HEPATOPROTECTIVE EFFECTS OF TURMERIC AND MILK THISTLE SEED FLOUR AGAINST ETHANOL LIVER DAMAGE IN WISTER RATS

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ABSTRACT: Chemical composition of milk thistle seed flour (MTSF) and turmeric (T) were investigated, for milk thistle seed flour, moisture (8.0%), protein (13.0 %), carbohydrates (27.55%), crude lipid (15.0%), ash (10.45%), and crude fiber (26.0%), while turmeric has moisture (8.1%) , protein (9.3 %), carbohydrates (57%), crude lipid (17.0%), ash (6.0%) and crude fiber (2.6%). For total phenol, the highest value in turmeric (11.57mg GAE/g) while milk thistle seed flour (3.39 mg GAE/g) also total flavonoid for turmeric (4.9mg) while and in milk thistle seed flour (2.34mg). DPPH for milk thistle recorded the highest percent of (FRSA) 98.5 % and turmeric recorded lowest present 82.2% in concentration 100 µg/ml. Reducing power for milk thistle recorded 0.651 but turmeric (T) recorded 0.502 in concentration 100 µg/ml . The identification of phenolic compounds for plant extracts were investigated by HPLC ,the highest content in milk thistle seed flour (MTSF) was Benzoic acid (103.33 ppm) while the lowest content was Caffeine(1.07 ppm) but in turmeric(T) the highest content was Benzoic acid (208.41 ppm), while the lowest content was quercitin (3.08 ppm).The level of plasma aspartate aminotransferase (AST) , alanine aminotransferase (ALT) , alkaline phosphatase (ALP) , total bilirubin , total protein and albumin and plasma antioxidant state SOD , CAT, GPx and MDA were determined to assay hepatotoxicity.

Key words: Milk thistle seed flour, disorder, Biochemical analyss

INTRODUCTION

Milk thistle (Silybum marianum L. Gaertn) is one of the most ancient known herbal medicines, it is an annual or biennial plant belongs to the family Asteraceae (Compositae). The plant is native to Mediterranean area and now has cultivated in other warm and dry regions (Li et al., 2012). Now Silybum marianum is one of the most medicinal plants. The plant has many common names such as, bull thistle, heal thistle, holy thistle, lady's thistle, pig leaves, royal thistle, snake milk, so thistle, St. Mary's thistle, Venus thistle, Marian thistle, Mary thistle, mild thistle, milk ipecac, our lady's thistle (Corchete, 2008). Milk thistle seed contained 20-30% oil, 25-30% protein, 0.038% tocopherol and 0.63% sterols. Wichtl and Bisset (1994).

Abu Jadayil et al., (1999) reported that milk thistle contained 5.8, 19.1, 26.3, 25.4, 4.8, and 24.3 % for moisture, protein, crude fat, crude fiber, ash and nitrogen-free extract, respectively. Silymarin extracted from milk thistle seed consists of 70-80% flavonolignans and 20-30% polyphenolic compounds. It was reported that the world demand of silymarin is about 18-20 tons per year (Ram et al., 2005). Milk thistle seed involved 0.48% total phenols based on seed dry weight. Khalil (2008) Curcuma naturally found in India to Thailand, Indochina, Malaysia, Indonesia, and finally spreads to northern Australia. Curcuma is extensively cultivated in tropical and subtropical regions of Asia, Australia, Western Africa and South America (Ravindran et al., 2007). The nutritional...
compositions of the rhizomes are crude protein (19.44%), lipid (2.5%), and carbohydrate (97.5%). The rhizomes also have a moisture content of 19% and an ash content of 3.21% (Jain and Parihar, 2017). Curcumin (diferuloylmethane) is the compound responsible for the yellow colour, and comprises curcumin I (94%), curcumin II (6%) and curcumin III (0.3%) (Xiang et al., 2018). The total phenolic content of the rhizome extracts of *C. aromatica* is reported in the range of 151.33 ± 13.9 μg/mg eq to gallic acid (Jain and Parihar, 2017) to 265 ± 1.08 mg/g of ascorbic acid (Srividya et al., 2012), and the total flavonoids content ranges from 106.8 ± 2.76 μg/mg eq to quercetin (Jain and Parihar, 2017) to 175 ± 1.56 mg/g of rutin (Srividya et al., 2012). Curcuma phaeocaulis rhizome has 8,9-dehydro-9-formyl-cycloisolongifolene (15.6-46.2%), germacrone (8.9-21.2%), and curlone (0.8-20.2%) as the main constituents (Zhang et al., 2017). Curcumin increases the intestinal lipase, sucrase, and maltase activity (Su et al., 2017). Curcumin also suppresses the intestinal fibrosis (Lin et al., 2006). Moreover, it has been reported that curcumin has significant effect on dyspepsia and gastric Ulcer and a study showed defensive effects of male Sprague–Dawley (pylorus-ligated) rats treated with curcumin (Kim et al., 2005).

**MATERIALS AND METHODS**

**Family name and different names (English and Scientific)**

<table>
<thead>
<tr>
<th>English name</th>
<th>Scientific name</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk thistle</td>
<td><em>Silybum marianum</em> L. Gaernt</td>
<td>Asterace</td>
</tr>
<tr>
<td>Turmeric</td>
<td><em>Curcuma aromatica</em> rhizomes</td>
<td>Zingiberaceae</td>
</tr>
</tbody>
</table>

**Chemical composition:**

Determination of moisture content: according to (A.O.A.C. 2000).

Determination of crude protein: Total nitrogen was determined (dry basis) according to the modified micro-kjeldahl Pirjo and Pekka (1996).

Determination of ash: according to (A.O.A.C. 2000).

Determination of crude fiber: Crude fiber was determined according to (A.O.A.C. 2000).


Determination of total carbohydrate. Total carbohydrate was determined using the following equatio Difference = 100 – ( Ash % + Protein % + Fat % + Fiber %)

Determination of free phenolic compounds. The concentration of free phenolic compounds in methanol extract was determined colorimetrically by the method of Folin as described by (ulcin, et al., 2002).

Determination of total flavonoid compounds. The total flavonoid content were determined using the method reported by Dewanto et al., (2002).

**Quantitative Determination of phenolic compounds by HPLC.**

Phenolic compounds of *Silybum marianum* or Turmeric samples were extracted according to the method describe by Duke et al., (2003). in which a known weight of dried samples was extracted by methanol. Each of phenolic compounds for the two extracts were identified and performed on JASCO HPLC using hypersil C18 -18 reversed phase column (250 x 4.6) with 5 μ particle size. Injection by means of Rhodyne injection value with 50 PJ fixed loop was used. A constant flow rate of one ml /min was used with two mobile phases solvent (A) 0.5 % acetic acid in distilled water at PH 2.65; solvent (B) 0.5% acetic acid in pure (99.5 %) acetonitrile, the elution gradient was
Hepatoprotective effects of turmeric and milk thistle seed flour against

linear starting with (A) and ending with (B) over 35 min using UV detector set at wavelength 254 nm. Phenolic compounds of the samples were identified by comparing their retention times with those of standard mixture. The concentration of an individual compound was calculated on the basis of peak area measurements and then converted to mg/100g dry weight.

Determination of reducing power:
A spectrophotometric method of (Oyaizu 1986) was used for the measurement of reducing power. For this determination 2.5 ml of each extract (25µg/ml -50 µg/ml -75 µg/ml -100 µg/ml) were mixed with 2.5 ml of 200 mmol/L sodium phosphate buffer (PH6.6) and 2.5 ml of 1% potassium ferricyanide. The mixture was incubated at 50°C for 20 min. After adding 2.5 ml of trichloroacetic acid (w/v), the mixture was centrifuged at 650 rpm for 10 min. The upper layer (5 ml) was mixed with 5 ml deionized water and 1 ml of 1% of ferric chloride, and the absorbance was then measured at 700 nm. Higher absorbance indicates higher reducing power, where vitamin C was used as standard.

Determination of free radical scavenging activity by DPPH
Effect of different extracts on DPPH (2, 2 diphenyl-1-pircrylhydrazyl) free radical was measured according to (Lee et al., 1996). Positive control (standard) was prepared by mixing 4.0 ml of ascorbic acid (0.05 mg/ml) and 1.0 ml of DPPH (0.4g/ml) for aqueous extract, and negative control as a blank, was prepared by mixing extract base (water and methanol) with 1.0 ml of DPPH. Four different concentration of extract were mixed with 4.0 ml DPPH, the volume mad up to known volume, mixed well and left to stand at room temperature in a dark place for 30 min. Absorbance was read using a spectrophotometer at 520m. The ability of extract to scavenge DPPH was calculated using the following equation:

Radical scavenging activity% = (Blank OD-Sample OD)/(Blank OD)×100

Experimental design
The experimental animals were divided into 4 groups, each having 6 rats as follows (for 45 days). The first group was used as normal (negative control) and received tape water as drinking water. The other three groups, received tape water and ethanol (40%v/v) at a dose of (3.76 g/kg body weight) by stomach tube, daily for 45 days, from which the second group (positive control) doesn’t have any other treatment drink only ethanol (40%v/v) at a dose of (3.76 g/kg body weight). The third group (ethanol + aqueous extract of milk thistle seed flour (MTSF) or at dose of 200 mg/kg b.w). The fourth group (ethanol + aqueous extract of Turmeric at dose of 200 mg/kg b.w.

Biochemical analysis:
Liver function tests:
Determination of alanine transaminase (ALT) activity: according to the method of Reitman and Frankle (1957).
Determination of aspartate transferase (AST) activity: according to the method of Reitman and Frankel (1957).
Determination of Bilirubin (Total): Bilirubin was determined in plasma as described by (Tietz,1990)
Determination of total protein: Total protein was determined in plasma as described by Schultze and Heremans, (1966).

Determination of globulin and A/G Ratio
Globulin and A/G ratio were calculated according to the formula of (Doumas et al., 1971). A/G Ratio was calculated according to the formula A/G
\[ \text{Ratio} = \frac{\text{Albumin}}{\text{Globulin}} \]

**Antioxidant biomarker in vivo:**

Determination of Superoxide dismutases (SODs). Superoxide dismutases (SODs) activity was determined in plasma as described by (Nishikimi et al., 1972)

Determination of catalase (CAT) activity. Catalase activity was determined in plasma according to (Aebi 1984).

Determination of glutathione peroxidase (GPX) activity. Glutathione peroxidase (GPx) activity was determined in plasma as described by (Paglia and Valentine, 1967).

Determination of lipid peroxidation (LPO level). Lipid peroxide was determined according to the method (Bulakova et al., 1975).

**Statistical analyses:**

Collected data were subjected to analysis of variance (ANOVA). Mean’s differentiation were compared using Duncan tested at p<0.05

**RESULTS AND DISSECTION**

**Proximate analysis of milk thistle seed flour and turmeric:**

Data in Table (1) showed the proximate analysis of milk thistle and turmeric. It is clear from such data that, our result were in the same line with those found by Anjusha and Gangaprasad A (2014). Who found that, turmeric is the major species subjected to many studies. It contains protein (6.3%), fat (5.1%), minerals (3.5%) and carbohydrates (69.4%). Also the result were in the same line with those found by Abu Jadayil et al., (1999). Milk thistle seed flour is the major species subjected to many studies. It contains protein (19.1%), fat (26.3%), fiber (25.4%), ash (4.8%), moisture (5.8%) and carbohydrates (18.6%).

**Total phenolic and total flavonoid of different extracts**

Data in Table (2) showed total phenol and total flavonoids methanolic extract of milk thistle seed flour (MTSF) and turmeric (T). It is clear from such data that, the highest mean of turmeric (11.57) while the lowest mean in milk thistle seed flour (3.39) content while total flavonoid, the highest mean of Turmeric (4.9) while the lowest content in milk thistle seed flour (2.34). The above data of turmeric were in the accordance with that obtained by S.W Qader et al (2001). In which they mentioned that polyphenol content from 6.15 to 16.07 in ethanolic extract. As for Flavonoid content: Our result of Turmeric were in the accordance with the data obtained by J.C. Tilak et al (2004). In which they indicated that it raning from 3.58 to 7.86 in ethanolic extract. Mean while our result of flavonoid content milk thistle seed flour (MTSF) were in the accordance with that obtained by Bruneton, (1995), who stated that the flavonoids range from 1.5 to 3%.

<table>
<thead>
<tr>
<th>Parameters (%)</th>
<th>Milk thistle seed flour (MTSF)</th>
<th>Turmeric(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>13</td>
<td>9.3</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>27.55</td>
<td>57</td>
</tr>
<tr>
<td>Crude lipid</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>Ash</td>
<td>10.45</td>
<td>6</td>
</tr>
<tr>
<td>crude fiber</td>
<td>26</td>
<td>2.6</td>
</tr>
<tr>
<td>Moisture</td>
<td>8</td>
<td>8.1</td>
</tr>
</tbody>
</table>

Table (1): proximate analysis (w/w%) of milk thistle seed flour and turmeric.
Hepatoprotective effects of turmeric and milk thistle seed flour against

Table (2): Total phenol compounds, total flavonoid of milk thistle seed flour and turmeric.

<table>
<thead>
<tr>
<th></th>
<th>Total Phenol (mg GAE/g)</th>
<th>Total flavonoids (mg catchin /g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk thistle seed flour (MTSF)</td>
<td>3.39</td>
<td>2.34</td>
</tr>
<tr>
<td>Turmeric (T)</td>
<td>11.57</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Free radical scavenging level by DPPH of all extracts of milk thistle seed flour and turmeric

Data in Fig. (1) showed the result of Free radical scavenging level by DPPH assay % in different concentration 25mg/ml, 50 mg/ml, 75 mg/ml and 100 mg/ml, milk thistle recorded the higher percent of (FRSA) 98.5 % then Turmeric recorded present 82.2% in concentration 100 mg/ml. Our result were in the accordance with the obtained by Khalil,(2008) which DPPH radical scavenging activity of methanol extracts of milk thistle seed flour MTSF was found to be (95.09).

Reducing power and total antioxidant capacity

Data in Fig. (2) showed the result of reducing power level assay % in different concentration 25µg/dl, 50 µg/dl, 75 µg/dl, 100µg/dl, milk thistle seed flour (MTSF) and turmeric (T) . It is clear from such data that the reducing power of milk thistle seed flour (MTSF) and turmeric increased by increasing the concentration and reach the maxium in milk thistle (0.651) in concentration 100 Mg/dl, while in turmeric (T) reach (0.52)

Effect of all extracts of milk thistle seed flour (MTSF), tureric on Liver function in rates plasma.

Plasma ALT, AST and ALP enzymes

Data in Table (5) showed (ALT) level in plasma in all studied groups for 45 days of treatment. It can be noticed that negative control group recorded (37.16 U/L) while the positive control group (which treated with ethanol 40%/v/v in drinking water) recorded (84.83 U/L) have the highest values comparing with negative control (37.16 U/L). but the group which treatment with methanol extract milk thistle seed flour (MTSF) at
200mg/kg b.w. decreased to (45.83 U/L). In groups which treated with methanol extract of turmeric at 200mg/kg b.w. decreased to (55 U/L).

**Table (3): HPLC of milk thistle seed flour.**

<table>
<thead>
<tr>
<th>Compounds</th>
<th>ppm</th>
<th>Compounds</th>
<th>ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyrogallol</td>
<td>2.23564</td>
<td>Benzoic acid</td>
<td>103.33696</td>
</tr>
<tr>
<td>Quinol</td>
<td>ND</td>
<td>Rutin</td>
<td>5.50555</td>
</tr>
<tr>
<td>Gallic acid</td>
<td>9.57633</td>
<td>Ellagic</td>
<td>22.44046</td>
</tr>
<tr>
<td>Catechol</td>
<td>ND</td>
<td>O-Coumaric acid</td>
<td>1.77572</td>
</tr>
<tr>
<td>P-Hydroxy benzoic acid</td>
<td>ND</td>
<td>Salicylic acid</td>
<td>31.16560</td>
</tr>
<tr>
<td>Caffeine</td>
<td>1.07233</td>
<td>Myricetin</td>
<td>95.60416</td>
</tr>
<tr>
<td>Chlorogenic</td>
<td>6.96801</td>
<td>Cinnamic acid</td>
<td>1.73047</td>
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<tr>
<td>Vanillic acid</td>
<td>10.63546</td>
<td>Quercitin</td>
<td>2.95785</td>
</tr>
<tr>
<td>Caffeic acid</td>
<td>4.12392</td>
<td>Rosemarinic</td>
<td>7.23908</td>
</tr>
<tr>
<td>Syringic acid</td>
<td>1.13271</td>
<td>Neringein</td>
<td>31.72992</td>
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<tr>
<td>Vanillin</td>
<td>4.22284</td>
<td>Kampherol</td>
<td>68.65241</td>
</tr>
<tr>
<td>P-Coumaric acid</td>
<td>3.10603</td>
<td>Total</td>
<td>394.47703</td>
</tr>
<tr>
<td>Ferulic acid</td>
<td>7.51458</td>
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<td></td>
</tr>
</tbody>
</table>

ND= Not detected
**Hepatoprotective effects of turmeric and milk thistle seed flour against**

### Table (4): HPLC of turmeric.

<table>
<thead>
<tr>
<th>Compounds</th>
<th>ppm</th>
<th>Compounds</th>
<th>ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyrogallol</td>
<td>3.02391</td>
<td>Benzoic acid</td>
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</tr>
<tr>
<td>Quinol</td>
<td>4.23620</td>
<td>Rutin</td>
<td>8.29178</td>
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<tr>
<td>Gallic acid</td>
<td>4.46560</td>
<td>Ellagic</td>
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<td>Catechol</td>
<td>3.01135</td>
<td>O-Coumaric acid</td>
<td>9.34567</td>
</tr>
<tr>
<td>P-Hydroxy benzoic acid</td>
<td>ND</td>
<td>Salicylic acid</td>
<td>6.63558</td>
</tr>
<tr>
<td>Caffeine</td>
<td>ND</td>
<td>Myricetin</td>
<td>17.99695</td>
</tr>
<tr>
<td>Chlorogenic</td>
<td>3.57219</td>
<td>Cinnamic acid</td>
<td>ND</td>
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<tr>
<td>Vanillic acid</td>
<td>ND</td>
<td>Quercitin</td>
<td>3.08968</td>
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<tr>
<td>Caffeic acid</td>
<td>8.49539</td>
<td>Rosemarinic</td>
<td>19.64714</td>
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<tr>
<td>Syringic acid</td>
<td>ND</td>
<td>Neringein</td>
<td>12.23942</td>
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<td>Vanillin</td>
<td>ND</td>
<td>Kampherol</td>
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<td>P-Coumaric acid</td>
<td>ND</td>
<td>Ferulic acid</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td>ND</td>
<td></td>
<td>388.24070</td>
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</tbody>
</table>

ND= Not detected

### Table (5): effect of milk thistle seed flour and turmeric on ALTand AST and ALP.

<table>
<thead>
<tr>
<th>Groups</th>
<th>ALT(U/L)</th>
<th>AST(U/L)</th>
<th>ALP(U/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± S.D</td>
<td>Mean ± S.D</td>
<td>Mean ± S.D</td>
</tr>
<tr>
<td>Negative control</td>
<td>37.16±2.86&lt;sup&gt;d&lt;/sup&gt;</td>
<td>108±4.77&lt;sup&gt;d&lt;/sup&gt;</td>
<td>199.16±2.85&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Positive control</td>
<td>84.83±2.32&lt;sup&gt;a&lt;/sup&gt;</td>
<td>145±5.44&lt;sup&gt;a&lt;/sup&gt;</td>
<td>262±8.34&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Milk thistle seed flour(MTSF)</td>
<td>45.83±2.13&lt;sup&gt;c&lt;/sup&gt;</td>
<td>133.83±14.5&lt;sup&gt;c&lt;/sup&gt;</td>
<td>198.33±4.55&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Turmeric (T)</td>
<td>55±2.82&lt;sup&gt;b&lt;/sup&gt;</td>
<td>139.67±19&lt;sup&gt;b&lt;/sup&gt;</td>
<td>209.66±3.44&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Table (5) Values represent mean ± S.D obtained from 6 rats, means in the same column followed by the same letters do not differ significantly, and when the means followed by different letters differ significantly at (p ≤ 0.05).

### Plasma AST enzyme

Data in Table (5) showed (AST) level in plasma in all studied groups for 45 days of treatment. It can be noticed that negative control group recorded (108 U/ml) while positive control group (which treated with ethanol 40%v/v in drinking water) recorded (145 U/L) have the highest values comparing with negative control (108U/ml). The group which treatment with methanol extract of milk thistle seed flour (MTSF) at 200mg/kg bw decreased to (133.83 U/L). In groups which methanol extract of turmeric at 200mg/kgbw. decreased to (139.67 U/L). Our results were in the accordance with the obtained by Shaker et al. (2010) which found that the ethanolic extract of *S. marianum* significantly decreased the elevated liver enzymes caused by CCL₄, and in the same line with khajhdehp, et al, (2012).

### Alkaline phosphatase (ALP) activity.

Data in Table (5) showed alkaline phosphatase level in plasma for all studied groups after 45 days of treatment. It can be noticed that negative control group recorded (199.16 U/L) while, positive control group (which treated with ethanol 40%v/v in drinking water) recorded (262 U/ml) have the highest values comparing with negative control (199.1U/L). The group which treatment with
methanol extract milk thistle seed flour 200mg/kg b.w. decreased to (198.33 U/L). In groups which methanol extract of turmeric 200 mg/kg b.w. decreased to (209.66 U/L). The present result are going in the same line with khajhdehp, et al., (2012).

**Plasma albumin level**

Data in Table (6) showed total protein level in plasma for all studied groups after 45 days of treatment. It can be noticed that negative control group recorded (3.88 mg/dl) while, positive control group (which treated with ethanol 40%v/v in drinking water) recorded (3.83 mg/dl). The group which treatment with methanol extract of milk thistle seed flour at 200/kg b.w. increased to (3.97 mg/dl). In group which treated with methanol of extract turmeric at 200mg/kg b.w. decreased to (3.85 mg/dl) compared with negative control.

**Total protein level**

Data in Table (6) showed total protein level in plasma for all studied groups after 45 days of treatment. It can be noticed that negative control group recorded (6.8 mg/dl) while, positive control group (which treated with ethanol 40%v/v in drinking water) recorded (6.65 mg/dl), have the lowest value comparing with negative control (6.8mg/dl). but the group which treatment with methanol extract of milk thistle seed flour at 200mg/kg b.w. increased to (7.28 mg/dl). In groups which methanol extract of turmeric 200 mg/kg b.w. decreased to (7.07 mg/dl).

**Total bilirubin**

Data in Table (6) showed total bilirubin level in plasma for all studied groups in 45 days of treatment. It can be noticed that negative control group recorded (0.253 mg/dl) while, positive control group( which treated with ethanol 40%v/v in drinking water ) recorded (0.275 mg/dl ) have the highest values comparing with negative control (0.253mg/dl). but the group which treatment with methanol extract of milk thistle seed flour at 200mg/kg b.w. decreased to (0.235U/mL) . In group which treated with methanol extract of turmeric 200 mg/kg b.w. decreased to (0.198mg/dl). The present result are going in the same line with Suja, et al , (2004) and khajhdehp, et al , (2012).

**Antioxidant parameters**

**Super oxide dismutases (SODs)**

Data in Table (7) showed SOD level activity in plasma for all studied groups in 45 days of treatment. It can be noticed that negative control group recorded (79.16 U/L) while, positive control group (which treated with ethanol 40%v/v in drinking water) recorded (124.66 U/L) have the highest values comparing with negative control (79.16 U/L). The group which treatment methanol extract of milk thistle seed flour at 200mg/kg b.w. decreased to (117.5 U/L). In group which treated with methanol extract of turmeric at 200mg/kg b.w. decreased to (112.5 U/L).

<table>
<thead>
<tr>
<th>Groups</th>
<th>Albumin (mg/dl)</th>
<th>T.protein (mg/dl)</th>
<th>T. bilirubin (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative control</td>
<td>3.88±0.1</td>
<td>6.8±0.26</td>
<td>0.253±0.07</td>
</tr>
<tr>
<td>Positive control</td>
<td>3.83±0.33</td>
<td>6.56±0.63</td>
<td>0.275±0.10</td>
</tr>
<tr>
<td>Milk thistle seed flour</td>
<td>3.97±0.19</td>
<td>7.28±0.45</td>
<td>0.235±0.04</td>
</tr>
<tr>
<td>Turmeric (T)</td>
<td>3.85±0.23</td>
<td>7.07±0.6</td>
<td>0.198±0.04</td>
</tr>
</tbody>
</table>

Table (6) Values represent mean ± S.D obtained from 6 rats, means in the same column followed by the same letters do not differ significantly, and when the means followed by different letters differ significantly at (p ≤ 0.05).
Hepatoprotective effects of turmeric and milk thistle seed flour against 

Table (7): Effect of milk thistle seed flour and turmeric on SOD, CAT, GPx, MDA.

<table>
<thead>
<tr>
<th>Groups</th>
<th>SOD (U/L) Mean ± S.D</th>
<th>CAT (U/L) Mean ± S.D</th>
<th>GPx (U/L) Mean ± S.D</th>
<th>MDA (U/L) Mean ± S.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative control</td>
<td>79.16±5.23&lt;sup&gt;d&lt;/sup&gt;</td>
<td>27.33±3.3&lt;sup&gt;d&lt;/sup&gt;</td>
<td>41.33±2.42&lt;sup&gt;c&lt;/sup&gt;</td>
<td>4.28±0.4&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Positive control</td>
<td>124.66±8.6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>48.5±1.87&lt;sup&gt;a&lt;/sup&gt;</td>
<td>62.33±3.88&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.96±0.69&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Milk thistle seed flour</td>
<td>117.5±2.17&lt;sup&gt;b&lt;/sup&gt;</td>
<td>44±2.82&lt;sup&gt;b&lt;/sup&gt;</td>
<td>50.16±4.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6±0.22&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Turmeric (T)</td>
<td>112.5±52.3&lt;sup&gt;c&lt;/sup&gt;</td>
<td>37.33±2.16&lt;sup&gt;c&lt;/sup&gt;</td>
<td>48.33±4.5&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.59±0.28&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Table (7) Values represent mean ± S.D obtained from 6 rats, means in the same column followed by the same letters do not differ significantly, and when the means followed by different letters differ significantly at (p ≤ 0.05).

Catalase level

Data in Table (7) showed Catalase level in plasma for all studied groups after 45 days of treatment. It can be noticed that negative control group recorded (27.33 U/L) while, positive control group (which treated with ethanol 40%v/v in drinking water) recorded (48.5 U/L) have the highest values comparing with negative control (27.33 mg/dl). but the group which treatment methanol extract milk thistle seed flour at 200mg/kg b.w. decreased to (44.0 U/L). In group which treated with methanol extract of turmeric 200 mg/kg b.w. decreased to (37.33 U/L).

Glutathione peroxidase (GPx) activity

Data in Table (7) showed GPx activity level in plasma for all studied groups after 45 days of treatment. It can be noticed that negative control group recorded (41.33 U/L) while, positive control group (which treated with ethanol 40%v/v in drinking water) recorded (62.33 U/L) have the highest values comparing with negative control (41.33 U/L). but the group which treatment with methanol extract milk thistle seed flour at 200mg/kg b.w. decreased to (50.16 U/L). In group which treated with methanol extract of turmeric 200 mg/kg b.w. decreased to (48.33 mg/dl).

Malondialdehyde level:

Data in Table (7) showed MDA level in plasma for all studied groups after 45 days of treatment. It can be noticed that negative control group recorded (4.28 U/L) while, positive control group (which treated with ethanol 40%v/v in drinking water) recorded (6.96 U/L) have the highest values comparing with negative control (4.28 U/L). but the group which treatment with methanol extract milk thistle seed flour at 200 mg/kg b.w. decreased to (6.0 U/L). In group which treated with methanol extract of turmeric 200 mg/kg b.w. decreased to (5.59 U/L). The result are in the same line with Toklu et al (2008) they stated that MDA recorded in negative control 0.96 and positive control recorded 6.64 mean while methanol extract milk thistle seed flour recorded 5.01 due to the antioxidant properties of flavonoids which present in the plant.

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دراسة تأثير بذور شوك الجمل وذور الكركم على السمية الكبدية التي يسببها الإيثانول في الفئران البيضاء

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المملوكة العربية

يمكن أن يكون التأثير العام للنتيجة التي تم الحصول عليها:

التركيب الكيميائي الإجمالي للثباتات المختبرية: محتويات دقيق بذور شوك الجمل، البروتين (13.0٪) ، الكربوهيدرات (27.5٪) ، الدهون (15.0٪) ، الرماد (10.45٪) ، الألياف (6.0٪) ، اليافع خام (8.0٪) .

التمينا كلية: يمكن أن نستنتج أن أعلى متوسط للكركم 11.57 مجم GAE / جم (بينما أدنى متوسط في دقيج بذور شوك MTSF (9.3٪) ) كربوهيدرات 57٪) ، دهون 17.0٪) ، الرماد 6.0٪) ، الألياف 26.0٪) ، الرطوبة 8.0٪).

إن الفينولات الكمية يمكننا أن نستنتج أن أعمى متوسط لذور الكركم 11.57 مجم GAE / جم) بينما أدنى متوسط في دقيج بذور شوك MTSF (3.39 مجم GAE / جم)).

التمينا كلية: يمكننا أن نستنتج أن، أعمى متوسط لذور الكركم 4.9 مجم GAE / جم ) ولكن بروتين الكبركم 9.3٪) كربوهيدرات 57٪) ، دهون 17.0٪) ، الرماد 6.0٪) ، الألياف 26.0٪) ، الرطوبة 8.0٪) .

استخدام في ارتفاع نسبة MDA و GPx و CAT و SOD. كما نتيجة نسباً على DPPH الفعال

الثباتات الدقيقة: يمكننا أن نستنتج أن ذور الكركم (82.2٪) في التركيز 100 مجم / ديسيمتر، سجل دقيج بذور شوك MTSF (98.5٪) جزء في المليمين بينما أدنى محتوى كان الكافيين 1.072٪) (أعلى محتوى كان حمض البنزويك 103.336٪) جزء في المليمين بينما أقل محتوى كان حمض البنزويك 208.41٪) جزء في المليمين.

تم استخدام المجموعة الثقيلة الإيجابي (النقطة المفضلة) وحصلت على ماء لرش. أما المجموعات الأخرى فقد تلت المياء والإيثانول (40٪ حجم / حجم) بجرعة 3.76 مل / كجم من وزن الجسم، يوميًة لمدة 45 يومًا، ولم يتم الحصول على المجموعة الثالثة (النقطة المفضلة) (40٪ حجم / حجم) بجرعة 3.76 مل / كجم من وزن الجسم MTSF + مستخمص مائي من دقيج بذور شوك MTSF (40٪ حجم / حجم) بجرعة 3.76 مل / كجم من وزن الجسم، يوميًة لمدة 45 يومًا، وتم قتل الفئران. تمت جمع العينات من المريء من أربعة أشواط لقياس النباتات النباتية. اكتسبت النتائج أن الإيثانول تسببت في ارتفاع في خضاع معيوني، P < 0.05 (P) في ALT و AST وbilirubin في البلازما. كما تسبب في خضاع معيوني، P < 0.05 (P) في ALT و AST وbilirubin في البلازما. كما تسبب في خضاع معيوني، P < 0.05 (P) في ALT و AST وbilirubin في البلازما.

النواتن الواقية لذور الكركم ومستحكي بذور شوك الجمل ضد تمف الكبد الناتج عن الإيثانول في الجرذان الوليدية

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