Journal of Home Economics

Volume 24, Number (3), 2014

Journal of Home Economics

http://homeEcon.menofia.edu.eg **ISSN 1110-2578**

Studying The Effect Of Leaves And Seeds Powder Of *Carica Papaya* At Two Doses On Hyperuricemic Of Experimental Animals

Hussein,E.A.[3], Yahia,N.M.[1], And Hussein,E.S[2]

Professor of Nutrition, Nutrition and Food Science Dept., Faculty of Home Economics, Minofiya University.[1], Associate Prof. of Nutrition and Food Science,Nutritionand Food Science Dept., Faculty of Home Economics, Al-Azhar University.[2],B.Sc. Home Economics, Nutrition and Food Science Department, Al-Azhar University (2012).[3]

Abstract: Hyperuricemia is a primary risk factor for the development of gout. *A Carica papaya* fruit is a source of nutrients such as provitaminA carotenoids, vitamin C, folate and dietary fiber, pulp and seeds also contain a variety of phytochemicals, including lycopene and polyphenols. The current research study the effect of seeds and leaves of *Caricapapaya* at two different concentrations (5 and 10%), on level of Hyperuricemia between healthy and hyperuriecemic rats. Thirty sixmale albino rats weight 150±10g divided into six groups (+ve), (-ve), (5 and 10%) leaves and seeds powder.Hyperuricemic induced by alcohol(2 g /kg of body weights every 24 hours)for six days.Food intake (FI), body weight gain and organs weight were recorded. Furthermore, Biochemical analysis of serum; urea, creatinine, uric acid, total protein, albumin, globulin, A/G ratio, AST, ALT, total cholesterol, triglyceride, HDL-c, LDL-c, and VLDL-c were determined. Both seeds and leaves caused an increase in the body weight for both used concentrations. However used leaves at 5% raised FI between in all the studied groups. On the other hand, kidney weight shows no effects between all the groups in both leaves and seeds although there is an increase in the liver weight for both leaves and seed 10, 5%, respectively. Surprisingly, all the determined urea levels in all the studied groups decreased; however, seeds with 10% were the highest reduction among all groups. Uric acids significantly decreased at level 10% in seed powder, there were a significantly decreased in serum ALT and AST at two levels for leaves and seeds powder. Seeds powder at two doses caused a decrease in total protein and globulin while, in serum albumin was increased significantly at two

levels. Leaves powder at 10% and seeds at two doses cause a decrease in serum total cholesterol and serum triglycerides. Serum HDL was significantly increased while, serum LDL was decreased. Consumption *Carica papaya* seeds or leaves caused improvement benefits in health status.
Key words:*Carica papaya*, hyperuricimia, renal function,lipid profile.

Introduction:

Hyperuricemiais a metabolic disorder marked by an excess of uric acid in the blood, which is the product of a disorder in purine metabolism (**Mariado Rosário*et al.*, 2001*)***. Hyperuricemia is defined as a plasma uric acid level greater than 6.8 mg/dl. at physiological temperature (37°C) and neutral pH. Nevertheless, recent evidence has pointed out the importance of adapting this range to the population examined. For example, only serum uric acid levels were lower than 6.0 mg/dl have to be considered normal in chronichyperuricemic and gouty patients. As a matter of fact, this is the sole serum uric acid level truly preventing uric acid crystal deposition ***(*Choi *et al.*, 2005,Eggebeen., 2007, and Richetteand Bardin.,2010).**

Hyperuricemia is a primary risk factor for the development of gout, although it is likely that many hyperuricemic individuals will not develop symptom ***(*Alvarez-Larioand Macarrón- Vicente.,2011).**

Changgui*et al.*, *(*2013) reported that, uric acid is a final enzymatic product in the degradation of purine nucleosides and it has the ability to scavenge oxygen radicals and protect the erythrocyte membrane from lipid oxidation. Hyperuricemia (HU) is a result of multifactor interactionsincluding gender, age, genetic and environmental factorsclassically, the following conditions are associated withHU: alcoholism, obesity, hypertension, dyslipidemiahyperglycemia, diabetes mellitus, lithiasis, renal failureand medication use (diuretics, cyclosporine, low-doseaspirin)***(*Liu *et al.*, 2011*)*.**In the United States, gout is twice as likely in African American males as it is in European Americans ***(*RheumatologyTherapeutics Medical Center.,2007).**It has become common in China, Polynesia, and urban sub-Saharan Africa **(Richette and Bardin, 2010).**

Carica papaya (Family: *Caricaceae*) is a short lived, fast growing woody large herb to 10 or 12 feet in height **(Balasubramanian *et al.*, 2002).** It originated from Southern Mexico, Central America, and the Northern part of South America. It is now cultivated in many tropical countries such as Bangladesh, India, Indonesia, Srilanka, the Philippines, and the West Indies including Malaysia. Malaysia is known to be one of the top 5 papaya exporting countries **(FAO., 2012)**. *Carica papaya* is a

member of the *Caricaceae* and is a dicotyledonous, polygamous, and diploid species (**Soobitha *et al.*, 2013*)*.Cassia *et al., (*2011)** studiedthe chemical composition of papaya seeds and found that, papaya seeds were rich source of proteins (27.3-28.3%), lipids (28.2-30.7%), and crude fibers (19.1-22.6%). Also, he found appreciable quantities of calcium and phosphorus in the seeds; however, the presence of toxicants, such as glucosinolates, was also found.

Ikeyi *et al.*, (2013) reported that, the qualitative test using *Carica papaya* leaves which gave results that Carica papaya leaves contain, saponin, tannin, flavonoid, alkaloid and glycoside. So, our research aimed to study the effect of leaves and seeds powder of *Carica papaya* at two doses (5 and 10%) on hyperuricemic experimental animals.

Materials and methods:-

Seeds and leaves of *Papaya* were obtained from local market at Samanoud City; Al-Gharbia Governorate, Egypt.A total of 36 normal male albino rats of Sprague Dawley strain weighing (150 ± 10 gm) were obtained from the Laboratory Animal Colony, Ministry of Health and Population, HelwanFarm, Cairo, Egypt. Casein, cellulose, corn starch, minerals and vitamins required for preparing diets were obtained from El-Gomhorya Company, Cairo, Egypt.

Preparation of papaya seeds and leaves:-

Papayaseeds were washed by tap water,after that seeds were left to dry at air dried for 3-4 days. Seeds were grinded finally (2-3 roll) in home grinder, then kept in polyethylene bags till use. Papaya leaveswere washed bytapwater**,** then leaves were left to dry at air dried for 3-5 days. Leaves were crushed and grinding then kept in polyethylene bags till use.Moisture, protein, fat,ash and fiber were determined according to **A.O.A.C., (2000).** Total carbohydrate was calculated by differences and calorie was estimated by multiplying protein and carbohydrates by 4.0 and fat by 9.0.

Basal Diet

Basal diet (casein – basal diet) was composed of 37g casein (16% protein), 10g corn oil (10% fat), 4g cellulose (4% fiber), mineral mixture (4%) and corn starch up to 100g according to **NRC,(1995).**The salt mixtures used in the experiment were composed according to **Hegsted,1941).** Vitamin mixtures used in the experiment of **Campbell, (1963).**

Experimental design animal groups:

After one week, rats were divided into two main groups as follows:-

- **First main group (negative control (–ve) group(6 rats)** fed on basal diet during the period.

Second main group (30 rats)were injected oral administration by ethanol (2 g /kg of body weight every 24 hours) for six days to induce hyperuricemia, according to **Faller and and Irving(1982)**.

- **First subgroup:** was left as a control positive (+ve) and fed on basal diet only.
- **Second and Third subgroup**: fed on basaldiet replaced with Papaya leaves powder at two levels 5 and 10%
- **Fourth and Fifth subgroup:**fed on basaldiet replaced with Papaya seeds powder at two levels 5 and 10%.

Biological evaluation:

During the experiment of period (28days), the quantities of diet which were consumed and / or wasted were recorded every day. In addition, rat's weight was recorded weekly. At the end of the experiment period, rats were fasted over night before sacrificed and blood samples were collected fromdien ofeye, in dry clean centrifuge tube. Serum was carefully separated and transferred into dry clean Ebendorf tubes and kept in deep freezers till analysis as described by **Schermer(1967).** Liver and kidneys were removed from each rat carefully dissection, cleaned from the adhesive matter by a saline solution , dried between tofilter paper and weighed , according to the methods described by **Drury and Wallington (1980).**

Biological Parameters:-

Food intake (FI), body weight gain (BWG), feed efficiency ratio (FER) and organ relative weights as a percent of total body weight were calculated according to **Chapman *et al.*,(1959).**

Biochemical analysis:

Each sample was placed in a dry clean centrifuge tube, then centrifuged for 10 minutes at 3000r.b.m/min to separate the serum. Serum was carefully separated into dry clean Ebendorf tubes by using Pasteur pipette and kept frozen till analysis.

Serum urea, creatinine , serum uric acid, total protein, albumin, globulin, A/g ratio, AST, ALT, total cholesterol, triglyceride, HDL-c, LDL-c, and VLDL-c were determined according to **Patton and Crouch (1977)**, **Faulkner and King (1976),Barham and Trinde (1972) and Fossati*et al.,* (1980)**,**Sonnenwirth and Jaret (1980)**, **Drupt (1974),**

Catherine et al (2003), **Reitman and Frankel (1957)**, **Allain*et al.*, (1974), Trinder and Ann (1969)**, **Lopes - Virella*et al.*, (1977)**, **Friedwald*et al.*, (1972)** and **Kikuch-Hayakawa *et al.*, (1998)**respectively.

Statistical analysis:-

Data were expressed as (Mean ± SD). Differences between control and treated groups were tested for significance using a oneway analysis of variance (ANOVA test) according to **Armitage andBerry., (1987)**followed by Duncan's multiple range test. Differences were considered of significance at a level of $P \leq 0.05$ using SPSS (version 20.0) computerized program.

Results And Discussion:

Chemical composition of seeds and leaves ofCarica papaya:

Concerning chemical composition of seeds and leaves of *Carica papaya* results in table (1) showed that, seeds was higher content of protein, fat and fiber with values 27.80, 26.15 and 27.74; while, leaves was the highest in ash content by 16.47.

These results were agreement with those obtained by **Cassia *et al.*, (2011)** who found that papaya seeds contained (27.3-28.3%), lipids (28.2-30.7%), and crude fibers (19.1-22.6%). Moreover these results were agreement with those obtained by**Walker., (1975)** who found driedpapaya leaves contained crude protein 23.5%, crude fiber 10.6% ash 12.3% and gross energy 17.8 MJ/kg. **James., (1983)** found100 g of leaves were contain 74 calories, 77.5 g moisture 7.0 g. protein, 2.0g fat, 11.3 g total carbohydrate 1.8 g fiber, 2.2 g ash.

Nutrition evaluations:

Body weight gain, fed intake and feed efficiency ratio:

Data presented in table (2) showed the effect of feeding seeds and leaves powder on body weight gain (BWG g/28day),fed intake (FI g/ day), and feed efficiency ratio (FER) inhyperuricemic of experimental animals.

Results in table (2) showed there were significant decreased in (+ve) as compared with (-ve) (19.9± 2.7 and 21.5±1.4 g/28days). On the other hand, there were significant decreased ($P \leq 0.05$) between leaves powder at two levels (5 and 10 %) as compared withpositive controls, seeds powder at two levels(5 and10%).Values of mean± SD were (17.4±1.2 and 13.4±2.5 vs. 21.2±1.6, 19.05±2.1 and 19.9± 2.7 g/28 days).

These results are in agreement with those obtained by **Halim*et al*., (2011)** who found that body weight gain was increased about 6.57% when fed experimental animals on aqueous leaves extract at 200mg/kg body weight. Also, our result were in a same line with those obtained by **Duru*et al*., (2012) and Juárez-Rojop *et al*., (2012)**they found that average weight gain decreased about 7.2 to 22.71% when the level of aqueous leaves extract increased in normal, diabetic and hepatotoxicity rats. Also, the obtained results found that there were decreased in body weight gain with the level of substitution increased; this finding was agreement with **Adeneyea and Olaguonjub., (2009)** who found that body weight gain in rats fed on different levels of aqueous seeds extractwas deceased at high doses**.**

Concerning fed intake (FI) results in the same table showed that leaves powder at level 5%was the highest value followed byseeds powder at level 5%, then seeds and leaves powder at level 10% and finally positive control withvalues 21.86±0.13, 21.75±0.09, 21.71±0.04, 21.71±0.17 and 21.64±0.13(g/day), respectively.

From the above resultsit could be observed that there werenon-significant difference (P≥0.05) between (+ve) control and all treated group except of leaves powder at level 5%.

These findings are in agreement with those obtained by **Halim*et al*., (2011)** they found that food consumption of hepatotoxicity rats was increased about 9.5 – 13 % by increasing the level of aqueous leaves extract.

Concerning of feed efficiency ratio (FER), results in the same table (2) illustrated thatleaves powder at level 10% was the highest significantly (P≤0.05) than other all group (1.67±0.3). While, (-ve) control was the lowest value (1.00±0.64). Moreover, there were non-significant differences (P≥0.05) between (+ve) control as compared with leaves powder at level 5%, seeds powder at two level (10 and 5%). Values of mean± SD were1.10±0.16 vs.1.25±0.08, 1.15±0.13 and 1.03±0.08 respectively

Relative weight of kidney results in table (3) values showed that there were no significant differences (P≥0.05) between all groups under study.Besides that, negative control was the lowest value significantly than other group. The Values of mean± SD were0.68±0.46, 0.78±0.1, 0.79±0.1, 0.82±0.2, 0.83±0.1 and 0.88±0.1 g for (-ve), leaves powder at level 5%, seeds powder at level 10%, (+ve), seeds powder at level 5% and leaves powder at level 10%, respectively.

Concerning the relative weight of liver, results in the same table showedthere were no significant differences (P≥0.05) between (+ve) and (-ve) as follow (2.91±1.5 vs. 2.14±1.7). On the other hand, all treated

group fed on with leaves powder at level 5%, seeds powder at level 10%, leaves powder at level 10%,seeds powder at level 5%,showed significant increase($P \leq 0.05$) as compared with (+ve).Values of mean± SD were 3.25±0.3, 3.29±0.2, 3.51±0.2 and 3.67±0.4 vs. 2.14±1.7 g, respectively.

The obtained results were agreement with result **Balasubramanian*et al.*, (2002)** and **Halim*et al.*, (2011)**. They studied the effect of aqueous and ethanol extract of dried *Carica papaya*, aqueous leaves extract in relative weight of organs in hepatotoxicity rats and found increment in weight of organs when increased in fed level of aqueous and ethanol extract for dried fruit of *Carica papaya* and aqueous leaves extract.

Concerning of serum urea nitrogen results in table (4) showed there were a significant decrease($P \leq 0.05$) between (+ve) control and all treated groups under study. Values of mean± SD were53.91±7.44, 36.96±8.35, 39.23±8.77, 36.50±3.48 and 29.25±7.32mg/dl, respectively. Leaves powder at level 5% was more effect on serum urea than level 10%, while seeds powder at level 10% more effect than level 5%.

From data in the same table, it could be observed that the mean value of serum creatinine wasnon-significant difference ($P \geq 0.05$) between(+ve) control and all treated groups. Values of mean± SD were1.03±0.25, 0.83±0.18, 0.89±0.19, 0.79±0.09 and 0.83±0.16mg/dl, respectively. Leaves powder at level 5% was more effect on serum urea than level 10%, while seeds powder at level 5% more effect than level 10%.

On the other hand, results in the same table represented that the mean values of serum uric acid which showednon-significant difference ($P \geq 0.05$) between(+ve) control and all treated groups except of group fed on seeds powder at level 10%. Values of mean± SD were3.14±0.87, 2.86±0.69, 2.90±0.59, 2.88±0.40 and 2.16±0.27mg/dl, respectively.The higher results were observed in the group fed on diet substitution with seeds powder at level (10%).

The obtained results were in agreement with those obtained by **Olagunjua*et al.*, (2009)**they found that aqueous seed extract of *Carica papaya* at different dose (100-400 mg/kg caused a significant decrease in serum uric acid, serum urea and serum creatinine by 16-40%, 21-44 and 21-36%, respectively. Also, **Halim *et al.*,(2011)**found that serum urea and serum uric acid were increased about 13.8 % and 26% when fed experimental animals on *Carica papaya* leaves extract at high doses. The obtained results found that the range of increment of serum urea was 6.5%, the difference between our result and **Halim *et al.*,(2011)**may be referred to the difference in doses.

Concerning of serum (ALT), results in table (5) showed that there were significant different decreased (P≤0.05) in (+ve) control, seeds powder at level 5%, leaves powder at level (10 and 5%) and seeds powder at level 10%. Values of mean± SD were195.99±12.86, 190.63±8.76, 119.77±12.63, 133.92±9.98 and 147.03±10.93U/L, respectively.

On the other hand, the higher results were observed in the groups fed on diet substitution with leaves powder at level 10% followed by leaves powder at level 5%.

Also, the mean values of serum AST showed a significant differencesdecreased (P≤0.05) between positive control and all treated groups. Values of mean± SD were 250.68±12.08, 235.02±9.69, 204.29±13.16, 217.43±11.50 and 212.88±12.00 U/L, respectively. Moreover, experimental animals fed on leaves powder at level 10% was the lowest value followed by seeds powder at level 10%.

The mentioned findings were in agreement with those obtained by **Balasubramanian*et al*., (2002), Oduola*et al*., (2007), Adeneye*et al*., (2009), Halim*et al*., (2011), Duru*et al*., (2012) and Isela*et al*., (2012)**who found that serum ALT and serum AST were decrement by 2.6 to 47.5 % and 2.3 to 41% for hepatotoxic animals fed on *Carica papaya* leaves and seeds extract at different doses. Also, these findings are in agreement with those obtained by**Nwangw (2012)** who found thatserum ALT and serum AST were decrementabout 17–54 % and 4-36% by increased the aqueous extract of ripe *Carica papaya* seed on liver function enzymes.

Concerning of serum total proteindata in table (6) showed that there were significant differences (p≤0.05) between positive control, leaves powder at level (5% and 10%) and seeds powder at two does (5 and 10%). The values of mean ± SD were 6.97±1.49, 6.52±1.17 and 6.54±0.66 vs. 5.92±0.72 and 6.23±0.77 mg/dl, respectively.

Also, serum albumin showed that there were significant differences (p≤0.05) between positive controls, leaves powder at two levels (5% and 10%) and seeds powder at two does (5 and 10%). The values of mean ± SD were 3.19±0.56, 3.10±0.62 and 3.21±0.19 vs. 3.40±0.28 and 3.47±0.35 mg/dl, respectively. On the other hand, the higher results were observed in groups fed on diet substitution with seeds powder at level 10% followed by seeds powder at level 5%.

From the same table(6), serum globulin showed a significant differences (p≤0.05) between (+ve) control, leaves powder at level (5 and 10%) and seeds powder at two levels (5 and 10%). Values of means± SD were 3.78±0.94, 3.42±1.25, 3.33±0.55, 2.52±0.46 and

2.76±0.52 mg/dl, respectively. Leaves powder at level 10% was more effect on serum globulin than level 5%, while seeds powder at level 5% was more effect than level 10%.

From the same table, results showed that there were a significant differences in albumin/globulin (A/G) ratio in (+ve) control, seeds powder at level 5% , leaves powder at two levels (5% and 10%) and seeds powder at level 10%. The values of means± SD were1.28±0.17, 1.37±0.15, 0.98±0.15, 1.37±0.15 and 0.86±0.11 mg/dl, respectively.

Oduola*et al*., (2007) Adeneye*et al*., (2009) and Halim*et al*., (2011*)* found that serum albumin was increased by 10% when fed experimental animals on leaves and seeds of *Carica papaya* and aqueous leaves and seeds extract at different doses; while, serum globulin was slightly increased. Besides that, serum total protein was increased by 9% when experimental animals fed on leaves, seeds and seeds extract at different doses. The above results were in agreement with the mentioned finding which showed that the effect of leaves and seeds in serum total protein,serum albumin and serum globulin were varied from 0 % for serum total protein to 28.5% for serum globulin.

Concerning of serum total cholesterol results in table (7) showed there werea significant differences($P \leq 0.05$)and decreased between (+ve),leaves powder at level 5% ,leaves powder at level 10% and seeds powder at two levels(5and10%). The values of mean ± SD were150.04±14.86, 142.8±12.71, 120.98±20.44, 136.12±18.64 and 120.35±19.32mg/dl, respectively.

Regarding serum triglycerides data showed a significant decreased ($P \leq 0.05$) between (+ve) control and all treated groups under study with values 145.67±9.46, 119.09±17.39, 104.49±9.51, 120.82±17.81 and 93.79±14.18mg/dl, respectively. Besides that, the higher effect was observed in group fed on diet substation with seed powder at level 10% followed by leaves powder at level 10%.

Adeneye*et al*., (2009)found that the percentage of reduction in serum triglyceride ranged from 2.5- 33.3 % while serum total cholesterol was decreased by 12.6- 14.3%. Also, they found that serum total cholesterol was decreased when the level of *Carica papaya* of leaves and seeds increased, the percentage of reduction ranged from 11.5 to 36.3% while serum total cholesterol was decreased by 18-50%. **Halim*et al*., (2011)** found that the reduction of serum total cholesterol and serum tri –glyceride were 15 and 20%**.**

Results in table (8) revealed that level of serum HDL-c was significant increase between (+ve) control and all treated groups except of group fed on seeds powder at level 10% with mean

valuesof28.75±2.81, 35.22±3.56, 34.49±3.06, 36.46±2.92 and 32.03±2.28 mg/dl, respectively. Besides that, the higher effect was observed in the groups fed on diet substation with seed and leaves powder at level 5%.

Concerning serum LDL-c the values were89.91±19.20, 76.93±16.38, 74.81±15.3, 74.28±20.77 and 62.57±19.97mg/dlfor (+ve) control, seeds and leaves powder at level 5% and seeds and leaves powder at level 10%,respectively. On the other hand, leaves powder at level 10% was the lowest value, while positive control was the highest value.

Concerning to serum VLDL-c results in the same table (8) showed asignificant decrease (P≤0.05)between (+ve) control, seeds and leaves (powder at level 5%) and leaves and seeds (powder at level 10%). The values were mean ± SD29.75±3.03, 24.16±3.56 and 23.82±3.47 vs. 20.89±1.90 and 18.76±2.84 mg/dl, respectively. Moreover, leaves and seeds powder at level 10% were more effect on serum VLDL-c than level 5%.

The obtained results were in a same line with result obtained by **Halim*et al.*, (2011)**who found that the percentage of increment of serumHDL-c 18%. On the other hand,**Adeneye*et al.*, (2009)** found that serum HDL-c increased from 18-87%, serum LDL-c was decreased by 9.6-79%, VLDL-c was decreased by 42-54.5% and finally AI was decreased from 20-88%. Morover, **Adeneye*et al.*,(2009)** showed a changein serum HDL-c, LDL-c and VLDL-c by 30-69%, 5-35% and finally 24-38%, respectively.

Table (1): Chemical composition of seeds and leaves of *Carica papaya* g/100g (on dry weight basis).

composition	Moisture	Protein	Fat	Ash	Fiber	Carbohydrate	Calorie
	k.cal						
Driedseeds papaya	8.20	28.80	26.15	8.98	27.74	8.33	345.05
Dried leaves papaya	9.63	23.44	10.49	16.47	10.07	39.53	346.29

Table (2): Effect of papaya leaves and seeds at two does (5 and 10%) on body weight gain (BWG g/28 days), feed intake (FI), and fed efficiency ratio (FER) of hyperuricemic rats (n= 6 rats).

arameter Groups	BWG (g/28 days) M ± SD	FI (g/day) M ± SD	FER M ± SD
Control -ve	21.5±1.4^{a}	21.58±0.1^{de}	1.00±0.64^{d}
Control +ve	19.9±2.7^{bc}	21.64±0.13^{cde}	1.10±0.16^{cd}
Leaves powder 5%	17.4±1.2^{d}	21.86±0.13^{ab}	1.25±0.08^{bc}
Leaves powder 10%	13.4±2.5^{e}	21.71±0.17^{bcd}	1.67±0.03^{a}
Seeds powder 5%	21.2±1.6^{ab}	21.75±0.09^{abc}	1.03±0.08^{d}
Seeds powder 10%	19.05±2.1^{bc}	21.71±0.04^{bcd}	1.15±0.13^{bc}

Values denote arithmetic means ± Standard deviation of the mean.

Means with different letters (a, b, c, d, etc.) in the same column differ significantly at p≤0.05 using Duncan test, while those with similar letters are non-significantly different.

Table (3): Effect of papaya leaves and seeds at two does (5 and 10%) on relative weight organs of hyperuricemic rats (n= 6 rats).

Parameter *Groups*	*Kidney(g)* *M ± SD*	*Liver(g)* *M ± SD*
Control -ve	0.44 ±0.23^{b}	2.47 ±0.95^{ab}
Control +ve	0.53±0.10^{ab}	1.44±1.10^{c}
Leaves powder 5%	0.50±0.04^{ab}	2.09±0.16^{bc}
Leaves powder 10%	0.57±0.07^{ab}	2.36±0.23^{ab}
Seeds powder 5%	0.55±0.06^{ab}	2.28±0.14^{ab}
Seeds powder 10 %	0.51±0.04^{ab}	2.12±0.15^{bc}

Values denote arithmetic means ± Standard deviation of the mean.

Means with different letters (a, b, c, d, etc.) in the same column differ significantly at p≤0.05 using Duncan test, while those with similar letters are non-significantly different.

Table (4): Effect of papayaleaves and seeds at two does (5 and 10%) onkidney functions (Urea - creatinine -uric acid) of hyperuricemic rats (n= 6 rats).

Parameter Groups	Urea M±SD(mg/dl)	Creatinine	Uric acid
Control -ve	36.81 ±5.77^{b}	0.73±0.08^{b}	2.17±0.42^{bc}
Control +ve	53.91±7.44^{a}	1.03±0.25^{a}	3.14±0.87^{a}
Leaves powder 5%	36.96±8.35^{b}	0.83±0.18^{ab}	2.86±0.69^{ab}
Leaves powder 10%	39.23±8.77^{b}	0.89±0.19^{ab}	2.90±0.59^{ab}
Seeds powder 5%	36.50±3.48^{b}	0.79±0.09^{ab}	2.88±0.40^{ab}
Seeds powder 10%	29.25±7.32^{b}	0.83±0.16^{ab}	2.16±0.27^{bc}

Values denote arithmetic means ± Standard deviation of the mean.

Means with different letters (a, b, c, d, etc.) in the same column differ significantly at p≤0.05 using Duncan test, while those with similar letters are non-significantly different.

Table (5): Effect of papaya leaves and seeds at two does (5 and 10%) on serum ALT and serum ASTof hyperuricemic rats (n= 6 rats).

Parameter / Groups	(ALT)U/L	(AST)U/L
	M ± SD	
Control -ve	96.62±10.07[d]	130.49±8.00[e]
Control +ve	195.99±12.86[a]	250.68±12.08[a]
Leaves powder 5%	133.92±9.98[b]	235.02±9.69[b]
Leaves powder 10%	119.77±12.63[c]	204.29±13.16[c]
Seeds powder 5%	190.63±8.76[a]	217.43±11.50[c]
Seeds powder 10%	147.03±10.93[b]	212.88±12.00[c]

Values denote arithmetic means ± Standard deviation of the mean.

Means with different letters (a, b, c, d, etc.) in the same column differ significantly at p≤0.05 using Duncan test, while those with similar letters are non-significantly different

Table (6): Effect of papaya leaves and seeds at two does (5 and 10%) on total protein, albumin, globulinand A/G ratio of hyperuricemic rats (n= 6 rats).

parameter / Groups	Total protein	Albumin	Globulin	A/G Ratio
Control -ve	5.92±0.27[b]	3.27±0.24[b]	2.66±0.19[b]	1.24±0.14[a]
Control +ve	6.97±1.49[a]	3.19±0.56[bc]	3.78±0.94[a]	1.28±0.17[a]
Leaves powder 5%	6.52±1.17[a]	3.10±0.62[c]	3.42±1.25[a]	0.91±0.21[b]
Leaves powder 10%	6.54±0.66[a]	3.21±0.19[b]	3.33±0.55[a]	0.98±0.15[b]
Seeds powder 5%	5.92±0.72[c]	3.40±0.28[a]	2.52±0.46[b]	1.37±0.15[a]
Seeds powder 10%	6.23±0.77[b]	3.47±0.35[a]	2.76±0.52[b]	0.86±0.11[b]

Values denote arithmetic means ± Standard deviation of the mean.

Means with different letters (a, b, c, d, etc.) in the same column differ significantly at p≤0.05 using Duncan test, while those with similar letters are non-significantly different

Table (7): Effect of papaya leaves and seeds at two does (5 and 10%) on total cholesterol and triglyceride of hyperuricemic rats (n=6 rats).

Parameter / Groups	T .Cholesterol	Triglyceride
	M ± SDmg/dl	
Control –ve	119.35±17.00[cd]	90.23±14.68[d]
Control +ve	150.04±14.86[a]	145.67±9.46[a]
Leaves powder 5%	142.8±12.71[ab]	119.09±17.39[bc]
Leaves powder 10%	120.98±20.44[cd]	104.49±9.51[cd]
Seeds powder 5%	136.12±18.64[bc]	120.82±17.81[b]
Seeds powder 10%	120.35±19.32[cd]	93.79±14.18[d]

Values denote arithmetic means ± Standard deviation of the mean.

Means with different letters (a, b, c, d, etc.) in the same column differ significantly at p≤0.05 using Duncan test, while those with similar letters are non-significantly different.

Table (8): Effect of papaya leaves and seeds at two does (5 and 10%) on (HDL, LDL and VLDL)of hyperuricemic rats (n= 6 rats).

parameter	HDL-c	LDL-c	VLDL-c
	M±SD		mg/dl
Control -ve	36.52±3.78^{ab}	68.76±18.19^{ab}	18.05±2.94^{d}
Control +ve	28.75±2.81^{c}	89.91±19.20^{a}	29.75±3.03^{ab}
Leaves powder 5%	35.22±3.56^{ab}	74.81±15.39^{ab}	23.82±3.47^{bc}
Leaves powder 10%	34.49±3.06^{ab}	62.57±19.97^{b}	20.89±1.90^{cd}
Seeds powder 5%	36.46±2.92^{ab}	76.93±16.38^{ab}	24.16±3.56^{b}
Seeds powder 10%	32.03±2.28^{c}	74.28±20.77^{ab}	18.76±2.84^{d}

Values denote arithmetic means ± Standard deviation of the mean.

Means with different letters (a, b, c, d, etc.) in the same column differ significantly at $p \leq 0.05$ using Duncan test, while those with similar letters are non-significantly different

References

Adeneye, A.A.; Olagunju, J.A.; Banjo, A.A.F.; Abdul, S.F.;Sanusi. O.A.; Sanni, O.O.; Osarodion, B.A. and Shonoiki, O.E. (2009): **The aqueous seed extract of *Carica papaya* Linn. Preventscarbon tetrachloride induced hepatotoxicity in rats. International Journal of Applied Research in Natural Products**, 2(2): 19-32.

Adeneyea, A.A. and Olagunjub, J.A. (2009): Preliminary hypoglycemic and hypolipidemic activities of the aqueous seed extract of Carica papaya Linn. inWistar rats. Biology and Medicine**, 1 (1): 1-10**.

Alvarez-Lario, B.andMacarrón-Vicente, J. (2011). Is there anything good in uric acid? Q.J.M. **104(12):1015-24**.

Allain, C. C.; Poon, L.S. and Chan, C.S. (1974): Enzymaticdetermination of serum total cholesterol .Clin. Chem.,**20: 470-475.**

A.O.A.C. (2000): Official Methods of Analysis of the Association of Official Analytical Chemists. 17thEd., Gaithersburg, Maryland, U.S.A.

Armitage, P. and Berry, G. (1987): Statistical Methods in Medical Research. Blackwell, Oxford, U.K, **93-213.**

Balasubramanian, R.;Balasundaram, J.; Subramanian, K. and Narayanan, M. (2002): Effect of dried fruits of *Carica papaya* Linn on hepatotoxicity. Biol. Pharm. Bull.,**25(12): 1645-1646.**

Barham, D. and Trinder, P. (1972): Quantitative enzymatic colorimetric determination of uric acid in serum, plasma or urine Analyst, **97: 142-145.**

Campbell, J.A. (1963): Methodology of Protein Evaluation. PAG Nutr. Document R. 101 Led. 37 June Meeting, New York, U.S.A.

Cassia R.;Malacrida,M.K.and Neuza, J. (2011): Characterization of high oleic oil extracted from papaya (*Carica papaya L.)* seeds; Ciência e Tecnologia de Alimentos**; 31(4): 929-934.**

Catherine, W.J., Daniel, L.T. and Pamela, E. H. (2003): Essential Laboratory Mathematics: Concepts and Applications for the Chemical and Clinical Laboratory Technician.Ed**: 2nd(140): 268.**

Changgui,L.i.; Ming-Chia,H. and Shun-Jen, C. (2013): Metabolic syndrome, diabetes, and hyperuricemia, CurrOpinRheumatol, **25(2): 210-216**.

Chapman, D. G.; Castilla, R. and Campbell , J.A. (1959): Evaluation of protein in food. I.A. Method for the determination of protein efficiency ratio. Can. J. Biochem. Physiol., **37(5): 679-686.**

Choi, H.K.; Mount, D.B. and Reginato, A.M. (2005): Pathogenesis of gout. Ann. Intern. Med.,**143:499–516.**

Drupt, F. (1974):"Colorimetric method for determination of albumin." Pharm. Biol., **9: 777-779.**

Drury, R.A. and Wallington, E.A. (1980): Carton's Histological Technique 5th Ed., Oxford Univ.London, U.K.

Duru,M.K.C.;Madi,B. A. A;Amadi,C.T.;Lele,K.C.;Anudike,J. C.;Chima-Ezika,O.R. and Osuocha,K. (2012): Toxic effect of *Carica papaya* bark on body weight, haematology, and some biochemical parameters. BiokemistriAn International Journal of the Nigerian Society for Experimental Biology,**24 (2) 67-71.**

Eggebeen, A.T. (2007): Gout: an update. Am.Pharm. Physician.,**76(6):801– 8.**

Faller,J. and Irving H. F. (1982): Ethanol-induced hyperuricemia-evidence for increased urateproduction by activation of adenine nucleotide turnover. N Engl J Med;**307:1598-1602**.

FAO (2012): Food and Agriculture Organization Papaya Marketing-General Information. G Fruit web site,http://www.itfnet.org/gfruit/Templates%20English/papaya. market.info.htm.

Faulkner, N.R. and King, J.W. (1976): Fundamental of Clinical Chemistry. 2nd Ed.,TietzEditor,Saunders Philadelphia, U.S.A, **994-998.**

Fossati, P.;Prencipe, L. and Berti, G. (1980): Enzymatic colorimetric method for determination of uric acid in serum. Clin. Chem., **26 (2): 227-273.**

Friedwald, W.T.;Leve, R.I. and Fredrickson, D.S. (1972): Estimation of the concentration of low-density lipoprotein separated by three different methods .Clin. Chem., **18: 499-502.**

Hegested, A. (1941): Salt mixture. J. Biol. Chem., **138:459.**

Halim, S. Z.; Abdullah, N. R. and Afzan, A. (2011): Study of acute toxicity study of *Carica papaya* leaf extract in spraguedawley rats. Journal of Medicinal Plants Research,**(5):1867-1872**, Available online at http://www.academicjournals.org/JMPR**.**

Juárez-Rojop, I.E,; Díaz-Zagoya,J.C.; Ble-Castillo,J.L.; Miranda-Osorio,P.H.; Castell-Rodríguez, A.E.; Tovilla-Zárate, C.A.; Rodríguez-Hernández, A.; Aguilar-Mariscal, H.; Ramón-Frías, T. and Bermúdez-Ocaña, D.Y. (2012): Hypoglycemic effect of *Carica papaya* leaves instreptozotocin-induced diabetic rats, B.M.C. Complementary and Alternative Medicine,(**12):236.** http://www.biomedcentral.com/1472-6882/12/236.

Ikeyi A.P.; Ogbonna A.O. and Eze F.U. (2013): Phytochemical analysis of Paw-Paw (*CaricaPapay*) leaves. Int. J. LifeSc. Bt& Pharm. Res**. (2)3:347-351**.

James, A. Duke (1983): Handbook of Energy Crops http://www.hort.purdue.edu/newcrop%20/duke_energy/Carica_papaya.html

Kikuchi-Hayahawa,M.;Onodera,N., Matsubara,S.;Yasudo,E.;Chonan,O.; Takahashi,R. and Ishikawa,F.(1998): Effect of soymilk and bifidobacterium fermented soymilk on lipid metabolism in aged avariectomized rats. Bioscience Biotechnology and Biochemistry, **62(9):1688-1692.**

Liu, B.; Wang, T.; Zhao, H.N.;Yue, W.W.; Yu, H.P.;Liu,C.X.; Yin, J.; Jia, R.Y. and Nie, H.W. (2011): The prevalence of hyperuricemia in China:a meta-analysis. B.M.C Public Health, **11:832.**

Lopes-Virella, M. F.; Stone, S.; Ellis, S. and Collwell, J. A. (1977): Cholesterol determination in high-density lipoprotein separated by three different methods .Clin. Chem.**23 (5): 882.**

Maria do Rosário, G. P.;Estelamaris, T. M.; Paulo, C. B.;Veiga, J.; Magna, M. C.; Ana, L. L. S.;Jonivan, S.D. O. and Otavio, B.N.(2001): Diet and medication in the treatment of hyperuricemia in Hypertensive patients.Arq Bras Cardiol.,**76: 468-72.**

N.R.C.(1995): National Research Council.Nutrient Requirements of Laboratory Animals, Received Edition, pp(29-30), National Academy Press. Washington,D.C, U.S.A.

Nwangwa, E.K. (2012): Hepato-protectiveeffectsofaqueous extractof*Carica Papaya*seedsonliver functionenzymes. I.J.B.P.A.S., April, **1(3): 345-354.**

Oduola,T.;Adeniyi,F.A.A.;Ogunyemi,E.O.;Idowu,T.O.;and Bello,I.S. (2007): Evaluation of the effects of intake of extract of unripe pawpaw (*Carica Papaya)* on liver function in sickle cell patients World Journal of Medical Sciences,**2 (1): 28-32.**

Olagunjua,J.A.;Adeneyeb,A.A.; Fagbohunkac,B.S.;Bisugac,N.A.;Ketikuc,A.O.;Benebod,A.S. ;Olufowobic,O.M.;Adeoyec,A.G.;Alimic,M.A.;andAdelekec, A.G. (2009): Nephroprotective activities of the aqueous seed extract of *Carica papaya* Linn in carbon tetrachloride induced renal injured Wistar rats: A dose- and time-dependent study. Biology and Medicine**; 1 (1): 11-19.**

Patton, C. J. and Crouch, S. R. (1977): Enzymatic colorimetric method for determination of urea in serum. Anal. Chem., **49: 464-469.**

Reitman, S. and Frankel, S. (1957):A colorimetric method for the determination of serum glutamic oxaloacetic and glutamic pyruvic transaminases. Am. J. Clin. Path.,**28: 56.**

Rheumatology Therapeutics Medical Center (2007): What Are the Risk Factors for Gout. Retrieved 2007-01-26.c.f**wikipedia.org/wiki/Gout.**

Richette, P. and Bardin, T. (2010): Gout. Lancet; **375(9711):318–28.**

Sonnenwirth, A. and Jaret, L. (1980*):*Grad Wholes Clinical Laboratory Methods and Diagnosis.Vol.18th Ed., Mosby, London, U.K.**258-259.**

Soobitha, S.; Tan, C.C.; Kee, C. C.;Ravindran, T.;Mok, B.T.;Prem, K. M.;Adlin, A.; Noor, R. A. and Zakiah, I. (2013):*Carica papaya*leaves juice significantly accelerates the rate of increase in platelet count among patients with dengue fever and dengue haemorrhagicfever.Hindawi Publishing Corporation,Evidence-Based Complementary and Alternative Medicine. **1-7 http://dx.doi.org/10.1155/2013/616737.**

Schermer, S. (1967): The Blood Morphology of Laboratory Animals.3rd Ed., F. A. Davis Company, Philadelphia,**5-24.**

Trinder,P. and Ann,S.(1969): Enzymatic Colorimetric test with lipid clearing factor to determine triglycerides.Clin.Biochem,**6:24-27.**

Walker (1975): Central Research Station, Mazabuka, N. Rhodesia.**http://www.feedipedia.org/node/1530**

Journal of Home Economics, Volume 24, Number (3), 2014

دراسة تأثير جرعتان من مسحوق أوراق وبذور والباباظ علي حيوانات التجارب المصابة بارتفاع مستوي حمض اليوريك

عصام عبد الحافظ بودي[١] ، نبيلة يحيي محمود[٢] ، إيمان حسين عبد الرازق[٣]
أستاذ التغذية بقسم التغذية و علوم الأطعمة - كلية الاقتصاد المنزلى - جامعة المنوفية[١]
أستاذ مساعدالتغذية وعلوم الأطعمة قسم التغذية وعلوم الأطعمة - كلية الاقتصاد المنزلي- جامعة الأزهر[٢]
باحثة ماجستير . كلية الاقتصاد المنزلي . جامعة المنوفية[٣]

الملخص :
ارتفاع حمض اليوريك في الدم هو أحد عوامل الخطر الأساسي لتطوير الاصابة بمرض النقرس. البابايا هي فاكهه غنيه بالمصادر الغذائية مثل طلائع فيتامين أ والتي يطلق عليها اسم (الكاروتينات) و فيتامين سي ، حمض الفوليك والألياف الغذائية . كما أن لب ثمرة وبذور الباباظ تحتوي أيضا علي العديد من phytochemicals المواد الكميائية المتوفره في النبات ، بما في ذلك الليكوبين والبوليفينول.
تهدف هذه الدراسه الي تأثيرتركيزين مختلفين من مسحوق بذور واوراق الباباظ (٥ و ١٠%) علي مستوي حمض اليوريك في الدم لدي الفئران السليمه والمصابه بارتفاع مستوي حمض اليوريك . الخامات والطرق المستخدمه . تم استخدام عدد ٣٦ من ذكور الفئران البيضاء يتراوح وزنها من ١٥٠±١٠ وتم تقسيمهم الي ٦ مجموعات وكل مجموعه تحتوي علي ٦ فئران موزعة كالأتي مجموعة ضابطة سالبة وأخري موجبة وأربع مجموعات تم تدعيم الغذاء الخاص بهم بنسب ٥ و ١٠% من مسحوق الورق والبذور، وتم احداث الاصابه بالمرض(ارتفاع حمض اليوريك في الدم) عن طريق حقن الفئران عن طريق الفم بالكحول لمده ٦ ايام. تم تسجيل المأخوذ من الغذاء والزياده في وزن الجسم والاعضاء الداخلية (الكلي والكبد) للفئران التجارب وأيضا تم أخذ التحاليل البيوكميائيه وتقديروظائف الكلي (سيرم اليوريا ،الكرياتينين ،حمض اليوريك ، البروتين الكلي والألبيومين والجلوبيولين ومعدل كفاءه ترشيح الكليA/G ratio) ، وانزيمات الكبد AST, ALTو دهون الدم HDL-c, LDL-c ، الليبوبروتين عالي الكثافةالليبوبروتينمنخفض الكثافةVLDL-c, البروتين الدهني منخفضفي الكثافةجدا .
أشارت النتائج:- كل من بذور واوراق الباباظ المستخدمه لاحظت زياده في وزن الجسم لكل من التركيزات المستخدمه. علي جانب أخراظهرت النتائج انه لم يكن هناك أي تأثير علي وزن الكلي بين جميع المجموعات المعالجه في كل من الأوراق والبذور علي الرغم أن هناك زياده في وزن الكبد لكل من المجموعتين التي تم تغذيتهم علي الاوراق والبذور ١٠ ، ٥ % علي التوالي.كما أوضحت النتائج انخفاض مستوي اليوريا في الدم لجميع المجموعات المعالجه ولوحظ أعلي تأثير بالمجموعه التي تغذت علي البذور بنسبه ١٠%. كما حدث انخفاض معنوي بشكل ملحوظ لمستوي مصل حمض اليوريك في الدم بالمجموعه المعالجه التي تغذت علي البذور بنسبه ١٠% .كما كان هناك انخفاض معنوي لمستوي مصل AST, ALT علي التركيزين المختلفين لمسحوق أوراق وبذور الباباظ. وأظهرت الدراسة زياده معنويه علي مستوي الألبيومين عند التركيزين(٥ و١٠%) .كما أظهرت الدراسة أن مسحوق اوراق الباباظ بنسبه ١٠% ومسحوقالبذور علي التركيزين أحدث انخفاضا معنوي المستوي مصل الكولسترول الكلي والدهون الثلاثية . كما حدث ارتفاع معنوي لمستوي الدهون عالية الكثافة وانخفاض مستوي الدهون منخفضة الكثافة.وتشير الدراسة الي أن استهلاك مسحوق بذور وأوراق الباباظ يسبب فوائد و تحسن في الحاله الصحية.

الكلمات الكاشفة : بابايا – ارتفاع حمض اليوريك – وظائف الكلي –دهون الدم.