil, palm olein, apricot kernel oil, moringa oleifera oil, hypercholesterolemia, hypolipidemic.

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INTRODUCTION

There is considerable interest in determining the potential health of vegetable oils in relation to risk factors atherosclerosclerosis (heart disease) and cancer whether different dietary oils rich in monounsaturated fatty acids have similar effects on serum lipid levels still needs to be elucidated . In early assessments of the effects of dietary fat on human cholesterolemia or experimental atherosclerosis, total fat was the dietary parameter regarded as being the determining factor. The positive and significant association between a diet rich in saturated fat and raised cholesterol and increased cardiovascular risk has been well established (keys *et al*., 1986). Some studies have shown that plasma concentrations of total cholesterol and low-density lipoprotein cholesterol are significantly higher after palm oil-rich diet than those obtained with unsaturated edible oils such as high-oleic sunflower oil (Denke and Grundy;1992 , katan *et al*., 1995 and Cater *et al* ., 1997) , Soybean oil (Enas, 1996) and high –linoleic safflower oil (Mattson and Grundy, 1985). Others have presented favorable results showing that concentrations of low –density lipoprotein (LDL) , high-density (HDL) , and very LDL (VLDL) after palm oil diets are comparable to those obtained after ingesting diets rich in sunflower , peanut , corn , olive and soybean oils in normal- and hypercholesterolemia subjects (Baudet *et al*., 1984 and Choudhury *et al.,* 1995) and significantly different from those on milk and butter-rich diets . This investigation was undertaken to study the effect of

diets containing different oils, olive, palm, corn, sesame, apricot kernel and moringa oleifera on hypercholesterolemia rats.

REVIEW OF LITERATURE

1. Olive Oil

The olive is the fruit of the olive tree (*Olea europaea*). The olive tree, as it is currently known, grew in ancient Iran and Mesopotamia 5000 years ago. From there, it was propagated to Syria and Palestine and, later, to both sides of the Mediterranean Sea. According to other theories, the origin of the olive tree is situated in Africa. The olive tree was cultivated in the ancient Egypt and the olive oil was used in religious ceremonies. The Phoenician, who had commercial exchange with different cities around the Mediterranean basin, propagated its cultivation to the west. In this way, the olive tree arrived to Greece, where olive oil was mainly used as a therapeutic substance and for lighting. The Romans were the first to use olive oil as a food. In summary, olive oil and table olives were valued and used by all ancient civilization around the Mediterranean Sea. Later, when the new World (America) was discovered, the colonizers introduced the vine and olive tree in the new territories (Kiritsakis, 1998).

Olive oil is a fine product with high nutritional value and significant health benefits (Owen *et al.,* 2000). Quality olive oil are expensive owing to the hard and time consuming tasks involved in the cultivation of olive trees , the harvesting of the fruits, and the extraction of the oil , According to the European Union Legislation (European

Union Commission, 2003) , there are several types of virgin olive and olive pomace oils.

Virgin olive oil which obtained from olive fruits by mechanical or physical procedures exclusively, avoiding any processing conditions, especially high temperatures, which may produce an alteration in the oil. This oil cannot be subjected to any other treatment apart from washing, decantation, centrifugation or filtration. In practice, all the oils obtained in oil mills can be included in this class. However, it is obvious that it is impossible to obtain an optimal quality in all cases. Thus, within this class, the regulation established several categories, according to the acidity level, organoleptic score and lack of defect or off-flavours.

Extra virgin olive oil is considered as the best of all possible olive oils, It should have the organoleptic characteristics that will bring to mind the smells and flavours of the fruits from which it was obtained. It is oily phase of olive picked at the appropriate maturation degree and properly processed. It has all compounds of nutritional value at their maximum concentrations since it has not suffered any refining process. It is possible to obtain many extra virgin oils that differ among them only slightly, depending on diverse factors such as cultivars, climatic conditions, agronomic characteristics, etc. Bearing in mind these small variations, it can be said that an extra virgin olive oil adapted to every consumer demand or test exists.

The virgin olive oil which may displays slight alteration in its analytical index or in its organoleptic characteristics; but always in a

reduced proportion. These alterations, mainly those related to the organoleptic characteristics, can be so small that they are hardly appreciated, but are sufficient to depreciate the quality with respect to the extra virgin olive oil.

Ordinary virgin olive oil which has notable alterations in its physicochemical or organoleptic characteristics .They are used as one of the components in a mixture known as olive oil , if its organoleptic characteristics are not drastically altered , or they are destined to refining in the case of strong alterations.

Virgin lampante olive oil, it is not destined for human consumption in any case and must always be refined to make it edible.

Refined olive oil which results from any of the previous ones after refining. This refined olive oil has practically plain organoleptic characteristics, without any taste or smell, and it is used as a base material to prepare mixtures with other virgin olive oils.

Olive - pomace oil is produced from the solid phase that remains after the elaboration of the virgin olive oil. It is obtained by extraction with solvent and it is never used for direct consumption, Link virgin lampante olive oil, it must be refined. Its commercialization is made in mixture with virgin olive oils (Fernandez *et al*., 2004).

Virgin olive oil is the only edible oil of great production obtained by physical methods from the fruits *olea europaea* L.; it shows sensory characteristics and nutritional properties which are the main reasons for the increment of its consumption all over the world in the recent years (EEC, 2003).