Hypoglycemic and Hypolipidemic Effects of Chamomile Powder and Oil against High Fat High Fructose diet in rats

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ABSTRACT

The objective of this work was to study the effect of chamomile powder and oil against high fat, high fructose diet induced-metabolic disturbances in rats. Thirty six male rats were randomly assigned into 6 groups for 6 weeks as following: Group (I): normal control rats (-ve) fed on basal diet, Group (II): received basal diet contained chamomile powder 20 g /kg/ diet, Group (III): received basal diet contained chamomile essential oil 2 g /kg/ diet, Group (IV): (+ve) control: high fat diet and high fructose drinking (HF&HFr), Group (V): (+ve) and received chamomile powder 20 g /kg/ diet, Group (VI): (+ve) and received chamomile oil 2 ml /kg/ diet After 6 weeks, body weight, BMI, blood glucose, serum insulin, and calculated HOMA-index, lipid profile, leptin, resistin, TNF-α, total antioxidant capacity and total oxidant capacity were analyzed in the study male rats. Results showed high phenolic content in chamomile powder as well as estimate volatile components. chamomile powder and oil showed significant decrease in blood glucose, serum insulin, HOMA-index, leptin, resistin, TNF-α, total oxidant capacity while increasing the total antioxidant capacity in addition to lipid profile normalization in groups that received high fructose high fat diet containing chamomile powder and oil as compared to (+ve) control. It can be concluded that consumption of chamomile powder and oil can improve the lipid profile, reduce insulin resistance, blood glucose level and inflammatory cytokines as well as it can protect the body from the oxidative stress, related to their phenolic compounds. Thus, chamomile consumption has a beneficial effect in control and management of diabetes and diabetes associated complications with no risk of hypoglycemic effect.

Key words: Hypoglycemic- Chamomile - Hypolipidmic- Inflammatory Cytokines
INTRODUCTION

Diabetic is considered as most serious diseases which that linked to hyperglycemia which occurs either when the pancreas cannot produce enough insulin, or when the body cannot effectively use the produced insulin (Ramachandran et al., 2010). Visceral obesity one of the main risks of metabolic disorders Dysregulated production of certain inflammatory cytokines that exceeding the anti-inflammatory adipose tissue-derived mediators (adipokines as adiponectin) is known to stimulate a state known as insulin resistance (Nishimura et al., 2009).

Insulin and oral hypoglycemic drugs are commonly used for lowering blood glucose level in diabetics. However, they have numerous adverse effects including hypoglycemia, weight gain, and lactic acidosis as well as hepatic and renal dysfunction (Tripathi and Singh, 2000). Thus, many herbal products are commonly used as traditional medicine for diabetes treatment throughout the world (Pushparay et al., 2000).

Chamomile (Matricaria recutita L.) is a floury plant nat to Europe (Crevisin and Philpott 1990). It was a curative herb because of its anti-inflammatory, calmed, antimicrobial, and antioxidant effect (Maschi et al., 2008). Chamomile essential oil used in products including baked goods, confections, alcoholic beverages and herbal teas. Chamomile flowers are prepared as tea (Harbourne, et al. 2009). Flavonoids are the richness phenolic composites in herbicide have susceptibility to simmer lipid peroxidation products, inhibit DNA oxidative harm, and clear reactive oxygen species (ROS) (Mladenka et
The biological virility of chamomile because of phenolic composites as (apigenin, quercetin, patuletin, luteolin and glucosides), but principal ingredient of essential oil extracted from chamomile as α-bisabolol (Hadaruga et al., 2009).

This study was therefore undertaken to analyze the Chamomile (Matricaria recutita L.) powder and oil effects on blood glucose level, insulin sensitivity, lipid profile, antioxidant capacity and inflammatory cytokines in rats.

MATERIALS & METHODS

A- Materials:
Chamomile powder and essential oil: were obtained from Agriculture Research Center, Giza, Egypt
Fructose: Fructose was purchased from the International Company for Scientific and Medical Supplies, Cairo, Egypt.

Chemicals: Kits for measurements of lipid profile were purchased from Diagnosticum Zrt, Budapest and those for measurements of TOC and TAC were obtained from Labor Diagnostika Nord GmbH and Co, Germany.

B- Methods:
Determination of total phenolic compounds: Total phenolic compounds were determined according to the method of Waskmundzka et al. (2007).

Identification of chamomile oil by GC-MS: The dry
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flowers of chamomile were ground by domestic model electronic mixer. Each sample was subjected to hydrodistillation apparatus in a Clevenger type apparatus for 6 hours according to the method recommended by EPP, (1983). Oil has characteristic odor and sharp taste was obtained. The oils were dried over anhydrous sodium sulphate to remove traces of moisture and stored in refrigerator in dark at 4°C until use.

Diets:
Basal diet was prepared according to (Reeves et al., 1993). HF,HFr diet, consisted of basal diet containing 20% fat (15% beef tallow + 5% corn oil) combined with fructose added in drinking water at 13% w/v which is similar to concentration of soft drinks (Light et al., 2009).

Experimental Design:

Male rats were randomly assigned into six groups (6 rats) as following:
Group (I): normal rats (-ve control).
Group (II): received basal diet contained chamomile powder 20 g /kg/ diet
Group (III): received basal diet contained chamomile essential oil 2 ml /kg/ diet
Group (IV): high fat, high fructose-fed group (HF,HFr) (+ve control).
Group (V): (+ve control) and received chamomile powder 20 g /kg/ diet
Group (VI): (+ve control) and received chamomile oil 2 ml /kg/ diet

Oral glucose tolerance tests: (OGTT), twelve hours prior to day 40, rats were fasted overnight and were subjected to OGTT. Fructose added in drinking water in groups 4, 5 and 6 instead of water for the overnight fasting period to measure basal blood glucose concentrations from the tail vein blood The rats were given (2 g/kg b.w.) of glucose via
oral gavage as a 40% solution, blood samples were collected at 0, 30, 60, 90, and 120 min after glucose administration. At the end of the period (6 weeks), rats were fasted overnight and the blood samples were collected into non-heparinized centrifuge tubes. Serum were separated and frozen at -20 °C for biochemical analysis.

**Biochemical Parameters:**

**Determination of serum insulin:** Fasting serum insulin level was measured using the ultrasensitive rat insulin ELISA according to (Thorell and Lanner, 1973). Determination of insulin resistance by the homeostasis model assessment (HOMA-IR) calculated as the following formula: insulin (μU/mL) × glucose (mg/dl)/405 (Matthews et al., 1985).

**Determination of serum lipids:** Serum TG, TC and HDL described by (Fossati and Prencipe, 1982, Allain, 1974 and Burstein et al., 1970), respectively. Serum LDL levels were calculated according to the equation of Friedwald et al. (1972).

**Determination of serum resistin, tumor necrosis factor alpha (TNF-α) and leptin levels:** Fasting serum resistin, TNF-α and leptin were measured by enzyme-linked immunosorbent assay according to the methods that had previously described by (Thorell, 1973, Beutler et al., 1985 and Maffei et al., 1995), respectively.

**Determination of antioxidant parameters:** Serum total antioxidant and oxidant capacities were measured according to (Cao et al., 1993 and Flohe and Gunzler, 1984), respectively.

**Statistical Analysis:** The obtained data were statistically analyzed using computerized SPSS...
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(Statistic Program Sigmastat, Statistical Soft-Ware, SAS Institute, Cary, NC). Effects of different treatments were analyzed by one way ANOVA (Analysis of variance) test using Duncan’s multiple range test and p<0.05 was used to indicate significance between different groups (Snedecor and Cochran, 1967).

RESULTS & Discussion

Polyphenolic compounds are very important constituents in activating lipid free radical chains and preventing hydroperoxide. Data in Table (1) showed that the main phenolic acids identified in chamomile powder were Epicatechen (2022.30), Salicylic (309.5), Ellagic (174.1) and Cinnamic (110.75) with high contents, followed by Chlorogenic, Ferulic and Caffeine. It was reported that the flowers of chamomile contained flavonoids, tannins and terpenoids which showed different pharmacological properties (Hoberg et al., 2000 and Eugenio et al., 2012). Tannins are the most antioxidants present in the human diet and they are involved in protection against degenerative diseases and oxidative stress, gallic acid showed potent antioxidant activity by preventing lipid per-oxidation (Shahrzad et al., 2001). Chamomile extracts rich in phenolic compounds as chlorogenic acid, umbelliferone, apigenin and apigenin-7-glucoside, and flavonoids as rutin or quercitrin. (Patricia et al. 2010)

Volatile components of chamomile were reported in Table (2) as α-bisabolol (46.4), Terpinen – 4ol (22.1), β bisabolol, Viridiflorene, Trans trans farnesol, bisabolone, Cubebene, and other components

Chamomile volatile oil had components as (Camazulene 19.9%), (α-
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Bisabolol 20.9%), (A and B bisabolol-oxides 21.6% and 1.2%) and (β-farnesen 3.1%) as a major components. On the other hand, α- and β-caryophyllene, caryophyllene -oxide, spathulenol, and also some monoterpenes like β-phellandrene, limonene, β-ocymene and γ-terpinen had lower concentrations. (Costescu et al., 2008).

Volatile oils of chamomile including alpha-bisabolol and matricin were considered as anti-inflammatory and antilipidemic. (Sakai and Misawa, 2015).

The results in Table(3) showed that, differences in feed intake and body weight gain between rats were insignificant in all groups except group IV (High fat, high fructose-fed) which showed significant reduction in feed intake (10.1g/day) in addition to significant increase in body weight gain (147g/6weeks) when compared to normal control. Tuomisto et al., (1999) explained that, high fat diet may induce anorexia in rats. Furthermore, Jurgens et al. (2015) reported that, rats reduce energy ingested from liquid than that intake from the solid diet. Saravanan and Leelavinothan (2006) reported that, chamomile enhances body weight loss due to its antihyperglycemic effect and improvement in insulin secretion and protective effect in controlling muscle wasting.

The weight gain was insignificant between groups treated with chamomile; this indicates the minor effect of chamomile powder on lowering the BMI and weight gain. (Brown, 2014)

The results in Table (4) showed that blood glucose level in group IV was significantly higher (133mg/dl) than normal control group (91mg/dl). Diabetes mellitus is a chronic disease that associated with a higher blood glucose level in
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However, the blood glucose level in groups HF&HFr and treated with chamomile powder and oil was improved to normal group this was due to the antihyperglycemic effect of chamomile powder and oil. The Serum insulin level was nearing to normal control in normal groups consumed chamomile powder and oil but group fed on HF&HFr was significantly higher (38µU/ml) than normal control group. Atsushi et al. (2008) suggested that antihyperglycemic action of chamomile extract is due to inhibition of hepatic glycogen degradation.

No significant difference in HOMA-index between groups consumed powder or oil of chamomile with normal control group. In addition, HOMA-index was significantly higher in group IV (HF&HFr) +ve control when compared to the other groups which indicate the effect of chamomile powder and oil on increasing the insulin sensitivity. There are different approaches for quantitative determination of insulin resistance as well as beta-cell function, however, HOMA-index is found to be the most suitable mode (Wallace and Matthews, 2002).

Lipid profile analysis shown in Table.(5) revealed that group IV (HF&HFr) had significantly the highest levels of triglycerides, total cholesterol, LDL-C and VLDL-C while had the lowest level of HDL-C which indicated the negative effect of HF&HFr diet on the lipid profile. On the other hand, the best group was chamomile powder followed by chamomile oil which had significantly the lowest levels of triglycerides, total cholesterol and VLDL-C and had the highest level of HDL-C. The results indicate the great effect of chamomile powder in control of dyslipidemia. It was reported that high fat diet can induce abnormal increases in serum
concentrations of triglycerides, total cholesterol, low-density lipoprotein cholesterol and lipid peroxidation, in addition to depressed antioxidant defense system (Yan et al., 2006). Dyslipidemia caused in male rats fed on high fat and high fructose diet consumption compared to control (Amin et al., 2016).

Fructose caused troubles in metabolism due to an increment in free fatty acids and triglycerides into tissues as (liver, pancreas and muscle). Stanhope et al., (2009) Mang et al., (2016) reported that, chamomile had hypoglycemic and hypolipidemic effects on diabetic animals.

High fat & high fructose group had high significant levels of Leptin, resistin, TNF-α and total oxidant capacity while had the lowest total antioxidant capacity compared to the other groups. Although, leptin, resistin and TNF-α levels in all groups were the best in chamomile powder followed by chamomile oil groups compared to normal control, These results confirm with Vincent et al., (2009) who reported that, the antioxidant effect of chamomile may be to positive effect of antioxidants on HOMA-index has been shown in healthy people. Abnormal production of inflammatory cytokines is such as TNF-α and IL-6 known to induce insulin resistance (Nishimura et al., 2009).

Controlling diabetes and insulin resistance can be achieved via modulation of inflammatory cytokines and adipokines (Zhang and Gao, 2016). Free radicals generation cause exhaustion in the endogenous antioxidants and can cause hepatic inflammation by activation of the inflammatory cytokines (Weisberg et al., 2008).

Leptin is a peptide hormone as an adipokine that
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regulate energy intake and expenditure (Brennan and Mantzoros, 2006). Leptin could inhibit the development of obesity via stimulation of the satiety centers in brain (DePaoli, 2014). Leptin is synthesized primarily in the adipocytes and its level is proportional to total body fat (Fischer et al., 2002). Most of obese peoples have deficiency in leptin receptors, which lead to leptin resistance (Tartaglia et al., 1995). Several investigations have shown that high leptin level is associated with increased risk of developing diabetes (Tong et al., 2005). TNF-α is an adipocytokine that involved in systemic inflammation (Moller, 2000) and is secreted by macrophages and variety of cells including adipocytes (Gimeno and Klaman, 2005). TNF-α inhibits insulin transduction and affect on glucose metabolism (Zou and Shao, 2008).

Chamomile produced a significant protection against oxidative stress, it decreased malondialdehyde (MDA) level and increased antioxidant enzymes as superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPx). (Hichem et al., 2014)

CONCLUSION

Chamomile powder and oil have inhibitory effects on inflammatory cytokines such as TNF-α, and leptin in addition to resistin level. It also can improve the lipid profile, insulin sensitivity, hyperglycemia control and the total antioxidant capacity with relieving of the oxidative stress.

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<table>
<thead>
<tr>
<th>Nature Med., 1:1155-1161.</th>
<th>Inhibition of human cAMP</th>
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<td>Mang B; Wolters M; Schmitt B; Kelb K; Lichtinghagen R; Stichtenoth DO and Hahn A (2006):</td>
<td>Phosphodiesterase as a mechanism of the spasmylytic effect of Matricaria recutita L.</td>
</tr>
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</table>

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Table (1): Phenolic compounds of chamomile powder (ppm)

<table>
<thead>
<tr>
<th>Phenolic compounds of chamomile</th>
<th>Ppm</th>
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<tbody>
<tr>
<td>Gallic</td>
<td>22.02</td>
</tr>
<tr>
<td>Syring</td>
<td>36.60</td>
</tr>
<tr>
<td>4-Amino-benzoic</td>
<td>5.89</td>
</tr>
<tr>
<td>Epicatechen</td>
<td>2022.30</td>
</tr>
<tr>
<td>Chlorogenic</td>
<td>89.91</td>
</tr>
<tr>
<td>Catechin</td>
<td>27.56</td>
</tr>
<tr>
<td>Caffeine</td>
<td>78.40</td>
</tr>
<tr>
<td>Vanillic</td>
<td>28.53</td>
</tr>
<tr>
<td>Ferulic</td>
<td>82.74</td>
</tr>
<tr>
<td>Ellagic</td>
<td>174.10</td>
</tr>
<tr>
<td>Salicylic</td>
<td>309.50</td>
</tr>
<tr>
<td>Cinnamic</td>
<td>110.75</td>
</tr>
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</table>
Table (2): Volatile components of chamomile essential oil

<table>
<thead>
<tr>
<th>Peak No.</th>
<th>Compounds</th>
<th>Area %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>α- pinene</td>
<td>1.4</td>
</tr>
<tr>
<td>2</td>
<td>Sabinene</td>
<td>0.3</td>
</tr>
<tr>
<td>3</td>
<td>β -pinene</td>
<td>0.1</td>
</tr>
<tr>
<td>4</td>
<td>α- phellandrene</td>
<td>0.4</td>
</tr>
<tr>
<td>5</td>
<td>α- terpinene</td>
<td>0.1</td>
</tr>
<tr>
<td>6</td>
<td>T- terpinene</td>
<td>0.3</td>
</tr>
<tr>
<td>7</td>
<td>Terpinen- 4 ol</td>
<td>22.1</td>
</tr>
<tr>
<td>8</td>
<td>Methyl acetate</td>
<td>0.3</td>
</tr>
<tr>
<td>9</td>
<td>α- cubebene</td>
<td>1.9</td>
</tr>
<tr>
<td>10</td>
<td>Cis- β - farnesene</td>
<td>0.3</td>
</tr>
<tr>
<td>11</td>
<td>β - bisabolone</td>
<td>2.1</td>
</tr>
<tr>
<td>12</td>
<td>Trans – nerolidol</td>
<td>1.0</td>
</tr>
<tr>
<td>13</td>
<td>Spathulenol</td>
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</tr>
<tr>
<td>14</td>
<td>Caryophyllene oxide</td>
<td>1.2</td>
</tr>
<tr>
<td>15</td>
<td>Viridiflorene</td>
<td>6.6</td>
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<tr>
<td>16</td>
<td>β - bisabolol</td>
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<td>17</td>
<td>α- bisabolol oxide A</td>
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<td>18</td>
<td>α- bisabolol</td>
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<tr>
<td>19</td>
<td>Chamazulene</td>
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<tr>
<td>20</td>
<td>Trans-trans- farnesol</td>
<td>6.1</td>
</tr>
<tr>
<td>21</td>
<td>Guaiazulene</td>
<td>0.6</td>
</tr>
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</table>
Table (3): Effect of chamomile powder and oil on feed intake and body weight gain in male rats fed on basal or high fat high fructose diets

<table>
<thead>
<tr>
<th>Groups</th>
<th>Feed intake (g/day)</th>
<th>Body weight gain (g/6 weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>13.2±1.1(^b)</td>
<td>103±10.9(^a)</td>
</tr>
<tr>
<td>Control+Chamomile powder</td>
<td>12.1±1.1(^b)</td>
<td>103±9.7(^a)</td>
</tr>
<tr>
<td>Control+Chamomile oil</td>
<td>11.2±1.6(^{ab})</td>
<td>116±15.1(^a)</td>
</tr>
<tr>
<td>HF/HFr</td>
<td>10.1±1.4(^a)</td>
<td>147±14.2(^b)</td>
</tr>
<tr>
<td>HF/HFr + Chamomile powder</td>
<td>11.6±1.1(^{ab})</td>
<td>123±11.9(^{ab})</td>
</tr>
<tr>
<td>HF/HFr + Chamomile oil</td>
<td>11.1±1.1(^a)</td>
<td>122±9.8(^{ab})</td>
</tr>
</tbody>
</table>

The values are expressed as mean ± SEM (n= 6 rats/ group). Values with the same letters indicate insignificant difference and vice versa.
Table (4): Effect of chamomile powder and oil on serum insulin and HOMA-index in male rats fed on basal or high fat high fructose diets

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Blood Glucose (mg/dl)</th>
<th>Serum Insulin (µU/ml)</th>
<th>HOMA-index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>91±11.09\textsuperscript{a}</td>
<td>27±0.69\textsuperscript{b}</td>
<td>6.05±0.85\textsuperscript{a}</td>
</tr>
<tr>
<td>Control+Chamomile powder</td>
<td>90±5.04\textsuperscript{a}</td>
<td>28±0.97\textsuperscript{b}</td>
<td>6.2±0.35\textsuperscript{a}</td>
</tr>
<tr>
<td>Control+Chamomile oil</td>
<td>111±3.3\textsuperscript{b}</td>
<td>23±2.1\textsuperscript{a}</td>
<td>6.4±0.61\textsuperscript{a}</td>
</tr>
<tr>
<td>HF/HFr</td>
<td>133±4.9\textsuperscript{cd}</td>
<td>38±1.7\textsuperscript{d}</td>
<td>12.4±0.5\textsuperscript{c}</td>
</tr>
<tr>
<td>HF/HFr + Chamomile powder</td>
<td>113±3.3\textsuperscript{b}</td>
<td>23±2.1\textsuperscript{a}</td>
<td>6.4±0.61\textsuperscript{a}</td>
</tr>
<tr>
<td>HF/HFr + Chamomile oil</td>
<td>115±2.9\textsuperscript{b}</td>
<td>23±2.9\textsuperscript{a}</td>
<td>6.5±0.63\textsuperscript{a}</td>
</tr>
</tbody>
</table>

The values are expressed as mean ± SEM (n= 6 rats/ group). Values with the same letters indicate insignificant difference and vice versa.
Table (5): Effect of chamomile powder and oil on serum lipid profile in male rats fed on basal or high fat high fructose diets

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Triglycerides (mg/dl)</th>
<th>Total Cholesterol (mg/dl)</th>
<th>HDL-Cholesterol (mg/dl)</th>
<th>LDL-Cholesterol (mg/dl)</th>
<th>VLDL-Cholesterol (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>76.7±0.99&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>82.8±0.5&lt;sup&gt;b&lt;/sup&gt;</td>
<td>15.9±0.16&lt;sup&gt;b&lt;/sup&gt;</td>
<td>49.1±0.6&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>15.1±1.01&lt;sup&gt;bc&lt;/sup&gt;</td>
</tr>
<tr>
<td>Control+Chamomile powder</td>
<td>71.9±0.91&lt;sup&gt;a&lt;/sup&gt;</td>
<td>72.1±0.53&lt;sup&gt;a&lt;/sup&gt;</td>
<td>15.8±0.09&lt;sup&gt;b&lt;/sup&gt;</td>
<td>40.5±0.62&lt;sup&gt;a&lt;/sup&gt;</td>
<td>14.3±0.35&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>Control+Chamomile oil</td>
<td>77.7±0.91&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>81.6±0.46&lt;sup&gt;b&lt;/sup&gt;</td>
<td>15.7±0.24&lt;sup&gt;b&lt;/sup&gt;</td>
<td>49.6±0.46&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>15.5±0.29&lt;sup&gt;bc&lt;/sup&gt;</td>
</tr>
<tr>
<td>HF/HFr</td>
<td>88.1±1.09&lt;sup&gt;c&lt;/sup&gt;</td>
<td>91.4±0.92&lt;sup&gt;c&lt;/sup&gt;</td>
<td>13.3±0.15&lt;sup&gt;a&lt;/sup&gt;</td>
<td>57.2±1.01&lt;sup&gt;d&lt;/sup&gt;</td>
<td>17.7±0.41&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>HF/HFr + Chamomile powder</td>
<td>68.5±0.89&lt;sup&gt;a&lt;/sup&gt;</td>
<td>78.1±0.43&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>14.8±0.19&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>49.1±1.09&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>13.7±0.72&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>HF/HFr + Chamomile oil</td>
<td>76.9±1.13&lt;sup&gt;b&lt;/sup&gt;</td>
<td>80.1±0.611&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>14.5±0.25&lt;sup&gt;a&lt;/sup&gt;</td>
<td>52.3±0.68&lt;sup&gt;ad&lt;/sup&gt;</td>
<td>15.6±0.49&lt;sup&gt;bc&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

The values are expressed as mean ± SEM (n= 6 rats/group).
Values with the same letters indicate insignificant difference and vice versa.
Hypoglycemic and Hypolipidemic Effects of Chamomile Powder and Oil against High Fat High Fructose diet in rats

Lobna A. Shelbaya

Table (6): Effect of Chamomile powder and oil on serum Leptin, Resistin, TNF-α, Total antioxidant capacity and Total oxidant capacity in male rats

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Leptin (pg/ml)</th>
<th>Resistin (ng/ml)</th>
<th>TNF-α (pg/ml)</th>
<th>Total antioxidant capacity (mmol/L)</th>
<th>Total oxidant capacity (mmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>2.73±0.1a</td>
<td>3.75±0.04ab</td>
<td>3.8±0.11a</td>
<td>1.76±0.04c</td>
<td>0.236±0.012a</td>
</tr>
<tr>
<td>Control+Chamomile powder</td>
<td>2.98±0.31ab</td>
<td>3.71±0.06ab</td>
<td>3.73±0.17a</td>
<td>1.78±0.06c</td>
<td>0.235±0.01a</td>
</tr>
<tr>
<td>Control+Chamomile oil</td>
<td>3.55±0.131bc</td>
<td>4.18±0.047bc</td>
<td>3.8±0.16a</td>
<td>1.73±0.07c</td>
<td>0.227±0.009a</td>
</tr>
<tr>
<td>HF/HF Fr</td>
<td>4.86±0.066d</td>
<td>4.85±0.04c</td>
<td>4.7±0.126d</td>
<td>1.14±0.013a</td>
<td>0.465±0.014c</td>
</tr>
<tr>
<td>HF/HF Fr + Chamomile powder</td>
<td>3.05±0.11ab</td>
<td>3.81±0.47ab</td>
<td>3.30±0.05ab</td>
<td>1.54±0.02cb</td>
<td>0.286±0.01ab</td>
</tr>
<tr>
<td>HF/HF Fr + Chamomile oil</td>
<td>3.55±0.131bc</td>
<td>4.2±0.044bc</td>
<td>3.46±0.07ab</td>
<td>1.68±0.06c</td>
<td>0.277±0.006ab</td>
</tr>
</tbody>
</table>

The values are expressed as mean ± SEM (n= 6 rats/group).
Values with the same letters indicate insignificant difference and vice versa.
Hypoglycemic and Hypolipidemic Effects of Chamomile Powder and Oil against High Fat High Fructose diet in rats

Lobna A. Shelbaya

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التأثيرات الخافضة لمسحوق و زيت أزهار البابونج على سكر و دهون الدم في الفئران المغذى على حمية عالية في الدهون والفركتوز

لمياء محمد شلباية

الملخص العربي

هذا البحث يهدف إلى دراسة تأثيرات مسحوق أزهار و زيت البابونج على مستوي السكر والدهون في الفئران وتحليل مركبات الفيتوينول والمزوت العطرية المتواجدة في أزهار البابونج. تم تقسيم الفئران إلى 6 مجموعات وتشكل المجموعة الأولى بمذابة الدقيق، المجموعة الثانية تم تغذيتها بالوجبة القائمة، المجموعة الثالثة تم تغذيتها بالوجبة القائمة وغموض 20 جرام/كجم من مسحوق أزهار البابونج. المجموعة الرابعة تم تغذيتها بالوجبة القائمة بالإضافة إلى نسب عالية من الدهون والفركتوز كمجموعة ضابطة موجبة. المجموعة الخامسة كانت مجموعات الفيتوينول والمزوت العطرية المواضعة ب 참여 20 جرام/كجم من مسحوق أزهار البابونج. وقد أظهرت النتائج إحتواء ازهار البابونج على نسب عالية من المركبات الفيتوينول والمزوت العطرية المتواجدة بالاذهر. كما أدى تناول الحمية العالية في الدهون والفركتوز إلى زيادة الوزن وارتفاع مستوى السكر وكذلك مستوى الأنسولين في الدم مع ارتفاع مؤشر مقاومة الأنسولين HOMA IR. الجليسيريدات الثلاثية والكولسترول الكلي وكولسترول الدهون الشحمية منخفض الكثافة والبيتين والبرسيتين. إذ بقيت المجموعة الضابطة مع انخفاض في نسبة كولسترول الدهون الشحمية عالية الكثافة، وقدمت الفيتوينول وتقليل نسبة الكولسترول الشحمية منخفض الكثافة. ومن جهة أخرى، فإن إضافة مسحوق و زيت أزهار البابونج إلى الحمية العالية في الدهون والفركتوز قد أدى إلى تحسين ملاحظ في جميع القياسات السابقة. توصي الدراسة: بتناول مسحوق و زيت أزهار البابونج حيث أنه على النسبة المئوية المضاعفة من الأنسولين، مما يحملة الجسم من مخاطر الأكسدة.

الكلمات المفتاحية: خفض السكر - البابونج - خفض الدهون - الالتهابات