EFFECT OF DIFFERENT TYPES OF DIETARY FAT ON THE LIPID PROFILE OF RATS


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ABSTRACT

This study tries to elucidate the biochemical effects of dietary oils and fats commonly available in the Egyptian local market on the lipid profile of rats. The oils used were corn oil, sunflower oil and olive oil, whereas the fats used were hydrogenated corn oil, butter fat and palm stearin. Serum TG, TC, HDL-C, LDL-C and NEFA, liver MDA and microsomal fatty acids as well as pattern of fatty acids in used oils and fats were determined.

Results showed that rats received olive oil had lower serum TG, TC, LDL: HDL-C ratio and liver MDA than groups fed corn and sunflower oils. Mean serum TC and LDL: HDL-C ratio in rats fed corn oil were significantly lower than in those fed sunflower oil. High percentages of 18:1 and 18:2 microsomal fatty acids were found in olive oil and sunflower oil fed groups respectively. A significant increase in 20:4 microsomal fatty acid was found in rats fed the corn oil diet. Feeding hydrogenated corn oil increased significantly LDL: HDL-C ratio more than butter fat and palm stearin diets. Feeding palm stearin diet reduced liver MDA level significantly. Microsomal 18:1 was lower and 18:2 was higher in the hydrogenated corn oil group as compared with butter fat and palm stearin groups. Replacement of hydrogenated corn oil by olive oil decreased significantly the serum TG, TC and LDL: HDL-C ratio. Replacement of butter fat by olive oil caused a significant decrease in serum TG, TC, LDL: HDL-C ratio and liver MDA concentrations. Replacement of palm stearin by olive oil reduced serum TG and liver MDA concentrations. There were no significant differences between values of serum NEFA among the different groups.
ABBREVIATIONS

CETP, Cholesteryl ester transfer protein; CHD, Coronary heart disease; DBI, Double bond index; GLC, Gas liquid chromatography; HDL-C, High density lipoprotein-cholesterol; LDL-C, Low density lipoprotein-cholesterol; MDA, Malondialdehyde; m-RNA, Messenger ribonucleic acid; MUFAs, Monounsaturated fatty acids; NEFA, Non esterified fatty acids; PUFAs, Polyunsaturated fatty acids; SFAs, Saturated fatty acids; TC, Total cholesterol; TFAs, Trans fatty acids; TG, Triglycerides.

INTRODUCTION

Changing views about the effects of dietary fats and oils can profoundly influence the consumption of various foods and, ultimately, health and nutritional status. There is a tendency to increase the use of various kinds of vegetable oils because of public awareness that animal fats contribute to health problems and because of the running high cost of butter fat. The production of partially hydrogenated vegetable oils increased steadily because of their low cost, long shelf life and suitability for commercial frying. Palm stearin has a semisolid texture at room temperature. It represents an inexpensive highly palatable source of saturated fat in the food supply.

For over three decades interest has centered on SFAs and PUFAs whereas MUFAs have received less concern. The Mediterranean diet has been associated with a lower incidence of CHD (Nestel, 1995). In the “Seven Countries Study”, the protective effects of the Mediterranean diet were partially ascribed to the type, rather than the amount of fat, in the diet (Keys et al., 1986). The fat of choice in the Mediterranean diet was olive oil, rich in the MUFA oleic acid. Contributory protective effects of olive oil against CHD include beneficial alterations in serum lipid and lipoprotein concentrations (Mata et al., 1992) and increased resistance of LDL to peroxidation (Jialal et al., 1995).
In the present study, we compared the biochemical effects of oils and fats commonly available in the local market on the lipid profile of rats.

**MATERIALS AND METHODS**

**Animals and diets:**

Adult male Sprague Dawley rats were divided into 12 groups each consisted of 8 rats. Food and water were provided ad libitum.

Six types of oils and fats were selected for this study. The samples were collected from available brands found in the local market. Corn oil “Lesieur”, sunflower oil “Crystal”, olive oil “Egyptian Vineyards and Distilleries company”, hydrogenated corn oil “Mazola”, butter fat “Cow Brand” and palm stearin “Rawabi”.

Groups of rats were fed corn oil diet, sunflower oil diet or olive oil diet for 6 weeks or hydrogenated corn oil diet, butter fat diet or palm stearin diet for 6 weeks, 9 weeks or 6 weeks followed by olive oil diet for 3 weeks.

To the prepared standard diet, the tested oils and fats were added at the expense of cornstarch to form 10% by weight. The standard diet was prepared according to *Campbell (1963)*. It had the following composition (g/100g): Casein 10.0g, Cellulose 5.0g, Salt mixture 4.0g, Vitamin mixture 1.0g and Cornstarch 80.0g.

Salt mixture used was prepared according to *Hegsted et al. (1941)*. Vitamin mixture used was that described by the *AOAC (1990)*.

**Biochemical analysis:**

At the end of each experimental period, rats were fasted overnight, anesthetized with diethyl ether and blood was collected from the hepatic portal vein. Serum obtained by centrifugation was used for the determination of TG, TC and HDL-C using the bio Merieux enzymatic kits. Non Esterified Fatty Acid (NEFA) were determined by the method of *Lehane and Werner (1973)*. Liver Malondialdehyde (MDA) was done according to the method of
Liver microsomes were separated according to the method of Amar-Costesc et al. (1974). Total lipids were extracted from the microsomes according to the method of Bligh and Dyer (1959). The alkaline transesterification of the dried lipid extract was done according to Christie (1982). Separation and identification of the fatty acids methyl esters was done by gas-liquid chromatography (GLC). The fatty acid composition of the dietary oils and fats were similarly assessed according to the previous procedures.

**Statistical analysis:**

Data are expressed as Mean±SEM. Analysis of variance (ANOVA) test followed by least significant difference (LSD) was used to determine the significant differences among the groups. P-value <0.05 indicates a significant result.

**RESULTS**

Fatty acid profile of the dietary lipids used in this study is shown in table (1). Corn and sunflower oils contain a high relative proportion of PUFA linoleic acid (18:2). The predominant fatty acid in olive oil is MUFA oleic acid (18:1). Palmitic acid (16:0) is nearly similar in both hydrogenated corn oil and palm stearin. The highest amount of myristic acid (14:0) was found in butter fat. High percentage of stearic acid (18:0) was found in palm stearin. The least double bond index DBI was 16.7 for palm stearin while the highest one was 149.6 for sunflower oil.

As shown in table (2), mean serum TG, TC, LDL: HDL-C and liver MDA in rats fed olive oil were significantly lower than in those fed corn oil and sunflower oil. In corn oil fed group, TC and LDL: HDL-C were significantly lower than in sunflower oil group. LDL: HDL-C in hydrogenated corn oil fed group was significantly higher than butter fat and palm stearin groups. The liver MDA was significantly lower in palm stearin group than in the other two groups.

Replacement of hydrogenated corn oil by olive oil significantly reduced TG, TC and LDL: HDL-C (table 3). Replacement of butter fat by olive oil decreased TG, TC, LDL: HDL-
C and liver MDA. TG and liver MDA were significantly decreased when olive oil replaced palm stearin.

As shown in table (4), 18: 0 liver microsomal fatty acid was significantly higher in sunflower oil group than corn and olive oil groups. 18: 0 was higher in olive oil group than corn oil group. High percentages of 18: 1 and 18: 2 were found in olive oil and sunflower oil fed groups respectively. A significant increase in 20: 4 was found in corn oil fed group. The lowest percentage of 18: 1 microsomal fatty acid and the highest percentage of 18: 2 microsomal fatty acid were found in the hydrogenated corn oil fed group as compared with butter fat and palm stearin groups.

As shown in table (5), replacement of hydrogenated corn oil by olive oil led to a significant decrease in 18:0 microsomal fatty acid. Replacement of butter fat by olive oil led to a significant decrease in 16:1 microsomal fatty acid. Replacement of palm stearin by olive oil did not show any significant change in the microsomal fatty acids. There were no significant differences between values of serum NEFA among the different groups.

**DISCUSSION**

In this study, we examined the effect of PUFA (corn and sunflower oil) versus MUFA (olive oil) on the serum lipid pattern, liver MDA and microsomal fatty acids of rats. Our results provided evidence for TG, TC and LDL: HDL-C lowering effect of olive oil. These results are consistent with the observation of Kris-Etherton et al. (1999).

The hypocholesterolemic effect of olive oil may be due to enhanced receptor-mediated LDL catabolism as reported by Baggio et al. (1988). Olive oil is known to have a relatively high content of α-tocopherol, which has been shown to reduce LDL peroxidation (Jialal et al., 1995). Olive oil may contain other active antioxidants, such as polyphenols. Polyphenols in virgin olive oil may act in vivo as protective antioxidants (Vissers et al., 2002).
In agreement with our results, *Hwang et al. (1994)* reported that there was no significant difference in the NEFA concentrations between MUFAs and PUFAs fed groups.

Comparative effects of TFAs versus SFAs are important because TFAs most often replace saturates in the diet. Our results show that LDL: HDL-C is higher in the hydrogenated corn oil group than the other two SFA groups (butter fat and palm stearin). This finding is in accordance with the work of *Sundram et al. (1997)*. It was proposed by *Zock and Katan (1992)* that the increase in LDL-C was directly proportional to the amount of TFA consumed. This may include some degree of LDL receptor down-regulation (*Lagrost, 1992*). Decreased HDL-C associated with TFAs intake may be due to their replacement of certain SFAs, which induce rise in HDL-C (*Wood et al., 1993*).

The level of liver MDA following feeding palm stearin diet was significantly lower than that fed the hydrogenated corn oil and butter fat diets. This is consistent with the observations of *Pereira et al. (1991)* who reported lower levels of serum lipid peroxides in palm oil fed rats. This could be related to the high antioxidant concentrations of palm stearin.

Our results showed that feeding hydrogenated corn oil followed by olive oil led to significant decrease in TG, TC and LDL: HDL-C. This is in agreement with that reported by *Judd et al. (1994)*. *Abbey and Nestel (1994)* found that the TFA diet resulted in an increase in cholesteryl ester transfer protein (CETP) activity. Considerable evidence indicates that increased activity of CETP may promote atherosclerosis (*Tall, 1993*).

In this work, feeding butter fat followed by olive oil led to decrease in TG, TC, LDL: HDL-C. A study in non-human primates (*Rudel et al., 1990*) suggested that 16:0 was hypercholesterolemic compared to 18:1. *Schaefer (1997)* reported that the dietary SFAs raise TC and LDL-C by decreasing LDL-receptor mediated clearance as a result of reduction in LDL-receptor activity, which is in part due
to decreased amounts of m-RNA for the LDL receptor whereas 18:1 acts oppositely.

Feeding palm stearin diet followed by olive oil resulted in a significant decrease in TG and liver MDA concentrations. While the other lipid parameters were not changed significantly. *Bonanome and Grundy (1988)* showed that 18:0 (which is 49.7% in palm stearin used in this study), does not raise TC or LDL-C levels because it is rapidly desaturated into oleic acid (18:1). *Ng et al. (1992)* have reported similar findings.

Results of this study showed that replacement of the different fats used with olive oil resulted in non-significant difference in the serum NEFA concentrations. These findings are in agreement with those found by *Roche et al. (1998)*.

In addition, the present investigation showed that the relative fatty acid composition of liver microsomes of rats maintained on the diets containing corn, sunflower and olive oil had higher content of SFAs (16:0 and 18:0) compared to the content of those SFAs in the oils themselves. This may be due to the existence of some homeostatic mechanism that preserves a constant ratio of saturated to unsaturated fatty acids in liver microsomes and the fluidity of membranes *(Periago et al., 1989).* On the other hand, consumption of fat containing diets that are rich in SFA resulted in higher saturation of liver microsomal fatty acids more than that observed with the oils. Both oils and fats used in our study, promoted saturation of the microsomal fatty acids. This is in agreement with the observation of *Giron et al. (1996)* who found that changes in the level of dietary lipid saturation may have little or no effect on the level of saturation of the microsomal fatty acids.

High levels of 18:1 and 18:2 microsomal fatty acids were found in rats fed olive oil and sunflower oil respectively. This may be due to the high content of 18:1 in olive oil diet and 18:2 in sunflower oil diet *(Muriana et al., 1992).*

Our results show a significant increase in 18:2 in microsomal fatty acids of rats fed hydrogenated corn oil compared to those fed
butter fat and palm stearin. *Sundram et al. (1990)* reported lower values of 18:2 fatty acid in rat plasma triglycerides of palm stearin group compared to the polyunsaturated oils (corn oil and soybean oil) fed groups. They suggested that this reflect a sequential lowering in the incorporation of 18:2 fatty acid into the triglycerides due to lower availability brought about by the increased saturation of palm stearin.

Feeding hydrogenated corn oil followed by olive oil resulted in a significant decrease in 18:0 microsomal fatty acid. This decrease in the fat saturation may be due to the lower percentage of SFAs in olive oil compared to hydrogenated corn oil. *Thomassen et al. (1984)* reported that dietary TFAs might inhibit the desaturation-elongation enzyme systems of rat liver.

Feeding butter fat (contains 2.1% of 16:1 fatty acid) followed by olive oil resulted in a significant decrease in 16:1 microsomal fatty acid.

However, the consumption of vegetable oils can be a suitable option as an energy source when replacing saturated fats or trans fatty acids in the diet. The cholesterol raising fatty acids should be reduced in the diet. Commercial products baked or fried in saturated or hydrogenated fats should be avoided. Diet and lifestyle change must be accorded top priority.
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<tr>
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<th>18:1</th>
<th>18:2</th>
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<td>1.1</td>
<td>13.9</td>
<td>26.6</td>
<td>2.1</td>
<td>13.4</td>
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<td>30.4</td>
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<td>Palm stearin</td>
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<td>2.1</td>
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<td>30.1</td>
<td>49.7</td>
<td>16.7</td>
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</table>

**DBI** (Double Bond Index) = Sum of (% of each unsaturated fatty acid × No. of double bonds of that particular fatty acid).
Table (2): Serum lipid pattern and liver MDA of rats fed different types of dietary oils and fats for 6 weeks:

Values are means ± SE of the number of observations given in parentheses

<table>
<thead>
<tr>
<th></th>
<th>TG (mg/dL)</th>
<th>TC (mg/dL)</th>
<th>LDL: HDL-C</th>
<th>NEFA mM/L</th>
<th>Liver MDA n moles/ g wet weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Corn oil</strong></td>
<td>93.1 ± 0.9 c</td>
<td>77.8 ± 0.6 b,c</td>
<td>0.34 ± 0.04 b,c</td>
<td>0.83 ± 0.03</td>
<td>82.4 ± 3.6 c</td>
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<tr>
<td><strong>Sunflower oil</strong></td>
<td>89.1 ± 2.5 c</td>
<td>80.9 ± 0.6 a,c</td>
<td>0.49 ± 0.02 a,c</td>
<td>0.95 ± 0.05</td>
<td>81.4 ± 4.5 c</td>
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<tr>
<td><strong>Olive oil</strong></td>
<td>82.6 ± 1.7 a,b</td>
<td>68.8 ± 1.9 a,b</td>
<td>0.19 ± 0.01 a,b</td>
<td>0.87 ± 0.04</td>
<td>29.1 ± 1.6 a,b</td>
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<td>(6)</td>
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<tr>
<td><strong>Hydrogenated corn oil</strong></td>
<td>106.3 ± 5.3</td>
<td>88.2 ± 2.5</td>
<td>1.45 ± 0.12 e,f</td>
<td>0.77 ± 0.03</td>
<td>78.8 ± 5.4 e,f</td>
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<tr>
<td><strong>Butter fat</strong></td>
<td>103.4 ± 4.1</td>
<td>80.1 ± 2.5</td>
<td>0.29 ± 0.03 d,f</td>
<td>0.93 ± 0.05</td>
<td>49.7 ± 4.2 d,f</td>
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<tr>
<td><strong>Palm stearin</strong></td>
<td>96.6 ± 4.4</td>
<td>87.5 ± 2.4</td>
<td>0.63 ± 0.06 d,e</td>
<td>0.81 ± 0.05</td>
<td>32.1 ± 1.8 d,e</td>
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**a:** Significant difference from corn oil fed group  
**b:** Significant difference from sunflower oil fed group  
**c:** Significant difference from olive oil fed group  
**d:** Significant difference from hydrogenated corn oil fed group  
**e:** Significant difference from butter fat fed group  
**f:** Significant difference from palm stearin fed group  
P < 0.05
Table (3): Serum lipid pattern and liver MDA of rats fed different types of dietary fats for 9 weeks:

Values are means ± SE of the number of observations given in parentheses

<table>
<thead>
<tr>
<th></th>
<th>TG (mg/dL)</th>
<th>TC (mg/dL)</th>
<th>LDL: HDL-C</th>
<th>NEFA mM/L</th>
<th>Liver MDA nmoles/ g wet weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogenated corn oil (9w)</td>
<td>90.0 ± 4.3</td>
<td>99.6 ± 2.7</td>
<td>1.52 ± 0.11</td>
<td>0.69 ± 0.03</td>
<td>103.1 ± 7.7</td>
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<tr>
<td>Hydrogenated corn oil (6w) + olive oil (3w)</td>
<td>74.1 ± 2.4 (^a)</td>
<td>87.9 ± 3.5 (^a)</td>
<td>1.20 ± 0.1 (^a)</td>
<td>0.72 ± 0.03</td>
<td>107.8 ± 8.4</td>
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<td>(8)</td>
<td>(7)</td>
<td>(6)</td>
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<td>(7)</td>
</tr>
<tr>
<td>Butter fat (9w)</td>
<td>115.5 ± 3.1</td>
<td>84.5 ± 1.6</td>
<td>0.47 ± 0.04</td>
<td>0.84 ± 0.07</td>
<td>75.3 ± 5.9</td>
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<td>(8)</td>
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</tr>
<tr>
<td>Butter fat (6w) + olive oil (3w)</td>
<td>106.1 ± 3.3 (^a)</td>
<td>74.7 ± 1.3 (^a)</td>
<td>0.28 ± 0.01 (^a)</td>
<td>0.78 ±0.04</td>
<td>53.2 ± 4.5 (^a)</td>
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<tr>
<td>Palm stearin (9w)</td>
<td>105.7 ± 2.6</td>
<td>85.3 ± 2.8</td>
<td>0.55 ± 0.04</td>
<td>0.95 ± 0.07</td>
<td>84.3 ± 6.5</td>
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<tr>
<td>Palm stearin (6w) + olive oil (3w)</td>
<td>92.3 ± 3.3 (^a)</td>
<td>81.3 ± 2.1</td>
<td>0.57 ± 0.06</td>
<td>0.81 ± 0.06</td>
<td>59.2 ± 4.8 (^a)</td>
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\(^a\): Significant difference from fat fed group for 9 weeks

P < 0.05
Table (4): Fatty acid composition of liver microsomes of rats fed different types of dietary oils and fats for 6 weeks: (% of total fatty acids)

Values are means ± SE  (n=6)

<table>
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<tr>
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<th>16:0</th>
<th>16:1</th>
<th>18:0</th>
<th>18:1</th>
<th>18:2</th>
<th>18:3</th>
<th>20:4</th>
<th>DBI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn oil</td>
<td>20.9±0.9</td>
<td>19.7±1.4&lt;sup&gt;b,c&lt;/sup&gt;</td>
<td>18.8±5.3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>19.1±3.9&lt;sup&gt;b,c&lt;/sup&gt;</td>
<td>2.2±0.4</td>
<td>13.0±1.4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>115.6</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Sunflower oil</td>
<td>21.9±1.6</td>
<td>31.7±1.6&lt;sup&gt;a,c&lt;/sup&gt;</td>
<td>5.6±1.0&lt;sup&gt;a,c&lt;/sup&gt;</td>
<td>32.0±2.6&lt;sup&gt;a,c&lt;/sup&gt;</td>
<td>8.2±1.6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>102.4</td>
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<tr>
<td>Olive oil</td>
<td>22.0±3.2</td>
<td>1.4±0.2</td>
<td>26.1±2.4&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>22.4±3.4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.3±1.2&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>34.4</td>
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<tr>
<td>Hydrogenated corn oil</td>
<td>1.8±0.5</td>
<td>0.8±0.3</td>
<td>30.5±2.4</td>
<td>28.6±2.2</td>
<td>11.4±2.1&lt;sup&gt;e,f&lt;/sup&gt;</td>
<td>12.5±1.2&lt;sup&gt;e,f&lt;/sup&gt;</td>
<td>3.0±0.4</td>
<td>48.4</td>
<td></td>
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</tr>
<tr>
<td>Butter fat</td>
<td>32.2±3.1</td>
<td>1.3±0.4</td>
<td>27.1±3.2</td>
<td>24.2±2.4&lt;sup&gt;d&lt;/sup&gt;</td>
<td>6.5±0.7&lt;sup&gt;d,f&lt;/sup&gt;</td>
<td>2.3±0.7</td>
<td>45.4</td>
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<tr>
<td>Palm stearin</td>
<td>28.2±4.5</td>
<td>1.3±0.1</td>
<td>34.3±1.0</td>
<td>24.3±3.3&lt;sup&gt;d&lt;/sup&gt;</td>
<td>2.2±0.3&lt;sup&gt;d,e&lt;/sup&gt;</td>
<td>30.0</td>
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<sup>a:</sup> Significant difference from corn oil fed group  
<sup>b:</sup> Significant difference from sunflower oil fed group  
<sup>c:</sup> Significant difference from olive oil fed group  
<sup>d:</sup> Significant difference from hydrogenated corn oil fed group  
<sup>e:</sup> Significant difference from butter fat fed group  
<sup>f:</sup> Significant difference from palm stearin fed group P < 0.05
Table (5): Fatty acid composition of liver microsomes of rats fed different types of dietary fats for 9 weeks: (% of total fatty acids)

Values are means ± SE (n=6)

<table>
<thead>
<tr>
<th></th>
<th>6:0</th>
<th>11:0</th>
<th>12:0</th>
<th>14:0</th>
<th>16:0</th>
<th>16:1</th>
<th>17:0</th>
<th>18:0</th>
<th>18:1</th>
<th>18:2</th>
<th>DBI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogenated corn oil (9w)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>31.9±0.8</td>
<td>1.5±0.8</td>
<td>40.2±3.2</td>
<td>15.3±2.7</td>
<td>7.1±2.0</td>
<td></td>
<td>31</td>
</tr>
<tr>
<td>Hydrogenated corn oil (6w) + olive oil (3w)</td>
<td>1.2±0.3</td>
<td>1.2±0.1</td>
<td>1.4±0.1</td>
<td>31.5±4.0</td>
<td>7.1±0.5</td>
<td>10.8±0.8a</td>
<td>11.2±0.3</td>
<td></td>
<td>11.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butter fat (9w)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.2±0.1</td>
<td>24.8±0.6</td>
<td>4.2±0.3</td>
<td>31.6±1.1</td>
<td>27.5±1.1</td>
<td>4.6±0.4</td>
<td>40.9</td>
</tr>
<tr>
<td>Butter fat (6w) + olive oil (3w)</td>
<td>1.1±0.3</td>
<td></td>
<td>27.8±2.2</td>
<td>2.8±0.3a</td>
<td>31.8±1.1</td>
<td>23.4±2.8</td>
<td>5.6±1.3</td>
<td>37.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palm stearin (9w)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>31.9±2.3</td>
<td>19.4±2.6</td>
<td>1.4±0.2</td>
<td>22.2</td>
</tr>
<tr>
<td>Palm stearin (6w) + olive oil (3w)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>33.6±2.3</td>
<td></td>
<td></td>
<td>36.5±2.0</td>
<td>21.7±1.3</td>
<td></td>
<td>21.7</td>
</tr>
</tbody>
</table>

a: Significant difference from fat fed group (9w)    P < 0.05
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تأثير نوعية الدهون الغذائية على نمط الدهون في الجرذان

المختصر العربي

أجريت هذه الدراسة لمعرفة التأثير الحيوي للاوّاع المختلفة من الزيوت والدهون الغذائية شائعة الاستعمال في السوق المحلي على نمط الدهون في الجرذان. الزيوت المستخدمة هي زيت الزيتون، زيت عباد الشمس وزيت الذرة المهدرج بينما الدهون المستخدمة هي زيت الذرة المهدرج، السمن الحيواني وسمن النخيل. تم تعين محتوي مصل الدم من الجلسريدات الثلاثية، الكوليسترول الكلي، كولسترول الليبروببتينات منخفضة الكثافة، كولسترول الليبروببتينات عالية الكثافة والأحماض الدهنية غير المؤسترة وكذلك ثنائي ألدهيد المانول بكبد الجرذان والأحماض الدهنية في ميكروsomات بكبد الجرذان كما تم تحليل الأحماض الدهنية في الزيوت والدهون المستخدمة.

وقد توصلت نتائج الدراسة التي تم الحصول عليها إلى أن الجرذان التي تغذت علي زيت الزيتون وجد بها نقص معنوي في متوسط محتوي مصل الدم لكل من الجلسريدات الثلاثية، الكوليسترول الكلي ونسبة كوليسترول الليبروببتينات منخفضة الكثافة إلى نسبة كوليسترول الليبروببتينات عالية الكثافة عنها في الجرذان التي تغذت علي زيت الذرة وزيت عباد الشمس. كما وجد أيضاً نقص معنوي في متوسط محتوي مصل الدم من الكوليسترول الكلي ونسبة كوليسترول الليبروببتينات منخفضة الكثافة إلى كوليسترول الليبروببتينات عالية الكثافة في الجرذان التي تم تغذيتها علي زيت الذرة إذا ما قورنت بذاتي تم تغذيتها علي زيت عباد الشمس. وتحليل الأحماض الدهنية و用地 فرтика تكشف عن مستوي مرتفع من 18 في ميكروsomات بكبد الجرذان التي تم تغذيتها علي وجبات محتوية علي زيت الزيتون و20 في ميكروsomات بكبد الجرذان التي تم تغذيتها علي وجبات محتوية علي زيت الزيتون و20 في ميكروsomات بكبد الجرذان التي تم تغذيتها علي وجبات محتوية علي زيت الذرة المهدرج. كما وجدت أيضاً زيادة معنوية في الأحماض الدهنية الميكروsomية: 4 في الجرذان التي تم تغذيتها علي زيت الذرة المهدرج. كما أوضحت النتائج أيضاً أن نسبة كوليسترول الليبروببتينات منخفضة الكثافة إلى كوليسترول الليبروببتينات عالية الكثافة في مصل الدم كانت مرتفعة في الجرذان التي تم تغذيتها علي زيت الذرة المهدرج إذا ما قورنت بتلك التي تم تغذيتها علي سمن حيواني أو سمن النخيل. كما وجد نقص معنوي في محتوي ثنائي ألدهيد المانول بكبد الجرذان التي تم تغذيتها علي وجبات تحتوي علي سمن النخيل. أما في
مجموعة الجرذان التي تم تغذيتها علي زيت الذرة المهدرج كان مستوى الأحماض الدهنية الميكروسومية 18:1 منخفضا بينما ارتفع مستوى الأحماض الدهنية الميكروسومية 18:2 ارتفاعا معنويًا إذا ما قورنت بالمجموعات التي تم تغذيتها علي سمن حيواني وكذلك علي سمن النخيل. أدى إحلال السمن الحيواني بزيت الزيتون إلى نقص في مكونات مصل الدم من الجليسرادات الثلاثية والكوليسترول الكلي ونسبة كوليسترول الليپوبروتينات منخفضة الكثافة إلى كوليسترول الليپوبروتينات عالية الكثافة وكذلك في تركيزات ثنائي ألكسيدات المانول بالكبد. كما أدى إحلال سمن النخيل بزيت الزيتون إلى نقص معنوي في الجليسرادات الثلاثية وكذلك في تركيزات ثنائي ألكسيدات المانول بالكبد. كما تبين أنه لا يوجد تأثير معنوي في تركيزات الأحماض الدهنية غير المؤسترة بمصل الدم نتيجة استهلاك الوجبات المختلفة المستخدمة في الدراسة.