

Study the effect of natural antioxidants in mulberry on prostate cancer in male Wister albino

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ABSTRACT

Black mulberry (*Morusnigra L*) has been consumed as fresh as well as processed forms due to its nutritional value. Total phenolics, flavonoids, anthocyanins, antioxidant capacity and major phenolic compounds were identified in mulberry to investigate the health-related constituents of black mulberry products. The results indicated that the mulberry had contained the high amounts of natural antioxidant and antioxidant activity., Mulberry can be mixed with if yoghurt is the most consumed within the wider fermented milk products, mulberry extract at level 0%, 1%, 2%, 4%, 6%, 8% and 10% ml to 100 ml fermented milk to provide high nutritional value of yogurt products.. The yogurt sensory evaluation reported that if mulberry is added up to 8 ml to 100 ml milk, yogurt is acceptable. The biological experiment showed that for 5 days/week, the rat control group fed on basal diet and the 3 rats were rat group injection with 3.0 ml/kg rat from a testosterone enanthate tank, for 2 consecutive weeks of benign prostatic cancer induction. These rats were divided to control positive diet on basal diet. The 3rd, 4th, 5th and 6th rat groups fed basal diets and were taken separately orally from the mulberry aqueous extract at level 100, 200, 300 and 400 mg/kg body weight/ day for six-week storage period. Prostate weight and index content as TNF- α and PEG2 were calculated and analyzed, oxidative stress was also calculated. The findings showed that the different groups fed on basal diet and were administered orally separately from the mulberry aqueous extract, prostate weight, prostate index TNF α , PEG2 and oxidative stress were improved over positive regulate. In addition, histological prostate tests were verified with the expected findings, it could inferred that the mulberry had active antioxidant in it.

INTRODUCTION

The findings showed that the different groups fed on basal diet and that prostate cancer were

taken separately is one of the most frequently diagnosed malignancies in men worldwide (Siegel et al., 2017). Approximately 70% 80% change too prostate cancer patients experience bone metastasis (Shah et al., 2004), and 5% 12% of prostate cancel patients with c have regional lymph node metastasis. Both cancel cells and the tumor microenvironment contain tumor necrosis factor (TFNA), which has pluripotent effects on tumorigenesis and tumor progression (Liu et al., 1998) prostaglandins (PGs) influence several pathways which have been shown to play a role in carcinogenesis, such as cell proliferation, angiogenesis, apoptosis, and mutagenesis. PGs are derived from liberation of arachidonic acid. Prostatic tissues are nearly 10-fold higher in benign prostatic tissues (Chaudry et al.,1994). PGE2 has also been shown to promote osteoblast cell growth and prostate cancer cells (Tjandra winata et al., 1997). PGE2 interacts with four different receptor substs of E Prostanoid (EP1.EP4), which belong to the superfamily of G Protein-coupled receptors (Breyer et al.,2001). (Pritskhalaishvili et al.,2001) demonstrated that cells of human prostate cancel (PCa) cause the apoptotic death of the most active antigen presenting cells. Dendritic cells (DC), which are responsible for inducing unique immune responses to antitumor. The effect on murine PCa cells RM1 on the survival on the immature and tumor necrosis factor (TNFA) stimulated mature DC has been evaluated. The aim of this investigation was to test natural mulberry antioxidant mulberry extract/100 ml milk at rates 2,4,6, and 8 to generate yoghurt. In addition, the mulberry antioxidant was used as an experimental biological to protect male rats from cancer and was administered orally for six weeks at level 100, 200, 300 and 400ppm /kg /day.

MATERIALS AND METHODS

Materials

Black Mulberry (*Morus nigra* L.) was collected from local market at Giza-Egypt

and washed properly under running water to remove foreign particles, further dried in a portable hot air oven at 50 - 60 ° C. The dried berries were milled using a blender (Crown star model AJ 20 blender) into powder at 1800 rpm for 5 min and kept in sterile containers, stored under room temperature of 25°C for analysis.

The powder thus obtained was twicewich sieved to eliminate the coarse particle. Kits as TNF- α .and PEG2 and oxidative stress (MDA, COT, SOD and GSH) for determination of the parameters were purchased from Sigma Aldrich Corp.,

MO, USA. The cow's milk was purchased from local market, Giza-Egypt, which it was used to prepare the yogurt.

Methods:

Estimation of total phenolic acids, total flavonoids total anthocyanin compounds

The total phenolic content in the mulberry extract was determined with FolinCiocalteu reagent

using the **Qawasmeh *et al.*, (2012)** test. The measured UV reading was 760 nm. Gallic acid

was used as a baseline (1 mg / ml) and the findings were expressed as equivalents of gallic acid

(GAE mg/100 g of dry mass). The total content of flavonoids was calculated using the **Eghdami**

and Sadeghi (2010) methods. The absorbance was measured against a blank solution at 510 nm, and the total content of flavonoids was expressed as mg of quercetin equivalent per gram of dry weight (mg QE/100 g DW). The total content

of anthocyanin (TA) was calculated using the differential pH method (**AOAC, 2006**). Extract TA was expressed as the equivalent in milligrams of cyanidine-3-O-glucoside (C3 G) per 100 g of the day.

Determination methods of antioxidant activity in mulberry

Diammonium salt ABTS (2, 2-Azinobis 3-Ethylbenzothiazoline- 6-Sulfonic acid) the ABTS assay was conducted using **Miller and RiceEvans (1997) and Ramesh Kumar and Sivasudha (2012)** methods used for the study 1ml ABTS

Reaction solution was applied to the 100 μ L sample extract and immediately after 1 minute of initial mixing the absorbance was calculated at

734 nm The DPPH assay was performed as defined by **Ravichandran *et al.*, (2012)** the absorbance of the mixture with the UV. Visible spectrophotometer was

calculated at 515 nm. The formula below was used to calculate the percentage of scavenging activities; Inhibition percentage (percentage) = [(control-

sample)/control] Where, Power- DPPH absorbance, A sample absorbance combination reaction (DPPH).

Preparation of yoghurt from mulberry extract

200 ml of milk was added to each of the four glass beakers containing 500 ml. The five glass

beakers were lined with aluminum foil, then pasteurized for 20 minutes at 85 °C and then

cooled down to 35°C. The mulberry extract was applied separately to four beakers at levels 2, 4, 6, 8 and 10 ml to 100 ml of milk and the first beaker without

significantly applied as guide, as well as 6 % starter culture.

Evaluation of sensory properties of yoghurt samples

Twenty professional yogurt panelists have carried out sensory assessments of yogurt supplemented with mulberry extract at levels 2, 4, 6, 8 and 10 ml/100ml of milk in terms of taste, odor, texture, colour, overall appearance and acceptability according to **Obi et al., (2016)**.

Biological experimental

Male Wistar albino weaning rats (36 rats) were purchased from the National Organization for

Drug and Control Research, Giza, Egypt, with a weight of 150 to 160 g.

Rats were housed in

individual cages with screen bottoms and fed ad libitum on a one-week basal acclimatization diet, containing casein (20%), maize oil (8%), maize starch (31%), sucrose (32%), mg cellulose (4%), salt mixture. Experimental rats were fed for 15 days on fat and basal diets and six rats were randomly divided into six groups for each. The 1st main group was given a further 6 weeks of basal diet and considered negative control rats. The five groups of rats were fed with basal diet (30 rats, 6 rats in each group) were 5 days/week injection of 3.0 ml/kg from a testosterone enanthate tank.

Prostate weight and prostate index.

The prostate of each rat was rapidly dissected out and weighed. The prostate index was calculated for each rat by dividing the prostate weight by the body weight (mg/g).

Determination of TNF- α and PEG2 in prostate cancer

Homogeneous prostate products were used to prepare nuclear extracts for the determination of TNF α , using the nuclear extraction device EpiQuik™ (OP0002, EpiGentek, NY, US). Cells of prostate cancer (PC3) were grown to approximately 80 percent confluence in 10 cm² dishes. The cells were put the next day in MEM with 0.2 per cent BSA (SigmaAldrich). Over different time periods the cells were treated with TGF. β 1 (1 and 5 ng / mL)

Determination of markers of oxidative stress.

Portions of the prostate tissue were homogenized with ice-cooled phosphate buffered saline (5 mM potassium phosphate, pH 7.5). The Catalase (CAT) was calculated as per **Aebi (1995)** rule the **Janknegt et al., (2007)** calculated superoxide dismutase (SOD). Reduced level of glutathione (GSH) were calculated using chemical method described in **Moron et al (1979)**. The Lipid peroxidation was determined colorimetrically as malondialdehyde (MDA) by **Yoshioka et al (1979)**.

Histopathology.

Briefly, for preparing sections of 4 μm thickness, the fixed prostatic tissues from different groups were treated with paraffin technique. This was followed by deparaffinisation, rehydration, and hematoxylin and eosin (H&E) staining. At least three stained sections were photographed and used to assess prostatic glandular epithelial height using the ImageJ, 1.46a, NIH image analysis software.

Statistical analysis

The obtained data were exposed to the analysis of variance. Duncan's multiple range tests at ($P \leq 0.05$) level was used to compare between means. The analysis was carried out using the ANOVA procedure of the Statistical Analysis System (SAS, 2004).

RESULTS AND DISCUSSION

Antioxidant content and activity from mulberry extract

Antioxidant content as phenolic content, flavonoids compounds and anthocyanin compounds and antioxidant activity as DPPH and ABTS radical scavenging ability were determined in Mulberry (*Morus nigra* L.) extract and the results are reported in Table (1). From the results it could be found that the total phenolic content, flavonoids compounds and anthocyanin compounds were 940.62 mg gallic acid /100 g, 432.89 mg quercetin equivalent (QE)/ 100g and 76.25 mg cyanidin-3-O-glucoside (C3G) equivalent/100 g of dry weight, respectively.

Mulberries are also a good nutritional source of a variety of phenolic compounds, like flavanols and phenolic acids, as well as colored anthocyanins in the case of black and red mulberry fruits (Sanchez-Salcedo *et al.*, 2015 and Bao *et al.*, 2016). Phenolic compounds are the subject of increasing scientific interest; they are natural antioxidants in plant-derived foods and food products and their intake is frequently related to human health. Many of the bioactivities ascribed to mulberries, such as antioxidant action, hypolipidemic effect and macrophage activating effect, have also been linked to their phenolic compound composition (Kim *et al.*, 2013 and Krishna *et al.*, 2018).

Black mulberry (*Morus nigra* L.) is a fruit known not only for its nutritional qualities and its flavor, but also for its traditional use in natural medicine as it has a high content of active therapeutic compounds (Fazaeli *et al.*, 2013). Recently, mulberry fruit has been reported to exhibit several biological activities such as antidiabetic, antioxidative, anti-inflammatory and antihyperlipidemic activities. These biological activities were due to their polyphenol components including anthocyanins present in some of the varieties (Bae and Suhm 2007). Anthocyanins, belonging to the group of flavonoids and being responsible for the orange, red, and blue colors of flowers, fruits, and

vegetables, are viewed as natural colorants to replace synthetic ones. Therefore, new sources of these compounds are nowadays desired (**Pawłowska *et al.*, 2008**). Black mulberry has cyanidin-based anthocyanins, particularly cyanidin-3-O-glucoside and cyanidin-3-O-rutinoside. The scavenging ability of DPPH free radical is extensively used to screen the antioxidant potential of naturally-derived foods and plants. The photometric evaluation of the antioxidant capacity of the extract of mulberry showed good antioxidant capacity Table (1) A Significant decrease was observed in the DPPH radical activity due to the scavenging ability of the extracts. The ABTS radical scavenging ability was found to be higher in the mulberry extract. ABTS• radical is often used for the screening of complex antioxidant mixtures such as beverages, biological fluids and plant extracts for their antioxidant activities because of its ability in both the organic and aqueous media and the stability in a wide pH range (**Huang *et al.*, 2011**). The extract showed potent antioxidant activity in ABTS. Method which is consistent with that reported by, **Srikanth *et al.* (2012)** and is comparable with the standard used. Here, the extract's radical scavenging activity is for the direct role of its phenolic compounds in free radical scavenging.

Table (1): Antioxidant content and activity of mulberry extract

Antioxidant content and activity	Mulberry extract
Total phenolic (TP)	940.62±59.28 ^a
Total flavonoids (TF)	423.86±34.15 ^b
Total anthocyanin	76.25 ±6.18 ^c
DPPH	29.34±2.56 ^c
ABTS	42.39±4.23 ^d

All values are mean ± standard deviation (n = 3). Values in the same column with different letters are significant at P<0.05.

TP was given as mg gallic acid equivalent (GAE)/100 g sample; TF Content of extract was given as mg quercetin equivalent (QE)/100 g sample; The content was given as mg of cyanidin-3-O-glucoside (C3G) equivalent per 100 g of w of the sample; DPPH (1,1-diphenyl-2-picrylhydrazyl) and ABTS [(2,2-azinobis (3-ethylbenzothiazoline-6-sulfonic acid) diammonium salt)] were given inhibitions percent.

Sensory evaluation of yoghurt with mulberry extract

The influence of different treatments on the taste, odor, texture, color, general appearance, and overall acceptability scores were statistically significant (P < 0.05). Table (2) shows the sensory analysis results of mulberry-supplemented yoghurts. The utilization of mulberry extract in yoghurt production caused an increase in taste, odor, texture and overall acceptability scores. It was clear that

the yoghurt was prepared up to 8ml mulberry extract to 100ml milk give a better result. Black mulberry juice is well-known not only for its nutritional quality and distinctive flavor, but also as a good source of several bioactive phytonutrients (Hojjatpanah *et al.*, 2011). In general, the fruits of Mulberry were evaluated as a rich source of carbohydrates and sugars (respectively sucrose, glucose, fructose) (Dimitrova *et al.*, 2015).

Table (2). Sensory evaluation of yoghurt fortified with mulberry extract

Yoghurt mulberry	Taste (20)	Odor (20)	Texture (20)	Color (20)	(20) General appearances	Overall acceptability
Control	19.23 ^a ±1.35	18.71 ^a ±1.26	19.24 ^a ±2.12	18.64 ^a ±1.74	19.11 ^a ±2.05	92.93
2 ml mulberry	18.45 ^{ab} ±1.56	17.50 ^{ab} ±1.13	18.63 ^b ±1.66	17.90 ^b ±1.11	18.05 ^{ab} ±0.99	90.53
4 ml mulberry	18.00 ^b ±1.06	17.30 ^b ±0.65	17.45 ^{bc} ±0.77	17.48 ^b ±0.95	17.05 ^b ±0.99	87.28
6 ml mulberry	17.40 ^{bc} ±1.06	17.15 ^{ab} ±0.76	16.21 ^c ±0.25	16.10 ^{bc} ±0.86	16.74 ^{bc} ±0.12	83.60
8 ml mulberry	16.90 ^c ±0.76	17.00 ^b ±0.79	15.40 ^d ±0.93	15.91 ^c ±0.64	15.15 ^c ±0.63	80.72
10 ml mulberry	16.10 ^d ±0.76	16.00 ^c ±0.79	15.35 ^d ±0.93	14.89 ^d ±0.64	14.40 ^d ±0.63	76.74

All values are mean ± standard deviation (n = 3). Values at the same column with different letters are significant at P<0.05.

Prostate weight and index

Prostate weight and index were determined in rats treated with testosterone enanthate and the results are reported in Table (3) From the results it could be noticed that the prostate weight and index were significantly increased by 74.51% and 67.32% in rats injected with testosterone enanthate as control positive, respectively, when compared to the control negative group. Moreover, it was noted that treatment of rats with the used doses of mulberry extract at different levels for 6 weeks significantly decreased the body weight (227.32, 217.97, 211,19 and 206.65g, respectively, than the positive control, was 225.0g. Furthermore, the prostate index decreased when the rat groups treated with 100, 200, 300 and 400mg mulberry aqueous extract from mulberry fruits to 1.83, 1.45, 1.43 and 1.27×10³ g, respectively. These decreases in with prostate and index may be due to the mulberry fruits had contained high amounts of natural antioxidant as total phenol, flavonoids and total anthocyanine content which scavenging the free radical and protect the prostate.

Table (3). Weight of rat and prostate and prostate index

Groups	Total Weight	Weight of prostate	Prostate Index ($\times 10^3$)
Control negative	187.59 \pm 17.26 ^c	0.207 \pm 0.14 ^c	1.16 \pm 0.125 ^c
Control positive	229.0 \pm 20.13 ^a	0.812 \pm 0.61 ^a	3.55 \pm 0.18 ^a
100 mg	227.32 \pm 22.15 ^{ab}	0.415 \pm 0.48 ^b	1.83 \pm 0.046 ^b
200mg	217.97 \pm 19.35 ^{ab}	0.316 \pm 0.27 ^c	1.45 \pm 0.038 ^c
300mg	211.19 \pm 18.56 ^b	0.304 \pm 0.35 ^c	1.43 \pm 0.019 ^c
400mg	206.65 \pm 17.26 ^d	0.263 \pm 0.18 ^d	1.27 \pm 0.024 ^d

All values are mean \pm standard deviation (n = 6). Values in the same column with different letters are significant at P<0.05.

Effect of mulberry extract on PGE2 and TNF- α in rats prostate cancer

Evaluation of prostate content of PGE2 and TNF- α were determined in rats prostate cancer treatment with mulberry aqueous extract at different levels and the results are tabulated in Table (4). The results showed that the testosterone significantly elevated prostatic content of TNF- α in control positive with 52.06%. However, mulberry at different doses was decreased, such as inflammatory mediators to 7.84, 18.70, 29.36 and 45.13%, respectively. This concurs with reports demonstrating the ability of mulberry had rich source antioxidant activity which to inhibit TNF- α expression in renal tissues. Tumor necrosis factor-alpha (TNF- α) is an important inflammatory cytokine that may play a role in controlling the progression of prostate cancer and also, it is a mediator of the inflammatory process that is secreted by monocytes, macrophages, neutrophils, T cells, and NK cells after stimulation. TNF- α is a pro-inflammatory molecule that may play an important role in the development of the immune response and affect the progression of prostate cancer (Merchant, 2005 and Watts, 2005).

From the results in the same Table, it could be evaluation of PEG2 in prostate cancer was increased by 91.46% in control positive than control negative. The different groups were treated with mulberry aqueous extract showed that decreasing to 32.64, 51.47, 75.04 and 85.59% in rat groups were taken orally 100, 200, 300 and 400mg/kg body weight from mulberry, respectively. PGE2 also has been shown to stimulate cell growth in osteoblasts and prostate cancer cells (Tjandrawinata *et al.*, 1997). Therefore the lowering of PGE2 in the prostate may be due to the mulberry protects the prostate from cancer. Also, higher basal levels of COX-2 protein and PGE2 secretion by PC3 cells may also be maintained through autocrine effects of TGF- isoforms secreted by these cells (Walker *et al.*, 2012) and would suggest that the development and progression of prostate cancer may be dependent on autocrine effects of TGF- on COX-2 levels and PGE2 secretion.

Table (4). Effect of mulberry extract on PGE2 and TNF- α in rats prostate cancer

	PGE2	TNF - alpha
Control negative	5.242 \pm 0.290 ^f	96.442 \pm 0.682 ^f
Control positive	61.372 \pm 1.189 ^a	201.180 \pm 0.374 ^a
100 mg	41.342 \pm 0.941 ^b	185.400 \pm 3.654 ^b
200mg	29.782 \pm 1.320 ^c	163.557 \pm 1.527 ^c
300mg	15.317 \pm 0.765 ^d	142.110 \pm 1.800 ^d
400mg	8.842 \pm 0.722 ^e	110.380 \pm 1.306 ^e

All values are mean \pm standard deviation (n = 6). Values in the same column with different letters are significant at P<0.05.

Oxidative stressin rats prostate cancer

From the results in Table (5) it could indicate that mulberry extract at level 100, 200, 300 and 400 mg/kg body weight exhibited antioxidant properties as it ameliorated the increase in prostate content of lipid peroxides and the exhaustion of SOD and MDA. However, values of GSH content and CAT activity were slightly altered significantly. This may be due to limitations of the analytical methods used. These findings are in accordance with many reports that attributed the preventive effects of several agents to their antioxidant's properties (Wu *et al.*, 2017 and Shoiebet *et al.*, 2018).

Table (5) Effect of mulberry extract on oxidative stressin rat's prostate cancer

Groups	MDA (m. mol/mg)	GSH (m. mol/mg)	SOD (m. mol/mg)	CAT (u/mg/)
Control negative	0.266 ^e \pm 0.042	0.182 ^a \pm 0.015	41.417 ^a \pm 0.894	0.593 ^a \pm 0.014
Control positive	2.517 ^a \pm 0.373	0.104 ^e \pm 0.005	21.130 ^f \pm 0.666	0.507 ^e \pm 0.006
100 mg	1.930 ^b \pm 0.053	0.107 ^e \pm 0.002	27.735 ^e \pm 1.907	0.532 ^d \pm 0.006
200mg	1.502 ^c \pm 0.240	0.127 ^d \pm 0.006	30.747 ^d \pm 0.354	0.552 ^c \pm 0.004
300mg	0.963 ^d \pm 0.046	0.153 ^c \pm 0.003	34.830 ^c \pm 1.025	0.572 ^b \pm 0.003
400mg	0.690 ^d \pm 0.115	0.169 ^b \pm 0.002	38.732 ^b \pm 0.846	0.592 ^a \pm 0.005

All values are mean \pm standard deviation (n = 6). Values in the same column with different letters are significant at P<0.05.

Histopathology

Microscopic examination of the prostate gland to the control rats revealed normal histology of the gland; it appeared formed of acini lined by cuboidal to low columnar epithelium with occasional papillary infoldings (**Fig. 1 and 2**). Administration of testosterone resulted in prostatic hyperplasia (**Fig. 3-5**), the prostatic acini appeared with irregular outlines with the frequent inward folding of the epithelial lining forming intraluminal projections. The hyperplastic epithelium appeared as stratified layers of cells filling the acinar lumen. Prostate gland of the group received 100 mg of mulberry aqueous extract exhibited limited improvement only (**Fig. 6- 8**), most of the acini were irregular in shape and bearing intraluminal foci of hyperplastic epithelium. Some acini were containing enormous amounts of desquamated cells and apoptotic bodies. Administration of 200 mg of the mulberry aqueous extract resulted in quite similar histologic picture to that observed in the previous group (**Fig. 9- 11**), most of the acini were with intraluminal infoldings and papillary projections in their lumen. Regarding the prostate gland of the group received 300 mg of mulberry aqueous extract (**Fig. 12- 14**), a much better histologic picture was detected, most of the examined sections were apparently normal with few acini with infrequent infoldings. Using a higher dose of mulberry aqueous extract (400mg) (**Fig. 15- 17**) exerted the highest protective action, the prostate gland of rats from this group appeared apparently normal with normal acinar lining.

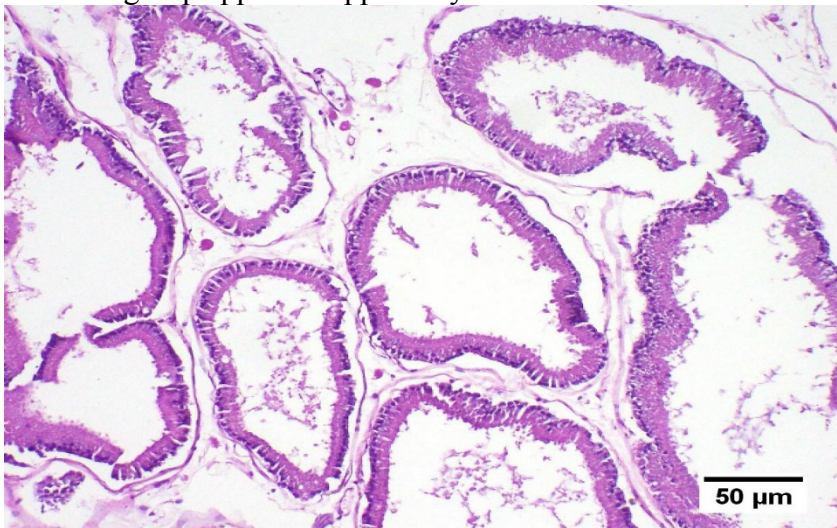


Fig. 1 Prostate gland of rat, normal group, showing the normal histology of the acini forming the gland (H&E).

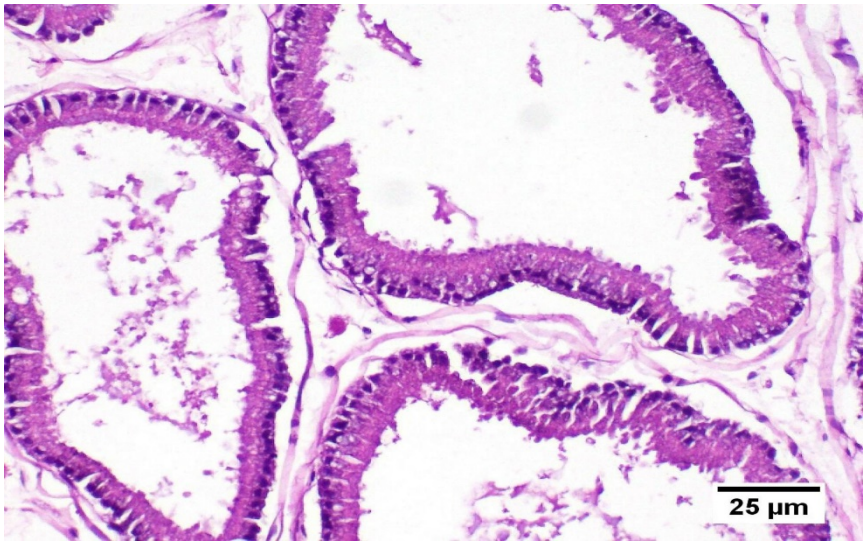


Fig. 2 Prostate gland of rat, normal group, showing the columnar epithelium lining the acini (H&E).

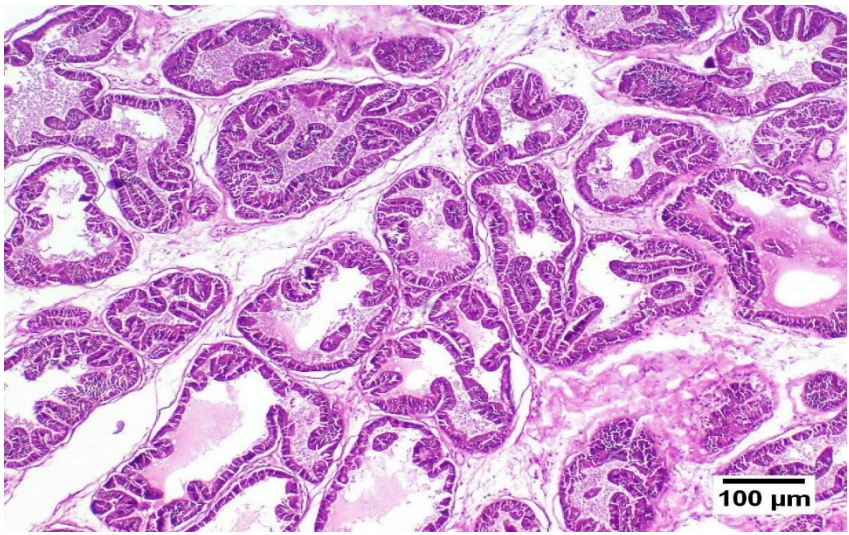


Fig. 3 Prostate gland of rat, testosterone group, showing irregular acinar shapes with multiple inward folding and papillary projections of the lining epithelium (H&E).

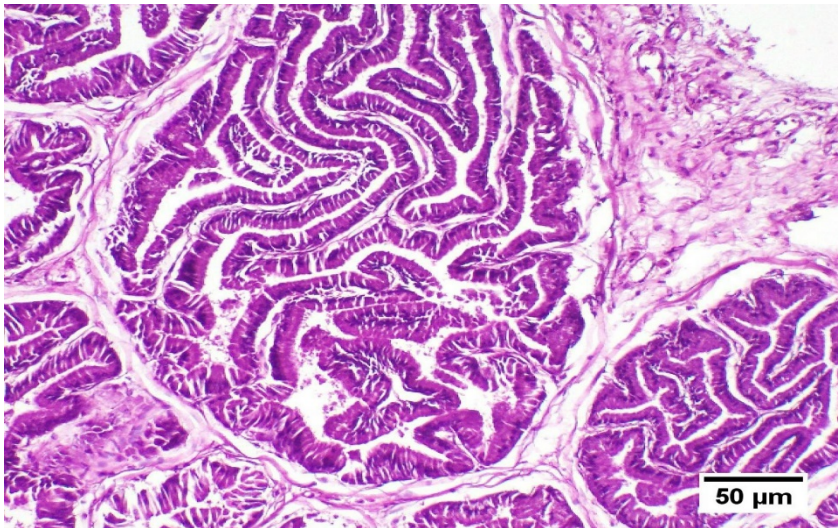


Fig. 4 Prostate gland of rat, testosterone group, showing intense deep in foldings of the lining epithelium forming intraluminal projections (H&E).

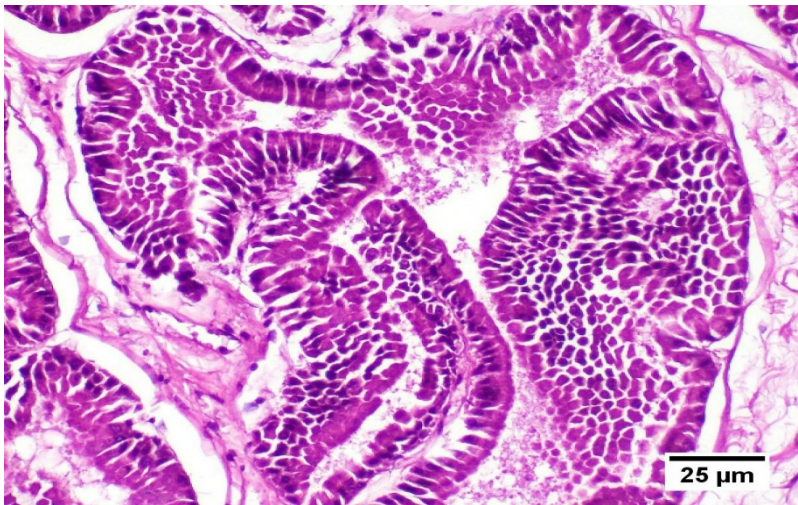


Fig. 5 Prostate gland of rat, testosterone group, showing intraluminal hyperplasia (H&E).

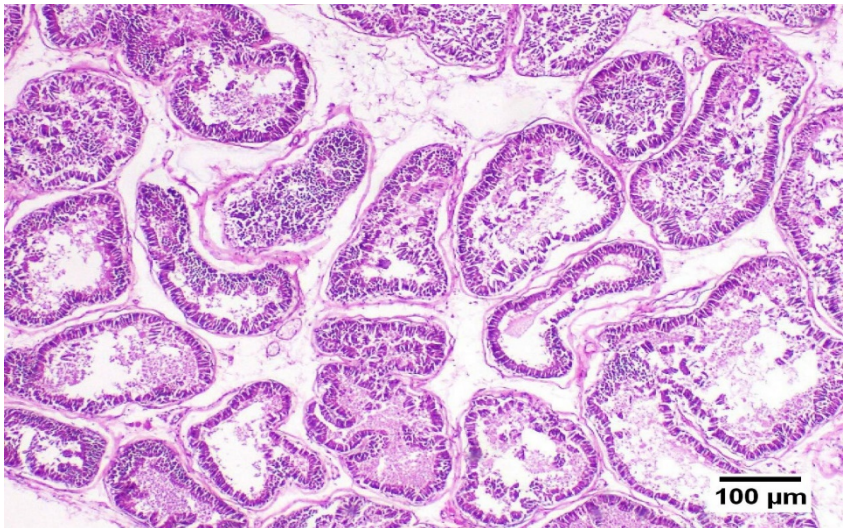


Fig. 6 Prostate gland of rat, 100 mg group, showing mild irregularity in the acinar walls (H&E).

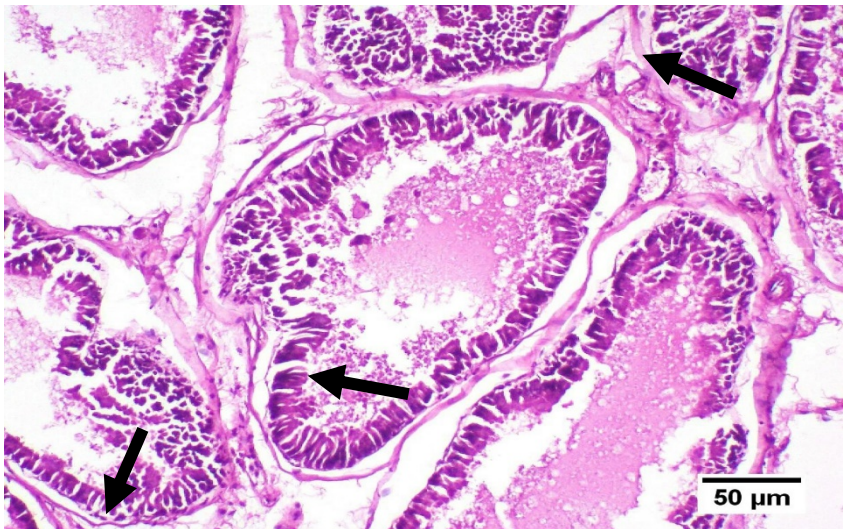


Fig. 7 Prostate gland of rat, 100 mg group higher magnification showing the acinar lining epithelium, note the presence of multiple foci of hyperplasia (arrows) (H&E).

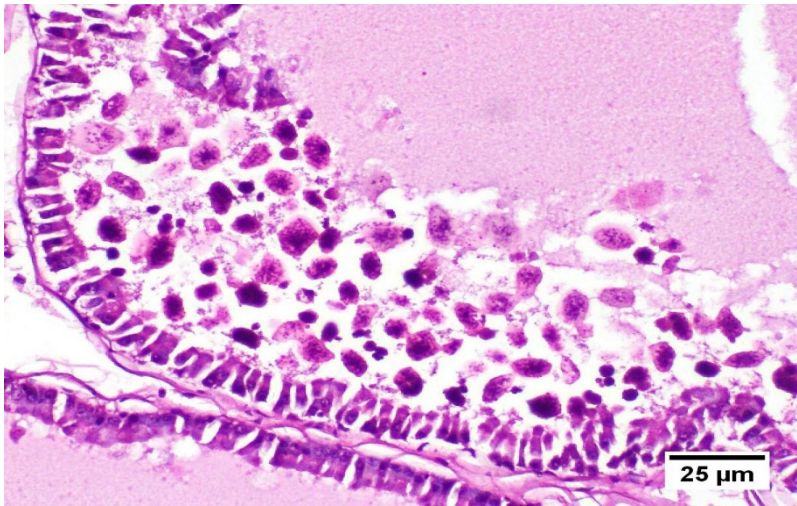


Fig. 8 Prostate gland of rat, 100 mg group showing desquamated an apoptotic figure within the acinar lumen (H&E).

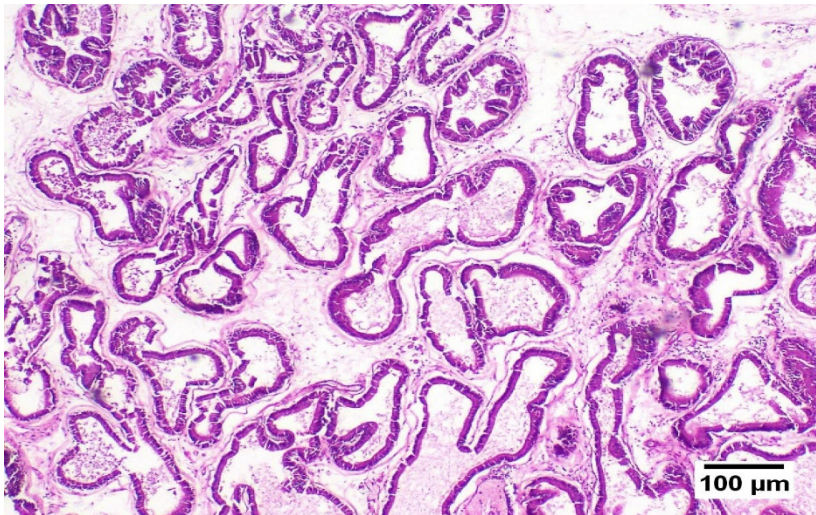


Fig. 9 Prostate gland of rat, 200 mg group showing acini with irregular outlines and frequent infoldings (H&E).

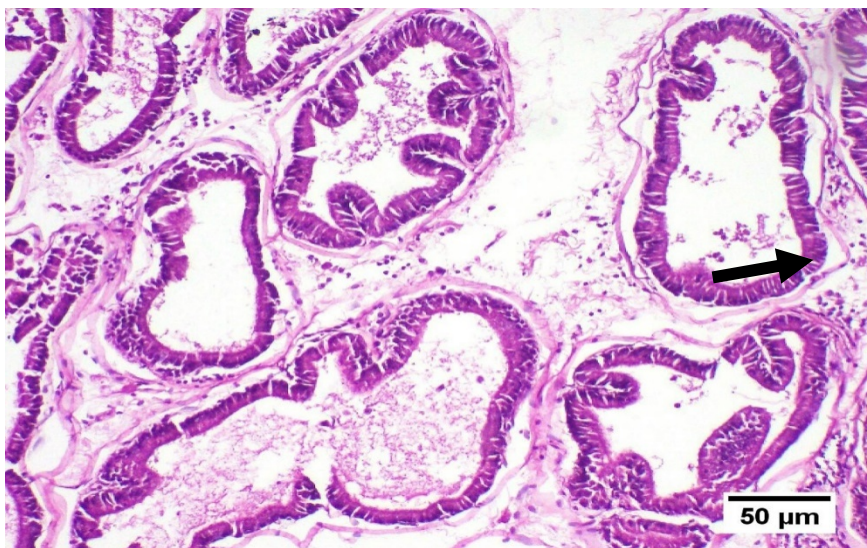


Fig. 10 Prostate gland of rat, 200 mg group showing some apparently normal acini (arrow) and some others with increased papillary projections (H&E).



Fig. 11 Prostate gland of rat, 200 mg group higher magnification showing focal intraluminal hyperplasia (black arrow) and few folding (red arrow) in the acinar epithelium (H&E).

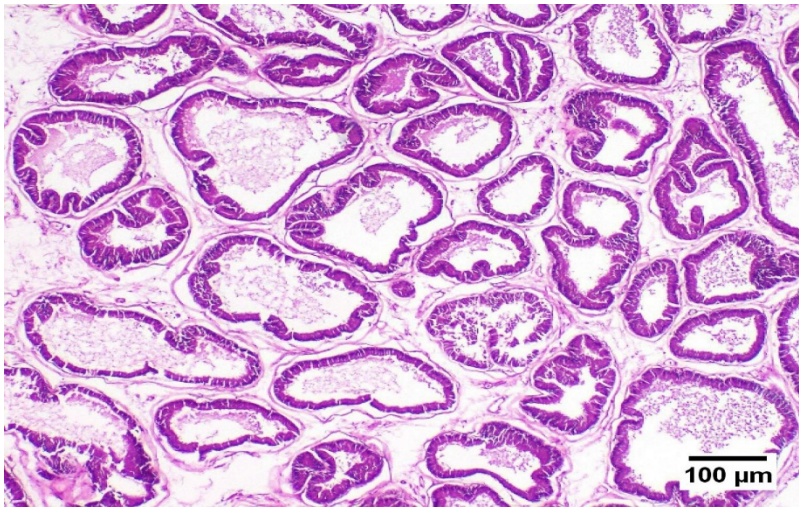


Fig. 12 Prostate gland of rat, 300 mg group showing apparently normal acini with few in foldings in the lining epithelium (H&E).

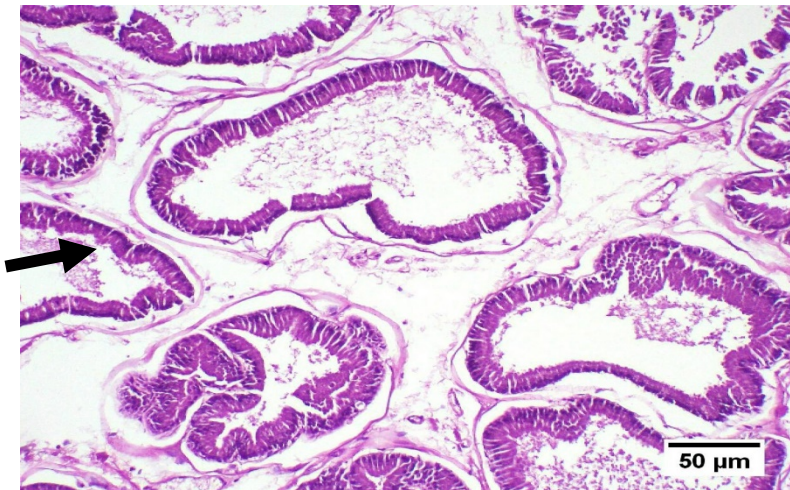


Fig. 13 Prostate gland of rat, 300 mg group higher magnification showing apparently normal acini with few intraluminal projections (arrow) in some acini (H&E).

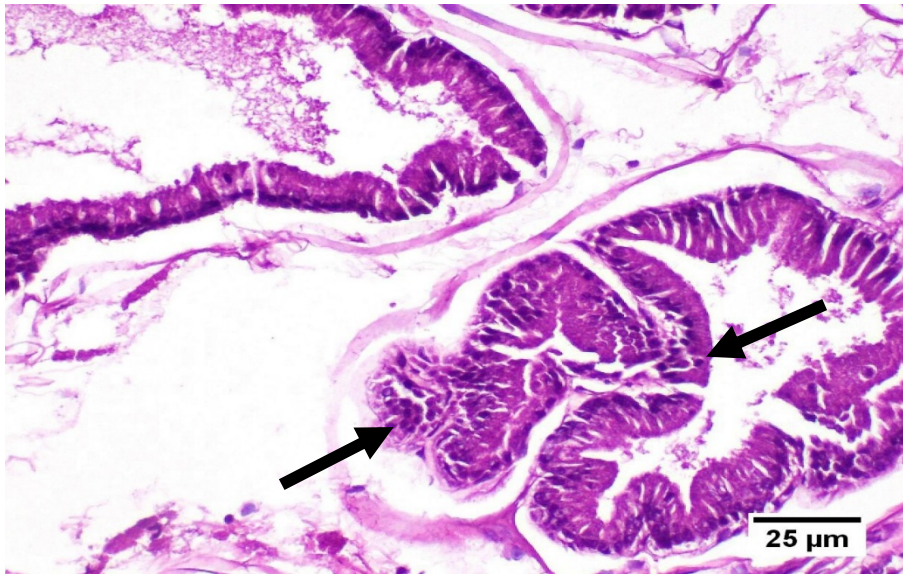


Fig. 14 Prostate gland of rat, 300 mg group higher magnification showing intraluminal hyperplastic epithelium (arrows) (H&E).

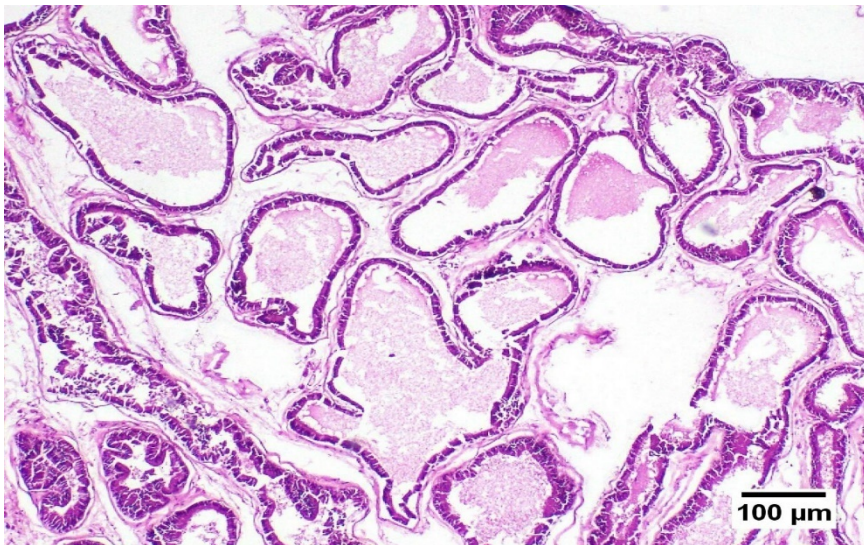


Fig. 15 Prostate gland of rat, 400 mg group showing apparently normal acini (H&E).

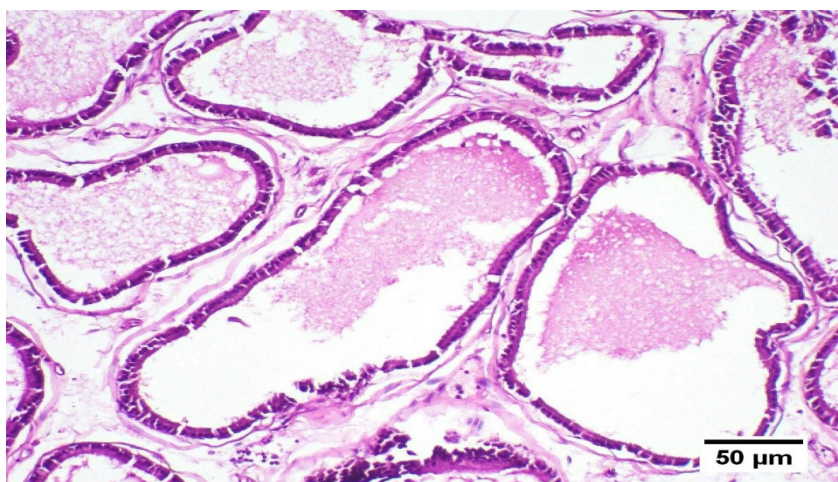


Fig. 16 Prostate gland of rat, 400 mg group showing apparently normal prostatic acini (H&E).

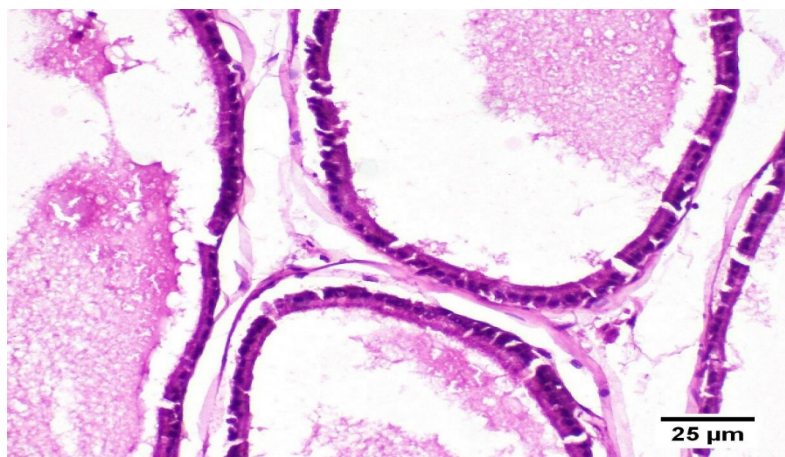


Fig. 17 Prostate gland of rat, 400 mg group higher magnification showing normal single cuboidal epithelium lining the acini (H&E).

CONCLUSION

Mulberry is a good source from antioxidant as total phenolic, flavonoids compounds and total anthocyanin and also antioxidant activity. When added the mulberry extract until 8 to 100mil milk to give yoghurt high nutrition value. More ever the rat group injection with 3.0 ml/kg rat from a vehicle of testosterone enanthate for 5 days/week, for 2 consecutive weeks for induction of benign prostatic cancer and treated with the mulberry aqueous extract for six weeks. The results reported that the mulberry improved in the prostate contents and oxidative stress prostate cancer and confirmed these results by histological prostate experimental.

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ملخص البحث

دراسة تأثير مضادات الأكسدة الطبيعية في التوت على سرطان البروستاتا في ذكور الفئران الالبينو

نظرًا لارتفاع قيمته الغذائية للتوت الأسود (Morusnigra L) يتم استهلاكه سواء في صورة الطازجة او المصنعة للإستفادة مي المكونات ذات الصلة بالصحة لمنتجات التوت الأسود ، تم تحديد الفينولات الكلية ، الفلافونويد ، الأنثوسيانين ، القدرة المضادة للأكسدة والمركبات الفينولية الرئيسية في التوت.

ظهرت النتائج أن التوت يحتوي على أعلى كميات من مضادات الأكسدة الطبيعية. ونظرا لان إستخدام الزيادي هو الأكثر استهلاكًا ضمن عائلة الحليب المخمر ، فيمكن إضافة مستخلص التوت في المستوى ٢ و ٤ و ٦ و ٨ و ١٠ مل إلى ١٠٠ مل من الحليب لإعطاء الزيادي قيمة غذائية عالية. وجاءت نتيجة التقييم الحسي للزيادي أنه عند إضافة التوت حتى ٨ مل إلى ١٠٠ مل من الحليب يعطي الزيادي مستوى عالي من القبول.

كما أظهرت التجربة البيولوجية أن المجموعة الضابطة من ١ لفئران التي تغذت على النظام الغذائي الاساسي و ٣٠ فأر تم حقنها ب ٣.٠ مل / كجم من وزن الفأر من مركب التستوستيرون إينونثات لمدة ٥ أيام / أسبوع لمدة أسبوعين متتاليين لتحريض سرطان البروستاتا الحميد. . تم تقسيم هذه الفئران للتحكم في التغذية الإيجابية على النظام الغذائي الأساسي وتم تغذية مجموعات الفئران المكونة من ٣ و ٤ و ٥ و ٦ على النظام الغذائي الأساسي وتم أخذها بشكل منفصل عن طريق الفم من مستخلص التوت المائي عند المستويات ١٠٠ و ٢٠٠ و ٣٠٠ و ٤٠٠ مجم / كجم من وزن الجسم / يوم لمدة ستة أسابيع فترة التخزين. تم تحديد وزن البروستاتا والمؤشر وتقييم محتوى البروستاتا كـ $TNF-\alpha$ و PEG2 وأيضاً تم تحديد الإجهاد التأكسدي.. أشارت النتائج إلى أن المجموعات المختلفة التي تم تغذيتها على النظام الغذائي الأساسي والتي تم تناولها بشكل منفصل عن طريق الفم من مستخلص التوت المائي ، ووزن البروستاتا ، ومؤشر البروستاتا $TNF-\alpha$ ، وPEG2 ، والإجهاد التأكسدي قد تحسنت من المجموعة الضابطة. علاوة على ذلك ، تم تأكيد النتائج النسيجية للبروستات بالنتائج الواضحة. يمكن الاستنتاج أن التوت يحتوي على مضادات أكسدة طبيعية تقضي على الجذور الحرة وتحمي من سرطان البروستاتا.

مفتاح الكلمات: سرطان البروستاتا ، التوت ، الإجهاد التأكسدي ، الزيادي ، مضادات الأكسدة الطبيعية.