Potential protective of dry corchorus olitorius and dry whole cow’s milk on osteoporosis induced rats

El Gamal Asmaa

Lecturer of Nutrition and Food Science, Ahamed Maher Teaching Hospital, Egypt.

Abstract:

This study was designed to determine the effect of dried whole cow’s milk and dried c.olitorius on osteoporosis female albino rats were classified into six groups of five rats each the animals were housed individually in wire. Group(1) control negative fed basal diet only. The others 25 rats were classified into five groups (5 rats) each as following: Group (2) +ve and other group (3,4,5,6) infected was Desprelone D where the addition of 10 mg/ kg B.W put in 25 cm of water where they are giving each rat oral for two week. Groups (3 and 4) treated with dried whole cow’s milk powder (2.5 and 5% of diet), Group (5 and 6) treated with dried c.olitorius (2.5 and 5% of diet) respectively, daily for (4) weeks.

The results indicated that all treating animals showed highest significantly in BWG , FI , FER , HDL-c, Ca, ionized Ca, Ph, estrogen, osteocalcin and ALP, calcitonin, B-ALP, TRAP, T3, T4, TSH, B-ALP bone, osteocalcin bone and calcitonin bone while showed highest significantly in groups (3, 4) in the TC , TG , LDL-c and VLDL-c as compared to the (5, 6) groups. As a result, the best values in the most of these variables appeared in dried whole cow’s milk powder (2.5 and 5%) compared with other treated groups, therefore were used during preparation of basel diet. The results of chemical composition in review revealed that dried whole cow’s milk content per 100g vitamin D 2 IU, calcium 113 mg, magnesium 205 mg phosphorus, compared with dried c.olitorius content per 100g vitamin D 0 IU, calcium 208 mg, magnesium 64 mg, phosphorus 83 mg.

Therefore, dried whole cow’s milk and dried c.olitorius is recommended for nutritional and healthy advantages for femal who suffer from osteoporosis.

Key words: osteoporosis, dried whole cow’s milk, dried c.olitorius, rats.

Introduction:

Osteoporosis is the most widespread bone disease and is multiple as widespread in women as in men. People with osteoporosis have thinning of their bones, causing their bones to become brittle and to fracture (break) easily. Osteoporosis is a serious disease. Moiety of women pastmenopause and older than 50 years will have a fracture due to osteoporosis. Bone mineral density is measured by DEXA (bone) scan. Results of bone
mineral density (BMD) measurement can show if a person has either osteopenia mild low bone density or osteoporosis hard low bone density (Sugerman, 2014). The same author showed that several causes of osteoporosis. These include old age, family history, white or Asian race, confinement to bed, certain diseases or medications. However, lifestyle changes that help stay healthy in general can also help prophylaxis from developing osteoporosis, including limiting alcohol, not smoking cigarettes, eating foods with plenty of calcium and vitamin D. Regular weight-by exercise.

Dairy and milk consumption are iterate included as important ingredient in a healthy and balanced diet. It is the first food for mammals and provides all the necessary energy and nutrients to ensure in conformity growth and development, being telling in respect to bone mass formation (Pereira, 2014). Dairy products have promise as health-promoting foods for the prevention or amelioration of osteoporosis, sarcopenia, the metabolic syndrome, cardiovascular disease, cognitive decline, and digestive ailments (Hess et al., 2015).

Nutritional value of whole cow's milk per 100 g energy (60 kcal), carbohydrates 5.26 g, sugars 5.26 g, lactose 5.26 g, fat 3.25 g, saturated 1.865 g, monounsaturated 0.812 g, polyunsaturated 0.195 g, protein 3.22 g, tryptophan 0.075 g, threonine 0.143 g, isoleucine 0.165 g, leucine 0.265 g lysine 0.140 g, methionine 0.075 g, cysteine 0.017 g, phenylalanine 0.147 g tyrosine 0.152 g, valine 0.192 g, arginine 0.075 g, histidine 0.075 g, alanine 0.103 g, aspartic acid 0.237 g, glutamic acid 0.648 g, glycine 0.075 g proline 0.342 g, serine 0.107 g, vitamin A equiv. 46 μg, thiamine (B1) 0.044 mg, riboflavin (B2) 0.183 mg, vitamin B12 0.45 μg, choline 14.3 mg vitamin D 2 IU, calcium 113 mg, magnesium 10 mg, potassium 132 mg, phosphorus, sodium 43 mg, water 88.32 g (Noelle, 2002).

Milk and bone health uncovers a striking discrepancy: experimental and observational studies of surrogate markers (e.g., bone turnover markers and BMD) usually showed that milk consumption was associated with a slower pace of bone remodeling and a higher bone mass (Patrice et al., 2016). One glass of milk consumption each day was associated with a 40% lower risk of fracture compared to little or no milk consumption, whereas other dairy products had no effect (Sahni et al., 2014).

The benefits milk product consumption may have on the prevention and management of chronic health conditions such as osteoporosis, the metabolic syndrome, and dementia (Hess et al., 2016). Adequate calcium intake is often recommended to prevent osteoporosis, because most of the
body’s calcium is stored in bones. Sufficient calcium consumption during adolescence, an important period of bone growth, may protect against bone mass loss in adulthood (National Institutes of Health Office of Dietary Supplements, 2013). Calcium and phosphorus, the nutrients vitamin D, magnesium, zinc, and potassium are elements in milk and are vital to bone health (Allen et al., 2006). Corchorus olitorius plant is cultivated in Egypt for the leaves, which provide one of the most popular potherb (Bulus, 2002). Molokhia (jute) is a plant from the Tiliaceae family from the Mediterranean region, its leaves have been found to be rich in antioxidants, such as vitamin C, vitamin E, β-carotene, α-tocopherol, glutathione and phenols. The leaves also contain fatty acids, minerals, other vitamins and mucilaginous polysaccharides, and have been used as traditional folk medicine (Zeghichi et al., 2003).

The leaves of corchorus are rich in betacarotene, iron, calcium, and vitamin C. The plant has an antioxidant activity with a significant α-tocopherol equivalent vitamin E (Islam, 2013). Nutritional values of jute leaves as saluyot (boiled/100 grams edible portion) moisture (80.4 – 84.1), food energy (cal.) 43 – 58, protein (g) 4.5 – 5.6, fiber (g) 1.7 – 2.0, total carbohydrates (g) 7.6 – 12.4, ash (g) 2.4, calcium (mg) 266 – 366, phosphorus (mg) 97 – 122, iron (mg) 11.6, sodium (mg) 12, potassium (mg) 444, Vit. A (I.U.) 6,390, thiamine (mg) (Vit.B1) 15, riboflavin (mg) (Vit.B2) 28, niacin (mg) (Vit.B3) 1.5 and ascorbic acid (mg) 95 (Islam, 2012). The same author showed that nutritional values of jute leaves (per 100 gm each) Calories (kl cal) 73, Protein (g) 3.6, Lipid (g) 0.6, Calcium (mg) 298, Iron (mg) 11, Carotene (mg) 6400, Vitamin B-1 (mg) 15, Vitamin B-2 (mg) 28 and Vitamin C (mg) 64.

Nutritional value raw (Corchorus olitorius) per 100 g (3.5 oz) energy 142 kJ (34 kcal), carbohydrates 5.8 g, fat 0.25 g, protein 4.65 g, Vitamin A 278 μg, Thiamine (B1) 0.133 mg, Riboflavin (B2) 0.546 mg, Niacin (B3) 1.26 mg, Pantothenic acid (B5) 0.072 mg, Vitamin B6 0.6 mg, Folate (B9) 123 μg, Vitamin C 37 mg, Calcium 208 mg, Iron 4.76 mg, Magnesium 64 mg, Manganese 0.123 mg, Phosphorus 83 mg, Potassium 559 mg, Zinc 0.79 mg, Vitamin D 0 IU (USDA, 2016).

Green leafy vegetables (GLV) Molokhia are important sources of macro and micro elements which are necessary for the maintenance of good health and prevention of diseases. These vegetables are rich sources of carotene, ascorbic acid, riboflavin, folic acid, and minerals elements like calcium, iron and phosphorous and potassium (Nnamani et al., 2007).
Materials and Methods:

Materials:

- Disprelone D (prednisolone sodium metasulphobenzoate 32.416 mg equivalent to prednisolone 10 mg) from pharmacy Mecca, Zagazig.

- Dry corchorus olitorius was obtained from the local market in Zagazig, Egypt and dry whole cow’s milk from super market.

Experimental rats:

Thirty female albino rats (Sprague Dowlay) weighting 145 ± 10 g. The rats were purchased from the Animal House Colony of The Ophthalmic Institute, Giza, Egypt.

Methods:

Preparation of Diets:

The basal diet consisted of casein as a source of protein, corn oil as a source of fat, choline chloride, vitamin mixture, cellulose as a source of fiber, salt mixture and corn starch were obtained from El-Gomhoria Co., Dokki, Giza. Basel diet was prepared according to AIN, (1993). It was consisted of 14 % casein, 10% corn oil, 0.2% choline chloride, 1% vitamin mixture (Campbell, 1963) 4% salt mixture (Hegsted et al., 1941) and 5% fibers (cellulose), the remainder was corn starch.

Experimental Design:

Thirty female albino rats (Sprague Dowlay) were divided into 6 groups of five rats each the animals were housed individually in wire cages with the diet was introduced in the rats in special food containers to avoid scattering of food. Water was provided to rats by glass tube projection through the wire cage.

- Group (1): “Control negative” was fed stander died where was normal not infected. other groups infected was Desprelone D where the addition of 10 mg/kg put in 25 cm of water where they are giving each rat oral for two week (David Banji et al., 2014 and Al-Soauly Reem, 2015).

- Group(2): control positive was fed stander diet with infected.

- Group(3): was fed stander diet with 2.5% of dried whole cow’s milk.

- Group (4): was fed stander diet with 5 % of dried whole cow’s milk.
- Group (5): was fed standard diet with 2.5% of dried corchorus olitorius.

- Group (6): was fed standard diet with 5% of dried corchorus olitorius.

Body weight (BWG) and the amount of food intake (FI) for each rat were measured once per week during the experimental period (6 weeks). BWG and FI were also calculated, food efficiency ratio (FER) was calculated at the end of experiment as follows: Food efficiency ratio (FER) = body weight gain/food intake.

At the end of the experiment period, the rats were anaesthetized by diethyl ether and sacrificed. Blood samples were collected in clean test tubes, blood were left for coagulation then centrifuged at 3000 rpm for 15 minutes to obtain serum to assay the biochemical analysis. Heart, liver and kidney for rats were collected and weighted. The organs were removed and the left femur bone was removed then cleaned and washed in saline solution and dried with filter paper and weight then kept at 20°C until analysis.

**Biochemical analysis of serum:**

Serum total cholesterol, triglycerides and serum high density lipoprotein cholesterol (HDL-c) were determined according to the methods of Ratliff and Hall (1973), Jacob and Van Denmark (1963) and Lopez (1977) respectively. Low density lipoprotein cholesterol (LDL-c) and very low density lipoprotein cholesterol (VLDL-c) were calculated according to Lee and Nieman (1996).

Serum calcium, ionized calcium and phosphorous in serum were determined by spectrophotometer using commercially available test kit (Furuichi et al., 2000 and Fishman, 1953). Osteocalcin, estrogen and alkaline phosphatase in serum were determined by enzyme immunoassay Owens and Ashby (2002), Shoji et al. (2003) and Varley et al. (1980). Serum calcitonin, bone-alkaline phosphatase and serum tartrate resistant acid phosphatase (TRAP) were determined according to the methods of Langen Pitulescu (2017), Garnero and Delmas (1993) and Luchin et al. (2000) respectively.

Also, tri-iodothyronine (T3), thyroxine (T4) and thyroid stimulating hormone (TSH) in serum were calculated according to Sterling et al. (1970), Hollowell et al. (2002) and Docter et al. (1993) respectively.

**Bone Analyses:**

Bone mineral of the left femur densitometry were performed calcium and phosphorous according to Fraser et al. (1986). Bone alkaline
Potential protective of dry corchorus olitorius and dry whole cow’s milk on osteoporosis induced rats

Phosphatase bone, osteocalcin bone and calcitonin bone were determined according to the methods of Whyte (1983), Gundberg (1989) and Deftos (1990) respectively.

Ash:

Ash determination, the amount of ash in the left femur was determined according to A.O.A.C. (1995).

Bone Density:

Bone density determination, the density of bone in the left femur was determined by DEXA UNITE (LUNAR OXIQ 4716) according to the method El-Dawy (1986). Bone density was estimated in Tiba Scan investigation center, Shibin El Kom, Egypt.

Statistical Analysis:

Data were presented as means ± SE. Statistical analysis was performed using computerized statistical package social sciences (SPSS) program with one way analysis of variance (ANOVA) followed by Duncan’s multiple range tests according to Snedecor and Cochran (1986).

Results and Discussion:

Results of Body weight gain (BWG), feed intake (FI) and feed efficiency ratio (FER) of experimental rats are presented in Table (1) it found that BWG and FER of positive control group were decreased significantly, compared with those of the normal rats.

Table (1): Effect of feeding different levels of dried whole cow’s milk and dried c. olitorius on body weight gain (g/day), feed intake (g/day), feed efficiency ratio (FER) in osteoporosis female rats (Mean± S.D)

<table>
<thead>
<tr>
<th>Group</th>
<th>Variables</th>
<th>BWG (g)</th>
<th>FI (g/day)</th>
<th>FER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative control(-ve) (G1)</td>
<td></td>
<td>20.2±0.84a</td>
<td>16.96±0.51a</td>
<td>1.19±0.05a</td>
</tr>
<tr>
<td>Positive control(+ve) (G2)</td>
<td></td>
<td>17.8±1.79b</td>
<td>16.98±0.90b</td>
<td>1.04±0.09b</td>
</tr>
<tr>
<td>Dried cow’s milk% 2.5 (G3)</td>
<td></td>
<td>12±1.58c</td>
<td>17.04±0.52a</td>
<td>0.70±0.09c</td>
</tr>
<tr>
<td>Dried cow’s milk% 5 (G4)</td>
<td></td>
<td>19.6±1.14a</td>
<td>16.96±0.36a</td>
<td>1.15±0.7a</td>
</tr>
<tr>
<td>Dried c. olitorius %2.5 (G5)</td>
<td></td>
<td>7±1.22d</td>
<td>17.14±0.56a</td>
<td>0.40±0.69d</td>
</tr>
<tr>
<td>Dried c. olitorius %5 (G6)</td>
<td></td>
<td>2.4±1.14e</td>
<td>17.12±0.55a</td>
<td>0.13±0.06e</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td></td>
<td>1.73</td>
<td>0.772</td>
<td>0.095</td>
</tr>
</tbody>
</table>

Means with different letters in each column are significantly different at P<0.05.
SD: Standard Deviation.
On the other hand rats which feeding on dried whole cow’s milk and dried C. olitorius diet had decreased significantly in BWG and FER compared with those of positive control group except rats which feeding on %5 dried whole cow’s milk diet had significantly increased in BWG and FER compared with those of positive rats but had significantly decreased in BWG and FER compared with those of positive control group (Michaëlsson et al., 2014). Mentioned that positive beneficial associations between dairy food consumption of milk and dairy products and bone mineral density decrease risk of fracture. Olusanya et al., (2018) they observed that reduction in body weight as well as the extract of corchorus olitorius leaf treatment groups at the dose of 400 and 800 mg/kg b.w.

**Table (2): Effect of feeding different levels of dried whole cow’s milk and dried c. olitorius on TC (mg/dl), TG(mg/dl), HDL-c (mg/dl), LDL-c (mg/dl) and VLDL-c (mg/dl) in osteoporosis female rats (Mean± S.D)**

<table>
<thead>
<tr>
<th>Group</th>
<th>Variables</th>
<th>TC (mg/dl)</th>
<th>TG (mg/dl)</th>
<th>HDL-c (mg/dl)</th>
<th>LDL-c (mg/dl)</th>
<th>VLDL-c (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative control (-ve) (G1)</td>
<td></td>
<td>108.28±7.59 abc</td>
<td>94.27±4.83 def</td>
<td>58.06±3.31 ab</td>
<td>32.64±3.70 d</td>
<td>17.84±2.47 bc</td>
</tr>
<tr>
<td>Positive control (+ve) (G2)</td>
<td></td>
<td>253.08±36.77 a</td>
<td>195.45±26.50 a</td>
<td>37.53±1.81 ab</td>
<td>163.19±12.99 a</td>
<td>43.20±10.60 a</td>
</tr>
<tr>
<td>Dried cow’s milk% 2.5 (G3)</td>
<td></td>
<td>152.8±12.33 b</td>
<td>102.9±4.94 ab</td>
<td>46.97±0.84 a</td>
<td>72.13±7.73 a</td>
<td>18.25±3.24 a</td>
</tr>
<tr>
<td>Dried cow’s milk% 5 (G4)</td>
<td></td>
<td>153.24±2.54 ab</td>
<td>117.22±1.67 b</td>
<td>36.69±2.17 ab</td>
<td>84.70±11.12 b</td>
<td>21.32±1.93 b</td>
</tr>
<tr>
<td>Dried c. olitorius %2.5 (G5)</td>
<td></td>
<td>121.52±2.61 ab</td>
<td>89.97±12.22 ab</td>
<td>53.42±2.88 b</td>
<td>65.68±10.13 a</td>
<td>17.92±4.31 b</td>
</tr>
<tr>
<td>Dried c. olitorius %5 (G6)</td>
<td></td>
<td>112.47±2.15 ab</td>
<td>86.01±10.43 ab</td>
<td>56.68±3.28 ab</td>
<td>60.36±2.75 ab</td>
<td>16.85±1.06 b</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td></td>
<td>21.18</td>
<td>16.95</td>
<td>3.31</td>
<td>11.63</td>
<td>6.58</td>
</tr>
</tbody>
</table>

Means with different letters in each column are significantly different at P<0.05.

SD: Standard Deviation.

The obtained results in Table (2) showed a marked significant increase in serum total cholesterol (TC), triglyceride (TG), low density lipoprotein (LDL-c) and very low density lipoprotein (VLDL-c) levels and significant decrease in serum high density lipoprotein (HDL-c) levels in positive control group compared with normal rats (negative control group). Comparing rats those treated with dried whole cow’s milk and dried c. olitorius diet of them revealed a marked significant decrease in serum levels of TC, TG, LDL-c and VLDL-c and significant increase in serum HDL-c levels compared with those of positive control group except group (4) which feeding dried whole cow’s milk %5 significant decrease which nearly returned toward the positive levels. The present results are in agreement with Siriamornpun et al. (2006) who reported that ω-3 fatty
acid in Corchorus olitorius with a much higher concentration than any other reported vegetable.

A number of animal experiments, epidemiological investigations have confirmed the essentiality of ω-3 fatty acids for normal retina and brain development of the premature infant, and for its hypotriglyceridemic, anti-inflammatory, and antithrombotic properties. (Mediene-Nenchekor et al., 2001). Mentioned that ethanolic leaf extract of Corchorus olitorius led to a reduction in cholesterol, triglycerides and low density lipoprotein (LDL) concentrations while it led to the normalization of high density lipoprotein (HDL) concentration, decreased the plasma cholesterol level to near normalcy and therefore reduces the risk of cardiovascular disease and depleted VLDL cholesterol levels which are characteristic of reduced risk of myocardial infarction.

Sjogren et al. (2004) reported that men with high intakes of milk products had an apparently beneficial and reduced distribution of the harmful small, dense LDL particles. Daly and Nowson (2009) found that some epidemiological and clinical studies have increased dairy consumption or calcium and vitamin D in milk can have a beneficial effect on blood pressure, and lipid and lipoprotein concentrations. The present results are in agreement with Reid et al. (2002) who reported that whole milk contains a significant amount of saturated fat, which raises serum cholesterol and LDL cholesterol. but other components in milk, including possibly vitamin D, may moderate any adverse effects on serum lipids.

Tabulated data in Table (3) showed that group 2 positive rats have significant decreased in serum levels of calcium (Ca), ionieized calcium (Ca++), phosphorus (ph) and bone alkaline phosphatase (B-ALP) levels and significant increase in serum alkaline phosphatase (ALP) enzyme levels compared with those of the normal rats (negative control group). In contrast, rats feeding on diet with dried whole cow’s milk or dried C. olitorius diet of them had significantly increase serum levels of Ca, Ca++, ph and B-ALP and significant decreased in serum ALP levels compared with those of positive control group.

Results in Table (4) showed significant elevations in serum activity of tri iodothyronine (T3) and tetra iodothyronine (T4) and reduced significant in serum thyroid stimulatory hormone (TSH) levels in positive control group compared with those of the normal rats. Treated rats with dried whole cow’s milk and dried c. olitorius diet have significant ameliorate in serum activity of TSH, T3 and T4 hormones compared with those of the
positive control rats except group 5 which feeding dried C. olitorius %2.5 in serum TSH, which nearly returned toward the normal levels.

Results demonstrated dairy foods naturally contain small amounts of magnesium and zinc, which are also vital for bone health. Most of the magnesium in the human body is found in bone, and magnesium serves an important role in calcium homeostasis through its regulation of serum calcium levels and secretion of parathyroid hormone. Magnesium deficiency may contribute to osteoporosis, and, like calcium and vitamin D, magnesium is an underconsumed nutrient in the U.S. Zinc, however, primarily functions as an enzyme cofactor, but like calcium and phosphate, also forms part of the apatite portion of bone Ilich and Kerstetter (2000).

Also, Larsen et al. (2004) reported that Providing adequate daily calcium and vitamin D is a safe and inexpensive way to help reduce fracture risk. Combination of supplemental calcium and vitamin D can reduce the risk of fracture. Other studies are in consistence with the present results. Olusanya et al. (2018) found the rats treated with ethanolic leaf extract of Corchorus olitorius showed significant (P < 0.05) reduction in the activity of liver and serum ALT, AST and ALP in the groups administered 800 mg/kg b.w when compared with the control while there was no significant difference (P > 0.05) in other treatment groups.

Table (3): Effect of feeding different levels of dried whole cow’s milk and dried C. olitorius on Ca(mg/dl), Ca++(mmol/l), B-ALP (U/l), Ph(mg/dl), ALP(U/l) in osteoporosis female rats (Mean ± S.D)

<table>
<thead>
<tr>
<th>Group</th>
<th>Variables</th>
<th>Ca (mg/dl)</th>
<th>Ca++ (mmol/l)</th>
<th>B-ALP (U/l)</th>
<th>Ph (mg/dl)</th>
<th>ALP (U/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative control (-ve) (G1)</td>
<td>10.47±0.44&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.28±0.035&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.669±0.039&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.93±0.55&lt;sup&gt;a&lt;/sup&gt;</td>
<td>140.56±3.68&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Positive control(+ve) (G2)</td>
<td>6.12±0.43&lt;sup&gt;e&lt;/sup&gt;</td>
<td>0.96±0.039&lt;sup&gt;e&lt;/sup&gt;</td>
<td>0.124±0.014&lt;sup&gt;d&lt;/sup&gt;</td>
<td>4.51±0.39&lt;sup&gt;e&lt;/sup&gt;</td>
<td>304.4±10.15&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Dried cow’s milk% 2.5 (G3)</td>
<td>8.77±0.24&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1.16±0.025&lt;sup&gt;e&lt;/sup&gt;</td>
<td>0.467±0.033&lt;sup&gt;e&lt;/sup&gt;</td>
<td>5.54±0.35&lt;sup&gt;e&lt;/sup&gt;</td>
<td>187.72± 20.56&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Dried cow’s milk% 5 (G4)</td>
<td>9.24± 0.20&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1.20± 0.027&lt;sup&gt;e&lt;/sup&gt;</td>
<td>0.565±0.127&lt;sup&gt;e&lt;/sup&gt;</td>
<td>5.99± 0.13&lt;sup&gt;e&lt;/sup&gt;</td>
<td>187.19± 16.61&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Dried c. olitorius %2.5 (G5)</td>
<td>7.78±0.21&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1.09± 0.011&lt;sup&gt;e&lt;/sup&gt;</td>
<td>0.381± 0.017&lt;sup&gt;e&lt;/sup&gt;</td>
<td>4.89± 0.11&lt;sup&gt;e&lt;/sup&gt;</td>
<td>232.38± 7.85&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Dried c. olitorius %5 (G6)</td>
<td>8.48±0.33&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1.12± 0.018&lt;sup&gt;e&lt;/sup&gt;</td>
<td>0.458± 0.026&lt;sup&gt;e&lt;/sup&gt;</td>
<td>5.33± 0.31&lt;sup&gt;e&lt;/sup&gt;</td>
<td>220.30± 9.84&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>LSD 0.05</td>
<td>0.424</td>
<td>0.036</td>
<td>0.075</td>
<td>0.447</td>
<td>16.63</td>
<td></td>
</tr>
</tbody>
</table>

Means with different letters in each column are significantly different at P<0.05.

SD: Standard Deviation.
Table (4): Effect of feeding different levels of dried whole cow’s milk and dried c.olitorius on TSH (IUU/ml), T3 (ng/ml) and T4 (ng/ml) in osteoporosis female rats (Mean± S.D)

<table>
<thead>
<tr>
<th>Group</th>
<th>Variables</th>
<th>TSH (IUU/ml)</th>
<th>T3 (ng/ml)</th>
<th>T4 (ng/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative control(-ve) (G1)</td>
<td></td>
<td>0.126± 0.006(^a)</td>
<td>0.334± 0.052(^d)</td>
<td>0.372± 0.069(^d)</td>
</tr>
<tr>
<td>Positive control(+ve) (G2)</td>
<td></td>
<td>0.078± 0.014(^d)</td>
<td>0.638± 0.063(^a)</td>
<td>0.897± 0.052(^a)</td>
</tr>
<tr>
<td>Dried cow’s milk% 2.5 (G3)</td>
<td></td>
<td>0.105± 0.007(^bc)</td>
<td>0.410± 0.042(^c)</td>
<td>0.584± 0.022(^c)</td>
</tr>
<tr>
<td>Dried cow’s milk% 5 (G4)</td>
<td></td>
<td>0.110± 0.012(^b)</td>
<td>0.105± 0.007(^e)</td>
<td>0.583± 0.084(^c)</td>
</tr>
<tr>
<td>Dried c.olitorius %2.5 (G5)</td>
<td></td>
<td>0.069± 0.012(^d)</td>
<td>0.514± 0.017(^b)</td>
<td>0.712± 0.076(^b)</td>
</tr>
<tr>
<td>Dried c.olitorius %5 (G6)</td>
<td></td>
<td>0.092± 0.014(^c)</td>
<td>0.507± 0.089(^b)</td>
<td>0.656± 0.040(^bc)</td>
</tr>
</tbody>
</table>

Means with different letters in each column are significantly different at P<0.05.
SD: Standard Deviation.

Table (5): Effect of feeding different levels of dried whole cow’s milk and dried C.olitorius on Estrogen (pg/ml), clacitonin (pg/ml), osteocalcin (pg/ml) and TRAP(U/l) in osteoporosis female rats (Mean± S.D)

<table>
<thead>
<tr>
<th>Group</th>
<th>Variables</th>
<th>Estrogen (pg/ml)</th>
<th>Clacitonin (pg/ml)</th>
<th>Osteocalcin (pg/ml)</th>
<th>TRAP (U/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative control (-ve) (G1)</td>
<td></td>
<td>0.926± 0.111(^a)</td>
<td>0.458±0.027(^a)</td>
<td>0.527±0.068(^a)</td>
<td>0.381±0.023(^a)</td>
</tr>
<tr>
<td>Positive control (+ve) (G2)</td>
<td></td>
<td>0.351± 0.029(^e)</td>
<td>0.116± 0.008(^d)</td>
<td>0.127±0.006(^e)</td>
<td>0.093±0.007(^c)</td>
</tr>
<tr>
<td>Dried cow’s milk %2.5 (G3)</td>
<td></td>
<td>0.602± 0.066(^b)</td>
<td>0.308± 0.057(^c)</td>
<td>0.432± 0.035(^bc)</td>
<td>0.213±0.026(^cd)</td>
</tr>
<tr>
<td>Dried cow’s milk %5 (G4)</td>
<td></td>
<td>0.602± 0.096(^b)</td>
<td>0.39± 0.029(^b)</td>
<td>0.489± 0.032(^ab)</td>
<td>0.288± 0.022(^b)</td>
</tr>
<tr>
<td>Dried c.olitorius %2.5 (G5)</td>
<td></td>
<td>0.550±0.041(^b)</td>
<td>0.318± 0.058(^c)</td>
<td>0.351± 0.061(^d)</td>
<td>0.187± 0.030(^d)</td>
</tr>
<tr>
<td>Dried c.olitorius %5 (G6)</td>
<td></td>
<td>0.562± 0.053(^b)</td>
<td>0.344± 0.043(^bc)</td>
<td>0.407± 0.029(^cd)</td>
<td>0.236± 0.027(^c)</td>
</tr>
</tbody>
</table>

LSD 0.05

Means with different letters in each column are significantly different at P<0.05.
SD: Standard Deviation.

Table (5) Shows a marked significant decrease in the serum of estrogen, calcitonin, osteocalcin and tartrate resistant acid phosphatase (TRAP) in positive control group rats compared to the normal rats ((negative control group) on the other hand there was a significant increased in serum of estrogen, calcitonin, osteocalcin and TRAP in dried whole cow’s milk and dried c.olitorius treated groups compared with those of positive control group alone. The present results are in agreement with Park et al. (2007)
who reported that dietary calcium intake, moderate physical exercise and estrogen replacement are necessary for the prevention of osteoporosis.

Also, Shen et al. (1995) found effects of estrogen replacement have been clearly established in the treatment of estrogen-deficiency-induced bone loss, the beneficial effects of calcium supplementation as a method of preventing bone loss are less obvious. Thus, it is important to understand the effects on bone health of dietary calcium deficiency as well as calcium supplementation. Gallagher (1993) reported that dietary calcium and estrogen deficiencies both can lead to osteoporosis in humans and animals.

Table (6): Effect of feeding different levels of dried whole cow’s milk and dried C.olitorius on Ca bone(mg/dl), Ph bone (mg/dl), B-ALP bone (U/l), osteocalcin bone(pg/ml) and calcitonin bone (pg/ml) in osteoporosis female rats (Mean± S.D)

<table>
<thead>
<tr>
<th>Group</th>
<th>Variables</th>
<th>Ca(B) (mg/dl)</th>
<th>Ph (B) (mg/dl)</th>
<th>B-ALP(B) (U/l)</th>
<th>Osteocalcin (B) (pg/ml)</th>
<th>Calcitonin (B) (pg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative control (-ve) (G1)</td>
<td></td>
<td>12.78±0.83</td>
<td>5.83±0.66</td>
<td>0.247±0.019</td>
<td>0.502±0.0009</td>
<td>0.665±0.030</td>
</tr>
<tr>
<td>Positive control (+ve) (G2)</td>
<td></td>
<td>7.59±0.34</td>
<td>5.86±0.20</td>
<td>0.592±0.022</td>
<td>0.115±0.005</td>
<td>0.103±0.006</td>
</tr>
<tr>
<td>Dried cow’s milk% 2.5 (G3)</td>
<td></td>
<td>8.97±0.15</td>
<td>6.71±0.13</td>
<td>0.393± 0.024</td>
<td>0.213± 0.012</td>
<td>0.308± 0.045</td>
</tr>
<tr>
<td>Dried cow’s milk% 5 (G4)</td>
<td></td>
<td>10.60± 0.80</td>
<td>8.02± 0.45</td>
<td>0.373± 0.014</td>
<td>0.369± 0.033</td>
<td>0.452± 0.053</td>
</tr>
<tr>
<td>Dried c. olitorius %2.5 (G5)</td>
<td></td>
<td>8.00± 0.17</td>
<td>6.10± 0.13</td>
<td>0.507± 0.020</td>
<td>0.210± 0.023</td>
<td>0.202± 0.039</td>
</tr>
<tr>
<td>Dried c olitorius %5 (G6)</td>
<td></td>
<td>8.33± 0.11</td>
<td>6.38± 0.13</td>
<td>0.452± 0.017</td>
<td>0.254± 0.011</td>
<td>0.280± 0.032</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td></td>
<td>0.654</td>
<td>0.452</td>
<td>0.026</td>
<td>0.024</td>
<td>0.049</td>
</tr>
</tbody>
</table>

Means with different letters in each column are significantly different at P<0.05.
SD : Standard Deviation.

Table (6) comparing positive control group rats with normal control group, the present results revealed a marked significant increase in bone alkaline phosphatase bone (B-ALP.B) and decrease in calcium bone (Ca.B), phosphorus bone (Ph.B), osteocalcin bone and calcitonin bone (Table 6). Treated rats with dried whole cow’s milk or dried C.olitorius caused significant decrease in (B-ALP.B) and increase in (Ca.B), (Ph.B), osteocalcin bone and calcitonin bone levels compared to those of untreated positive control group. These results are in accordance with those reported by Larsen et al. (2004) a balanced diet rich in low-fat dairy products, fruits, and vegetables (molokhia) provides calcium as well as numerous nutrients needed for good health. Lifelong adequate calcium intake is necessary for the acquisition of peak bone mass and subsequent maintenance of bone health.

The skeleton contains 99% of the body’s calcium stores; when the exogenous supply is inadequate, bone tissue is resorbed from the skeleton to maintain serum calcium at a constant level. Owusu et al., (1997) they
observed that, milk and dairy products are a convenient source of calcium for many people. Calcium is a mineral that the body needs for numerous functions, including building and maintaining bones and teeth, blood clotting, the transmission of nerve impulses, and the regulation of the heart’s rhythm.

Ninety-nine percent of the calcium in the human body is stored in the bones and teeth. The remaining 1 percent is found in the blood and other tissues. Cao et al. (2011) reported that bone mineral density (BMD) correlates positively with milk protein intake due to the ability of protein to increase the intestinal absorption of calcium (Chen et al., 2015) said that they are few studied focused on postmenopausal women, in whom milk intake prevented bone loss at specific sites.

**Bone Density:**

Control group (one) (-ve) photo (1) showed that femoral condyles subcortical in location by exam DEXA (dual energy x-ray absorpmetry). Result BMD 0.158 g/cm² normal bone density compared with group (2) (photo 2) result BMD 0.146 g/cm² decreased bone density (osteoporosis). On the other hand, photo (3and 4) showed that treated with dried whole cow’s milk (%2.5 and %5) had the highest score BMD 0.204 g/cm²and 0.286 g/cm² compared with untreated group(2), followed photo (5 and 6) treated with dried c.olitorius (%2.5 and %5) BMD 0.205 g/cm²and 0.238 g/cm² respectively.

Photo (1): Densitometry of rat’s bone left femur from negative control group.
Photo (2): Densitometry of rat’s bone left femur from positive control group.

Photo (3): Densitometry of rat’s bone left femur from group(3).

Photo (4): Densitometry of rat’s bone left femur from group(4).
Potential protective of dry corchorus olitorius and dry whole cow’s milk on osteoporosis induced rats

In conclusion, dried whole cow’s milk and dried c.olitorius effects against female rats. Osteoporosis associated with ovarian hormone deficiency and bone loss in rats. Therefore, dietary intake of dried whole cow’s milk and dried c.olitorius may be useful for female who suffer from osteoporosis.
References:


Potential protective of dry corchorus olitorius and dry whole cow’s milk on osteoporosis induced rats


الآثار المحتملة للملوخية المجففة واللبن البقري كمبيد الدسم المجفف على الفئران
المصابة بهشاشة العظام

أسماء محمد إبراهيم الجمل
زميلاً تغذية وعلوم أطعمة مستشفى أحمد ماهر التعليمي

الملخص:

أجريت الدراسة الحالية لدراسة تأثير مسحوق اللبن البقري كمبيد الدسم المجفف والمملوءة الملوخية المجففة على الفئران المصابين بالهشاشة العظام وقد أجريت الدراسة على 30 فئراً، من أثاث الفئران التجارب التي قسمت إلى 6 مجموعات متساوية تحتوي كل مجموعة على 5 فئران استخدمت المجموعة الأولى كمجموعة الضابطة المالية، والتي تغذت على الغذاء الأساسي، وباقي الفئران (6 أُناس) تم تقسيمهم إلى خمس مجموعات المجموعة الثانية والثانية الملوخية الموجبة والمجموعات الأخرى (0,4,6) تم أصابتهم بإعطاء العظام بواسطة علاج ديسيربول، للاقتصاص بالإضافة إلى ملء كل كيلو جرام من وزن الجسم توضع في 25 سم من الماء أعطيت لكل فار من هذه المجموعات عن طريق الفم لدورة أسبوعية (المجموعة 0,4) تم تحقيقهم على الغذاء الأساسي بالإضافة نسبة (0,2، 0,5%) مسحوق من اللبن البقري كالمبيد الدسم المجفف أما المجموعة (6,5) تم تحقيقهم على الغذاء الأساسي بالإضافة نسبة (0,2، 0,5%) مسحوق من الملوخية المجففة بالدايSEO 4 أسابيع.

وقد أظهرت النتائج أن المجموعات التي تغذت على كل من مسحوق اللبن والمملوءة سجلت نموًا ملحوظًا ذو دلالة إحصائية في الوزن والطبع المتناول، ونسبة الاستفادة من الطعام والليبروتينات مرتفعة للغاية، وهرمونات النمو الدقيق والألكالين فوسفاتاز كذلك أظهرت النتائج زيادة كفاءة المعان في عظام الفخذ، ومحترف العظام من العظام وزيادة مستوي الكالسيوم والماغنيسيوم، والدهون الدم للمجموعة (4,6) بالمقارنة مع المجموعة (6,5) كانت أفضل المجموعات (4,6) معالجة بإضافة نسبة (0,2، 0,5%) مسحوق من اللبن البقري كالمبيد الدسم المجفف في معظم النتائج نتيجة لتركيز الكيميائي المحفز على البهذة حيث يحتوي مسحوق اللبن البقري كالمبيد الدسم لكل 100 جم لكل 130 جم فيتامين د 116 كالمسيوم، 100 جم ما غسيب و 6,000 جم فوسفور بالمفсрنة بمسحوق الملوخية لكل 100 جم فيتامين د صفر وحده 6,000 جم فوسفور بالمفسرنة بمسحوق الملوخية لما له من فوائد صحية للبصاعين المصابين بهشاشة العظام.

الكلمات الدالة: هشاشة العظام، اللبن البقري كمبيد الدسم المجفف، الملوخية المجففة، الفئران.