Nephroprotective Effect of Moringa Oleifera Oil Against Kbro$_3$ Toxicity in Adult Rats

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Abstract:

The plant of *Moringa oleifera* has been taken part in many therapeutic functions. The helpful oil from *Moringa* seeds has its profitable sides to the people who have this tree in their neighborhoods.

To evaluate whether addition of 10, 20 and 30% *M. oleifera* oil has defensive potential against Potassium bromate, which was generated from nephrotoxicity in rats.

Male Wistar rats were nominated and divided into five groups. Each group consists of five rats. Those rats were injected a single intra-peritoneal of potassium bromate at a dose level 125 mg /kg body weight. That lasted on either normal diet or diets enriched with *Moringa oleifera* oil at many levels of concentrations for 6 weeks. At the last, after (45 days), the rats were given up to get blood samples for biochemical analyses.

KBrO$_3$ showed losing weight in rats, caused powerful rising in the levels of plasma, liver enzymes, creatinine, and uric acid and increased the oxidative stress on rats. In contrast, plasma liver enzymes, creatinine, uric acid levels ameliorated by the addition of *M. oleifera* oil to diets. Moreover, *M. oleifera* oil especially at level 20% to diets was a reason in great increase (p<0.5) in SOD, GPX and GST, while caused serious decrease (p<0.5) in MDA levels.

It was recognized that addition of *M. oleifera* oil at level 20% to diet supported powerful defense against KBrO$_3$-generated nephrotoxicity.
Introduction:

Kidneys are one of the most important organs in your body. The main task of your kidney is to balance your body’s chemicals. For sorry a lot of environmental xenobiotics and drugs have their effects on these tasks (Fatima et al., 2004). The gap in the level of prooxidant-antioxidant equilibrium defines Oxidative stress. That gap has tendency towards the prooxidants. That may cause DNA sugar serious illness, lamina lipid peroxidation and mutagenesis (Sun, 1990; International Agency for Research on Cancer, 1999).

Such as USA, some countries use Potassium bromate as a food preservative in flour maturation in the bread-making process and as a dough improver. In addition that we can use Potassium bromate in cosmetics and food products and also in water depuration (Kurokawa et al., 1982). Potassium (KBrO₃) is a bromate of potassium and its form like white crystals or powder. Potassium bromate is a renal oxidant and a sponsor of carcinogenesis in both female and male gender of rats in large quantity (Kurokawa et al., 1990; Umemura et al., 1995). Potassium bromate generates oxidative stress. It leads to carcinogenesis whether it is alone or perform as tumor supporter in carcinothen-initiated animals. Reinforcement in cellular proliferation in kidney is one of consequences KBrO₃-mediated oxidative stress. After long-term of displaying compound Renal cell tumours were revealed in both male and female rats (Umemura et al., 1995).

Rising 8-hydroxydeoxyguanosine up is a sign of oxidative DNA ruining and lipid peroxidation in male rats’ kidneys drafting by KBrO₃ (Ballmaier et al., 1995). Lately, renal oxidative stress in Wistar rats have been shown that it was originated by KBrO₃ promotes N-diethylnitrosamine (Khan et al., 2001).

Detoxificants, anti-carcinogens and antiinitiators are performed in Plants, fruits, common beverages and herbal constituents (Alam et al., 2000). Examining crude extracts of numerous edible plants produced the tool of many different compounds, which are acted with each other in extra, synergistic or antagonistic attitude to put down the tumour formation (Saleem et al., 2000).
Moringa oleifera is a member of a monogenic family of shrubs and trees moringaceae. Moringa oleifera (the original tree at the north of India) is a kind of the genus Moringa, which are the most widely planted. It was informed that the leaves of this plant have several biological functions, counting hypocholesterolemic, antidiabetic, hypotensive agent and anti-tumor agents (Pal et al., 1995; Tahiliani and Kar, 2000; Mehta et al., 2003; Kar et al., 2003). Not only the leaves, but also the seeds, flowers, roots, gums and fruits are very useful for recovering from infection (Ezeamuzie et al., 1996), cardiovascular activity, liver disease (Rao and Misra, 1998), cancer (Costa-Lotufo et al., 2005) and hematological, hepatic and renal activity (Mazumder et al., 1999). Moreover, the seeds of Moringa oleifera have the ability to depurate water (McConnachie et al., 1999), antimicrobial material (Filgona, 2005) and edible oils. M. oleifera Seed kernels are famous with moving away iron and cadmium ions from corrupt water (Sajidu et al., 2005). Favorably, almost all Moringa parts are used for treating a lot of diseases (Babu and Chaudhuri, 2005; Jaiswal et al., 2009 and Verma et al., 2009).

It`s known that Moringa oleifera seeds hold about 33% and 41% w/w of vegetable oil (Sengupta and Gupta, 1970). Moringa oleifera oil is rich with 70% oleic acid. Commercially, Moringa oleifera is familiar with “ben oil” or “behen oil”, as a result of containing behenic (docosanoic) acid, owns great struggle against oxidative reduction (Lalas and Tsaknis, 2002) In addition, Moringa oleifera has many medical functions and has massive nutritional profit (Anwar et al., 2007). The oil of Moringa seed (yield 30-40% by weight), which known as ben oil, is a sweet non-sticking, non-drying oil that fights rancidity. It is widely used in salads, for fine engine greasing, and in making sprays and hair care materials (Tsaknis et al., 1999).

In spite of using the leaves of Moringa oleifera in common treatment of renal disorders, no one has checked their nephroprotective activity yet. Moringa oleifera is able to obstruct many disorders, especially those, which perform reactive oxygen species. That`s why; it is supposed that it may perform as a great antioxidant against renal oxidative stress and hyperproliferative feedback settled by Moringa oleifera. What`s more; the current study was approved to check the
effectiveness of conjoined *Moringa oleifera* with KBrO₃ in preserving rats from the harmful effects of KBrO₃ (inserting oxidative stress).

**Materials and Methods**

**Materials:**

*Moringa seeds*: *Moringa Olivera* seeds were gathered from the National Research Center, Giza, Egypt.

*Potassium bromate (KBrO₃)*: takes the form of white crystals or powder, purchased from El-Gomhoria Co., Cairo, Egypt.

*Animals*: Twenty five male albino rats, *Sprague Dawley* strain, weighting (110±10g), were gotten from the animal house of Agriculture Research Center, Giza, Egypt.

**Process steps:**

*Extraction of M. oleifera oil*: *Moringa oleifera* oil was extracted according the method of *Rashid et al. (2008).*

*Determination of fatty acid*: The fatty acid profile of ethanolic extract of pumpkin seed oil was determined according to ISO 5508 (1990) and ISO 5509 (2000) by gas chromatography (GC) as described by *(Nath, 1996).*

**Experimental design:**

The experiment was performed in animal house in the Institute of phthalmology, Giza. All rats were fed for one week till the beginning of the experiment on basal diet (BD), after that they were thrown into 2 groups, the first group (n= 5 rats) was fed on the BD only as a non-positive control (–ve) normal rats. The rats of second main group (n= 20 rats) were injected a single intra-peritoneal of (KBrO₃) at a dose level 125 mg /kg body weight (*Kahan and Sultana 2004*) and fed on basal diet (BD) then divided into 4 sub-groups (each 5 rats) as follows:

**Sub-group (2):** received KBrO₃ and fed with BD only and considered as a positive control (+ve).

**Sub-group (3):** received KBrO₃ and fed with 10% *Moringa oleifera* oil supplemented diet.

**Sub-group (4):** received KBrO₃ and fed with 20% *Moringa oleifera* oil supplemented diet.
Sub-group (5): received KBrO₃ and fed with 30% *Moringa oleifera* oil supplemented diet.

Daily food intake was estimated. Weekly the body weight gain was stated. At the end of the experiment, biological evaluation of the tested diets was performed by determining total food absorption (FI) and body weight gain (BWG). Food and protein capability ratio (FER & PER) were calculated according to *(Chapman et al., 1950)*. After a period of (45 days), the rats were ready to give blood samples.

**Biochemical analysis:**

**Determination of hemoglobin and packed cell volume:** Heparenized blood was analyzed for estimation of hemoglobin (HB) and packed cell volume (PCV) as mentioned in *Drabkin (1949)* and *Mc Inory, (1954)*, in consequence.

**Determination of liver enzymes:** Serum alanine and aspartae aminotransferase (ALT, AST) and alkaline phosphates (ALP) enzymes, were estimated as stated in *Reitman and Frankel (1957)* and *Kind and King (1954)*, in consequence.

**Determination of kidney functions:** Serum creatinine and uric acid were determined in agreement with the steps mentioned by *Hare (1950)* and *Fossati et al. (1980)*, in consequence.

**Determination of antioxidant enzymes:** Plasma superoxide dismutase (SOD), glutathione peroxidase (GPX), glutathione S-transferase (GST) and malondialdehyde (MDA) as mentioned in *Beuchamp and Fridovich (1971)*, *Weiss et al. (1980)*, *Ellman (1958)* and *Uchiyama and Mihara (1978)*, in consequence.

**Statistical analysis:**

The great contrast between the two groups were figured out using Dunnet’s *t*-test followed by analysis of variance (ANOVA) and *p*<0.05 *(Snedecor and Cochran, 1967).*

**Results and Discussion**

**Moringa oleifera oil:**

During extraction, it was found that Moringa seeds contain 35% w/w oil, that is according to the past literature *(Anwar et al., 2005).*
Current researches focus on the sterol, tocopherol and flavonoid content of crude M. oleifera oil (Anwar et al., 2005; Lalas and Tsaknis, 2002 a). The oil of oleifera had an acid value of 2.9, which is essencial for acid pre-treatment prior to base-catalyzed transesterification. The parent oil`s kinematic viscosity was 29.63 mm2/s. It`s claimed that the cloud point of M. oleifera oil was 5°C and the pour point was 4°C. The stable oxidative level per Rancimat test was 15.32 h. (standard deviation = 1.29 h), getting along with the presence of antioxidants happening naturally in this oil (Lalas and Tsaknis, 2002 b).

Fatty Acids Profile and Chemical Composition of Egyptian Moringa Oleifera Seed Oil:

What`s more ,The oil content ranging from 35 to 41 % and is a rich source of omega-9 fatty acids, determined by GC and recorded (Palmitic 7.0 , Palmitoleic 2.0, Stearic 4.0, Oleic 78.0, Linoleic 1.0, Linolenic - and Arachidic 4.0) according to Da Silva et al. (2010). In this context the MO oil has bis-allylic methylene carbons with the fatty acid chains (just 1.0% of linoleic acid and the absence of linolenic acid), that may provide advantages in terms of the oxidative stability (Knothe, 2006).

Highlight the fact that Moringa oil is performed by a high content of oleic acid (71%) and it is also considered one of the oleic acid oil family (Sonntag, 1982). Moreover the oil seeds of Moringa oleifera could be applied strongly as a source of edible oil for human consumption (Lalas and Tsaknis, 2002b). As far as we know the fatty acid composition of M. oleifera seed oil reveals that it belongs to the team of high-oleic oils (C18:1, 67.90%–76.00%) according to Anwar et al. (2007).
Body weight gain of KBrO₃ nephrotoxic rats fed on Moringa oil for six weeks:

It was shown in Table 2 the influence of *Moringa oleifera* oil on body weight gain (BWG), food absorption (FI) and feed effectiveness ratio (FER) of KBrO₃ nephrotoxic rats after the experiment period. A significant decrease (p<0.5) in body weight gain (44.30 ± 7.71 g), food intake (14.20 ± 2.17 g/day) and FER (0.051±0.002) were observed in nephrotoxic rats without treatment (+ve control) compared to normal control group (-ve control). Body weight gain recorded 80.57 ± 8.17, 91.08 ± 10.22 and 90.92 ± 11.11 g, while FI scores were 15.90 ± 2.11, 16.35 ± 2.91 and 16.55 ± 2.18 g/day in nephrotoxic rats groups treated with *Moringa oleifera* oil at doses 10, 20 and 30%, respectively. Meanwhile FER recorded 0.084 ± 0.003, 0.092 ± 0.001 and 0.091 ± 0.001, respectively. So it could be observed that oral administration of *Moringa oleifera* oil at doses 10, 20 and 30% caused significantly increasing (p<0.5) in body weight gain.

Measurement of body weight and/or organ weight may be used to evaluate toxic events due to exposure to a toxicant. Alteration in body weight and/or organ to body weight ratio has been shown to imply toxicity arising from exposure to a toxicant (*Adeyemi et al., 2012 and Orisakwe et al., 2007*). No appreciable weight change was recorded for all groups given NiSO4 and treated with *M. oleifera* (*Adeyemi and Elebiyo, 2014*).

Effect of Moringa oil on blood cell parameters on KBrO₃ nephrotoxic rats:

Data represented in Table 3 showed that oral administration of KBrO₃ nephrotoxic rats on *Moringa oleifera* oil increased significantly (p<0.5) hemoglobin (Hb) blood level and packed cell volume (PCV) in blood, in a dose dependant manner compared to (+ve control) group. Memoglobin levels recorded 10.14±1.4, 10.55±1.98 and11.11±2.01 mg/dl, while PCV levels recorded 33.79±3.47, 34.14±4.01 and 36.71±4.11% in the blood of nephrotoxic rats treated with *Moringa oleifera* oil at doses 10, 20 and 30%, respectively. Meanwhile, the positive control group recorded 7.99±1.39 and 29.81±3.55, respectively. This results due to the higher iron content in *Moringa oleifera* oil.
Regarding the result of *M. oleifera* leaf extract on Hb, PCV, RBC and WBC values in male Wistar rats, it was noted that Hb count was getting high in significant way (p<0.05) in the groups 1% and 10%. Despite this increasing, it was well-documented the slight decreasing in Hb count of the group given 5% *M. oleifera*. Packed cell volume count highlighted a common increase in all the groups while comparing it with their control group. This increase was only great (p<0.05) in the 5% and 10% held groups (*Otitoju et al.*, 2014). *Adedapo et al.* (2009) claimed a modest increase in Hb count among rats treated with 400 mg/kg body weight of *M. oleifera* leave extract. The lowest (1 mg/kg) concentration of *Moringa oleifera* carried about the highest Hb count, however there was a common increase in Hb count. In the light of their recent result, it also shows that PCV count increased insignificantly if it put in comparison with the control group.

**Effect of Moringa oil on liver function on KBrO\textsubscript{3} nephrotoxic rats:**

As demonstrated in Table 4, KBrO\textsubscript{3} nephrotoxic rats increased significantly (p<0.5) in the serum levels of liver enzymes aspartate aminotransferase, alanine aminotransferase(ALT) and alkaline phosphatase if it is compared with (-ve control) rats group. Oral administration of *Moringa oleifera* oil at different doses seriously lowered (p<0.5) AST serum levels, ALT and ALP enzymes comparing to (+ ve control) group. AST recorded 49.37±6.01, 51.41±8.10 and 48.21±6.15 µ/ml, while ATP recorded 15.71 ± 1.81, 16.28 ± 2.01 and 18.13±3.51 µ/ml. Also data showed that ALP scores were 37.80 ± 4.11, 38.73±4.37 and 38.34 ± 5.01 µ/ml, respectively.

In comparing Potassium bromate to the control rats group, it significantly caused elevation in TRG, ALP, AST, CAT concentrations. Afterwards, it was realized great low in TRG, ALP, AST, and CAT on dose-dependent basis by the 20% and 40% *Moringa oleifera* extracts (*Oseni et al.*, 2015).

**Effect of Moringa oil on kidney function on KBrO\textsubscript{3} nephrotoxic rats:**

At this point, the stated data in Table 5 reflected the influence of *Moringa oleifera* oil at different doses 10, 20 and 30% on kidney function on KBrO3 nephrotoxic rats. Serum levels of creatinine and uric acid wereis increasingly becoming (p<0.5) in (+ ve control) group in case of
comparing it to normal control group. Oral administration of nephrotoxic rats on *Moringa oleifera* oil at doses 10, 20 and 30% caused significant increase (p<0.5) in creatinine level (0.99±0.02, 0.88±0.12 and 0.75±0.13 mg/dl) and uric acid levels (2.11±0.81, 2.41±0.77 and 2.17±0.67 mg/dl), respectively on nephrotoxic rats compared to creatinine and uric acid levels of (+ ve control) group as recorded 1.95±0.11 and 4.41±1.01 mg/dl, respectively. In accordance with the data, Plasma levels of creatinine and urea are among the major biochemical indices widely used to evaluate renal activities (*Gross et al., 2005; Adeyemi and Akanji, 2012*). Increasing creatinine levels indicate kidney is damaging. Under ordinary physiological case the amount released every day is constant and connects with body mass (*Gross et al., 2005*). At variance with, if the level of creatinine goes up because of retention in the blood, it might be used to sort glomerular filtration rate (*Adeyemi and Akanji, 2012*).

On the other side, Urea’s main task is the excretory waste of human beings. As a result of amino acid metabolism, many nitrogeneous wastes like ammonia. As ammonia is toxic to human body when retained, it is converted into urea by the liver. Urea is also called as carbamide. Urea , the main excretory product formed in the liver is carried away by the blood to kidneys (*Gross et al., 2005; Adeyemi and Akanji, 2012*). In case of eating food having different levels of M. oleifera to rats stopped the elevation of the indices for renal dysfunction (*Adeyemi and Elebiyo, 2014*). Using different doses of Moringa oil (MO) as treatment reduced the upcreasing levels of serum urea and creatinine in dose dependent manner. The elements of MO can protect the integrity of kidney. It also helps in increasing its regenerative and reparative capacity (*Ouedraogo et al., 2013*).

Moreover, it has been shown the Polyphenolic compounds retrograde oxygen species in nephrotoxicity (*Wongmekiati et al., 2008*). The animation or alteraion of the rat plasma creatinine to stander level associated with increasing *M. oleifera* doses in the diets given to rats (*Adeyemi and Elebiyo, 2014*).

**Effect of Moringa oil on antioxidant parameters on KBrO3 nephrotoxic rats:**

As realized in Table 6, the positive control group showed a significant decrease (p<0.5) in plasma superoxide dismutase (SOD),
glutathione peroxidase (GPX) and glutathione S-transferase (GST), while a significant increase (p<0.5) in malondialdehyde (MDA) compared to (-ve control) group. Treatment with Moringa oleifera oil caused significant increase (p<0.5) in SOD, GPX and GST, while caused significant decrease (p<0.5) in MDA levels compared to (+ve control) group. It could be observed that oral administration of nephrotoxic rats on Moringa oleifera oil at dose 20% improved the kidney antioxidant enzymes activity compared to 10 and 30% Moringa oleifera oil doses as caused significant increase (p<0.5) in SOD, GPX and GST (131.25±22.61, 118.41±11.18 and 3.45±0.97 µ/mg), while showed significant decrease (p<0.5) in MDA (9.11±2.16 nmol/g) of nephrotoxic rats.

Furthermore, antioxidants enzymes are considered as body’s leading guard, which task is to stop biological macromolecules from oxidative ruin and to move peroxides away, free radicals and superoxide anion generated within the cell. What’s more, Glutathione peroxidase (GPx) and catalase have been identified as the senior enzymes that can remove hydrogen peroxide produced by superoxide dismutase in cytosol and mitochondria by oxidizing GSH to GSSG (Park et al., 1994). Another key thing to remember that our study approves earlier reported antioxidant function of M. oleifera in vitro and in vivo, against hydroxyl radicals generated by Fenton reaction (Rao et al., 2001; Kumar and Pari, 2003). It has been informed that M.O contain different antioxidants including Vitamin C (Siddhuraju and Becker, 2003) which performs as an antioxidant molecule and its great influence could be applied to its ability to form a poorly ionized but soluble complex with toxic metal/metalloid (Flora, 2002).

Gupta et al. (2007) study the pointed out that administration of M. oleifera highly safed SOD, catalase and GPx functions by directly scavenging ROS as well as by holding down lipid peroxidation, suggesting antioxidant options of M. oleifera seed powder. Morever, many debates and researches assured that M. oleifera leaves help strongly in the recovery from hepatic illness induced by antitubercular drugs or acetaminophen.

For your surprise, we find that M. oleifera renew the function of the decreased glutathione (GSH). This glutathione was found shrunked following administration of the damaging agent. Morever, GSH is a
qualified hunter of free radicals which is considered a reason of oxidation of GSH to oxidized glutathione (GSSG). That GSSG leads to weaken the stores of GSH (Ahmed and Khater, 2001; Ashok Kumar and Pari, 2003; Pari and Ashok Kumar, 2002). Furthermore, the leaves` aqueous ethanol extract of M. oleifera has the ability to scavenge peroxyl, superoxyl, and 1,1-diphenyl 2-picrylhydrazyl (DPPH•) radicals (Siddhuraju and Becker, 2003). By taking all above results into consideration, it was reported that the phytochemical constituents in MO could take part in its antioxidant function and so, nephroprotection (Verma et al., 2009).

In general, the more decreased activities of SOD, CAT and GPx in plasma, liver and kidney of KBrO₃- treated rats, the more reduced synthesis of enzymes or oxidative inactivation of the enzyme proteins will be Fischer et al. (2012) and Linjawi and Roshdy (2015).

Conclusion

Before interpreting our results, we would just like to restate our main aims. This exploratory study has drawn our attention on its ability to show the nephrotoxic influence of potassium bromate and nephroprotective potentials of Moringa oleifera oil. Co-administration of M. oleifera oil with KBrO₃ have been reported as great protectors against oxidative stress induced by KBrO₃ in rats. Moringa oleifera oil at level 20% was the best addition which significantly enhanced the antioxidant enzymes in nephrotoxic rat.

Table (1): Fatty acid profile of Moringa oleifera oil

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oleic acid</td>
<td>22.11</td>
</tr>
<tr>
<td>Linoleic acid</td>
<td>11.14</td>
</tr>
<tr>
<td>Linolenic acid</td>
<td>1.51</td>
</tr>
<tr>
<td>Palmitic acids</td>
<td>7.37</td>
</tr>
<tr>
<td>Palmitoleic acids</td>
<td>2.10</td>
</tr>
<tr>
<td>Arachidic acid</td>
<td>1.34</td>
</tr>
<tr>
<td>Behenic acid</td>
<td>2.07</td>
</tr>
<tr>
<td>Stearic acid</td>
<td>3.83</td>
</tr>
<tr>
<td>Myristic acid</td>
<td>1.84</td>
</tr>
<tr>
<td>gadoleic acid</td>
<td>1.71</td>
</tr>
</tbody>
</table>
Table (2): Effect of Moringa oil on body weight gain (BWG), feed intake (FI), feed efficiency ratio (FER) and protein efficiency ratio (PER) of KBrO₃ nephrotoxic rats fed on Moringa oil for six weeks

<table>
<thead>
<tr>
<th>Groups Parameters</th>
<th>-ve control group</th>
<th>+ve control group</th>
<th>10% moringa oil</th>
<th>20% moringa oil</th>
<th>30% moringa oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial weight (g)</td>
<td>110.55±3.67ᵃ</td>
<td>110.41±3.50ᵃ</td>
<td>109.14±2.45ᵃ</td>
<td>108.33±2.99ᵃ</td>
<td>110.22±3.11ᵃ</td>
</tr>
<tr>
<td>Final weight (g)</td>
<td>203.47±13.01ᵃ</td>
<td>154.71±12.13ᵇ</td>
<td>189.71±11.22ᵇ</td>
<td>199.41±13.78ᵇ</td>
<td>201.14±12.35ᵇ</td>
</tr>
<tr>
<td>Weight gain (g)</td>
<td>92.92±11.33ᵃ</td>
<td>44.30±7.71ᵇ</td>
<td>80.57±8.17ᵃ</td>
<td>91.08±10.22ᵃ</td>
<td>90.92±11.11ᵃ</td>
</tr>
<tr>
<td>Feed Intake (g/d)</td>
<td>16.65±2.11ᵃ</td>
<td>14.20±2.17ᵃ</td>
<td>15.90±2.11ᵃ</td>
<td>16.35±2.91ᵃ</td>
<td>16.55±2.18ᵇ</td>
</tr>
<tr>
<td>FER</td>
<td>0.093±0.001ᵃ</td>
<td>0.051±0.002ᵇ</td>
<td>0.084±0.003ᵃ</td>
<td>0.092±0.001ᵃ</td>
<td>0.091±0.001ᵇ</td>
</tr>
<tr>
<td>PER</td>
<td>0.46±0.03ᵃ</td>
<td>0.25±0.01ᵇ</td>
<td>0.42±0.03ᵃ</td>
<td>0.46±0.02ᵃ</td>
<td>0.45±0.04ᵃ</td>
</tr>
</tbody>
</table>

Mean ± SD with the same letter is insignificantly different.

Table (3): Effect of Moringa oil on blood cell parameters on KBrO₃ nephrotoxic rats

<table>
<thead>
<tr>
<th>Groups Parameters</th>
<th>-ve control group</th>
<th>+ve control group</th>
<th>10% moringa oil</th>
<th>20% moringa oil</th>
<th>30% moringa oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>HB (gm/dl)</td>
<td>12.08±2.18ᵃ</td>
<td>7.99±1.39ᵇ</td>
<td>10.14±1.4ᵃ</td>
<td>10.55±1.98ᵃ</td>
<td>11.11±2.01ᵃ</td>
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<tr>
<td>PCV %</td>
<td>38.61±3.82ᵃ</td>
<td>29.81±3.55ᵇ</td>
<td>33.79±3.47ᵇ</td>
<td>34.14±4.01ᵃᵇ</td>
<td>36.71±4.11ᵃᵇ</td>
</tr>
</tbody>
</table>

Mean ± SD with the same letter is insignificantly different.

Table (4): Effect of Moringa oil on of liver enzymes; aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) on KBrO₃ nephrotoxic rats

<table>
<thead>
<tr>
<th>Groups Parameters</th>
<th>-ve control group</th>
<th>+ve control group</th>
<th>10% moringa oil</th>
<th>20% moringa oil</th>
<th>30% moringa oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST (µ/ml)</td>
<td>41.17±5.81ᵇ</td>
<td>72.39±9.61ᵃ</td>
<td>49.37±6.01ᵇ</td>
<td>51.14±8.10ᵇ</td>
<td>48.21±6.15ᵇ</td>
</tr>
<tr>
<td>ALT (µ/ml)</td>
<td>13.35±1.12ᵇ</td>
<td>28.55±3.35ᵃ</td>
<td>15.71±1.81ᵇ</td>
<td>16.28±2.01ᵇ</td>
<td>18.13±3.51ᵇ</td>
</tr>
<tr>
<td>Alk–Pho (µ/ml)</td>
<td>30.17±5.66ᵇ</td>
<td>50.38±5.81ᵃ</td>
<td>37.80±4.11ᵇ</td>
<td>38.73±4.37ᵇ</td>
<td>38.34±5.01ᵇ</td>
</tr>
</tbody>
</table>

Mean ± SD with the same letter is insignificantly different.
Table (5): Effect of Moringa oil on serum levels of creatinine and uric acid on KBrO$_3$ nephrotoxic rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Parameters</th>
<th>-ve control group</th>
<th>+ve control group</th>
<th>10% moringa oil</th>
<th>20% moringa oil</th>
<th>30% moringa oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creatinin mg/dl</td>
<td>0.77±0.01 $^b$</td>
<td>1.95±0.11 $^a$</td>
<td>0.99±0.02 $^b$</td>
<td>0.88±0.12 $^b$</td>
<td>0.75±0.13 $^b$</td>
<td></td>
</tr>
<tr>
<td>Uric acid mg/dl</td>
<td>1.83±0.26 $^c$</td>
<td>4.41±1.01 $^a$</td>
<td>2.11±0.81 $^b$</td>
<td>2.41±0.77 $^b$</td>
<td>2.17±0.67 $^b$</td>
<td></td>
</tr>
</tbody>
</table>

Mean ± SD with the same letter is insignificantly different.

Table (6): Effect of Moringa oil on superoxid dismutase (SOD), glutathione peroxidase (GPX), glutathione transferase (GST) and malondialdehyde (MDA) on KBrO$_3$ nephrotoxic rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Parameters</th>
<th>-ve control group</th>
<th>+ve control group</th>
<th>10% moringa oil</th>
<th>20% moringa oil</th>
<th>30% moringa oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOD ($µ/mg$)</td>
<td>140.81±21.17 $^a$</td>
<td>35.81±3.81 $^b$</td>
<td>110.15±11.15 $^a$</td>
<td>131.25±22.61 $^a$</td>
<td>118.82±17.34 $^a$</td>
<td></td>
</tr>
<tr>
<td>GPX ($µ/mg$)</td>
<td>121.33±17.13 $^a$</td>
<td>29.14±4.19 $^c$</td>
<td>89.59±7.95 $^b$</td>
<td>118.41±11.18 $^a$</td>
<td>114.38±13.21 $^a$</td>
<td></td>
</tr>
<tr>
<td>GST ($µ/mg$)</td>
<td>4.14±0.66 $^a$</td>
<td>1.51±0.19 $^c$</td>
<td>2.99±0.88 $^b$</td>
<td>3.45±0.97 $^b$</td>
<td>3.29±0.77 $^a$</td>
<td></td>
</tr>
<tr>
<td>MDA (nmol/g)</td>
<td>9.45±1.98 $^b$</td>
<td>19.34±3.14 $^a$</td>
<td>10.14±2.61 $^b$</td>
<td>9.11±2.16 $^b$</td>
<td>10.33±1.69 $^b$</td>
<td></td>
</tr>
</tbody>
</table>

Mean ± SD with the same letter is insignificantly different.
References:


Kind PR and King EJ (1954): Estimation of alkaline phosphatase activity by determination of hydrolyzed phenol with


التأثير الوقائي للكلوي باستخدام زيت المورينجا ضد التسمم ببرومات البوتاسيوم لدى فئران التجارب

محاسن علي قطب - منى ياسر عبد الخالق مصطفى
قسم الاقتصاد المنزلى - كلية التربية النوعية - جامعة المنصورة - مصر

يعتبر نبات المورينجا أوليفيرا من النباتات الهامة لما له من وظائف علاجية متعددة حيث يمثل الزيت المستخلص من بذور النبات أهمية كبيرة للشعوب المهتمة بزراعة هذا النوع من الأشجار

يهدف البحث إلى تقييم ما إذا كان إضافة زيت بذور المورينجا بنسبة 10، 20، 30% له تأثير وقائي ضد برومات البوتاسيوم المتسببة في احداث التسمم الكلى لدى فئران التجارب حيث حققت هذه الفئران فرديا داخل الغشاء البريتوني ب125ملجم/كجم من وزن الجسم من مادة برومات البوتاسيوم مع تناول الوجبة الأساسية ثم قسمت المجموعات إلى مجموعات ضابطة سالبة واخرى موجبة وثلاث مجموعات دعمت وجباتها بزيت بذور المورينجا بنسبة 0، 20، 30% لمدة 6 أسابيع. وبعد انتهاء فترة التجربة تم إجراء التحاليل البيوكيميائية لعينات دم الفئران

أدت إصابة الفئران ببرومات البوتاسيوم إلى فقدان الوزن في الفئران، وارتفاع ممحوظ في انزيمات الكبد، والكرياتينين، وحمض اليوريك وزيادة الضغط التأكسدي في الفئران. في المقابل، أدى تغذي الفئران على الوجبات الغذائية المدعمة بزيت المورينجا أوليفيرا وخاصة بنسبة 20% إلى ارتفاع نسبة الانزيمات المضادة للأكسدة مثل السوبر أكسيد ديسميوتاز، والجموتاثيون ترانسينيفرهيز، وال써عريدين، والجلوتاثيون ترانسينيفرهيز مع انخفاض في نسبة المالونالدهيد في فئران التجارب.

تم التوصل إلى أن إضافة زيت مورينجا أوليفيرا بنسبة 20% للوجبة دعم من قدرة الجسم الدفاعي ضد التسمم الكلوي الحاد بفعل برومات البوتاسيوم.