

## EFFECT OF FEEDING WITH ONION AND GARLIC ON REDUCING LIVER CANCER SYMPTOMS

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**ABSTRACT:** *This study was carried out to evaluate the effect of dehydrated onion and garlic (as a functional foods) to reduce the liver cancer symptoms in rates. Adult's albino rats were treated subcutaneous injection with carbon tetrachloride (CCl<sub>4</sub>) for four months. All groups of rats fed on the experimental diet for four weeks as the following: Casein only (Control Negative); Casein after (CCl<sub>4</sub>) injection (Control Positive). Casein with addition of 15% and 20% of garlic or onion as well as 15% or*

*The best diet affected Glutamate Oxaloacetate Transaminase (GOT) was that contained garlic 20%, followed by onion and garlic mixture 20%. Whereas, the diets contained 20% garlic had the best improvement to ALP while the best effect on GPT was for the groups feed on mix of garlic and onion 15% and mix of garlic and onion 20%. The best diets for improving LDH were onion 20% followed by mix of onion and garlic 15%, mix of onion and garlic 20%. Microscopically, some examined sections from group feed on both garlic 20% and onion 15% were histologically very closed to (C -ve) group.*

**Key words:** *Garlic - Onion – Liver Cancer - Biological evaluation – Histological examination - Functional Foods.*

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### INTRODUCTION

The liver is the largest organ in the body. It also has a remarkable power to regenerate itself. However, there are illnesses that can cause permanent and irreversible damage to the liver. Liver diseases may have a number of causes: infectious agents, toxic agents, dietary agents, storage diseases and congenital disorders (ADA, 2000).

Functional food is used as treatment or to prevent some diseases using plants, or plants part, such as leaves, flowers, roots, fruits, seeds, and rhizomes, preparation made from them called medicinal plants, or herbs (Weiss and Fintelmann, 2000). Herbal preparations contain many bioactive compounds with potentially deleterious as well as beneficial effects. Functional Food is a Natural or processed food that contains known biologically-active compounds which when in defined quantitative and qualitative amounts provides a clinically proven and documented health benefit, and thus, an important source in the prevention, management and treatment of chronic

diseases of the modern age. Garlic may also play a part in getting rid of potential carcinogens and other toxic substances. It is also a heart-friendly food since it keeps platelets from sticking together and clogging tiny blood vessels (Borek, 2001). Onion contains numerous sulfur compounds, including thiosulfinates and thiosulfonates; cepaenes; S-oxides; S,S-dioxides; mono-, di-, and tri-sulfides; and sulfoxides. Mincing or crushing the bulb releases cysteine sulfoxide from cellular compartments, making contact with the enzyme alliinase from the adjacent vacuoles. Onion extracts, rich in a variety of sulfides, provide some protection against tumor growth (Bianchini and Vainio, 2001).

In this study two species of plants (garlic and onion) were used for treating liver cancer and liver disorders. These plants were involved to form functional diets. The effect of feeding rates with the functional diets on the liver functions, serum protein, serum lipids, Alfa feto protein, lactate dehydrogenase and kidneys function were evaluated.

## MATERIALS AND METHODS

### 1. Plant samples:

Garlic and Onion, were purchased in a dried powder form from Harass Company, Bab Ellouk, Cairo, Egypt. It was stored at 37° C in a dark glass for 20 day until used, and used without any further preparation.

### 2. Reagents:

Casein, mineral mixture, vitamin mixture, fiber and Carbon tetrachloride were purchased from Al-Gomhoriya; Al-Bahr-Street-Tanta-Egypt), Corn oil, corn starch and olive oil were purchased from local market- Shebien El-Kom- Egypt. Alfa-fetoprotein (AFP) Lactate dehydrogenase (LDH) kits were obtained from spin react Company, Cairo, Egypt. Uric acid, Creatinine UREA- were from Diamond Company Egypt. Albumin, total protein, globulin Cholesterol, high-density lipoprotein and low density lipoprotein were from spectra company, Germany. Silymarin were

purchased from Chemical Industries Development (CID) Giza. Egypt.

### 3. Experimental animals

Sixty Sprague-Dawley white albino rats, each weighing 180-200 g, were purchased from the agriculture research center Ministry of Agriculture Giza, Egypt.

## Methods

### 1. Preparation of basal diet:

The basal diet (Casein-basal diet) was composed of 12.3 g of casein (10% protein); 10 g of corn oil (10% fat); 4 g of minerals mixture (4% minerals); 1 g of vitamins mixture (1% vitamins); 4 g of cellulose (4% fiber); and 71 g of corn starch, (*Jerome et al., 2002*)

### 2. Experimental diets:

Experimental diets were prepared as illustrated in Table (I).

**Table (I): Experimental diets constitutes**

Diets	Sample (g)	herbs Conc.	Casein (g)*	Corn oil (g)	Minerals mixture (g)	Vitamins mixture (g)	Fiber (g)	Corn starch (g)
B. diet	-	-	12.3	10.0	4.0	1.0	4.0	68.7
Diet A	Garlic	15	12.3	10.0	4.0	1.0	4.0	53.7
Diet B	Garlic	20	12.3	10.0	4.0	1.0	4.0	48.7
Diet C	Onion	15	12.3	10.0	4.0	1.0	4.0	53.7
Diet D	Onion	20	12.3	10.0	4.0	1.0	4.0	48.7
Diet E	Mixture	15	12.3	10.0	4.0	1.0	4.0	53.7
Diet F	Mixture	20	12.3	10.0	4.0	1.0	4.0	48.7
Diet G	Silymarin	15	12.3	10.0	4.0	1.0	4.0	53.7
Diet H	Silymarin	20	12.3	10.0	4.0	1.0	4.0	48.7

\*12.3 g of casein gives 10.0 g protein

### **3. Induction of liver cancer in experimental animals:**

The rats were treated subcutaneous injection with carbon tetrachloride (CCl<sub>4</sub>) mixed with an equal volume of olive oil and injected subcutaneously in a volume of 2 ml/kg. The dose and administration method for (CCl<sub>4</sub>) were chosen by pilot experiments, (Kanter *et al.*, 2003). After the injection of (CCl<sub>4</sub>) for four months, blood samples were obtained by retro orbital method to estimate liver functions, alpha feto protein (AFP) and lactate dehydrogenase (LDH) for making sure of liver cancer.

### **4. Biochemical analysis:**

#### **4-1. Blood sampling:**

At the end of the experiment (140 days) the rats were fasted over night and serially anesthetized with diethyl ether. Blood was collected in clean dry centrifuge tubes from hepatic portal vein, this tubes containing 3.1% sodium citrate solution (1:10 v/v) to prepare serum and plasma, respectively. A portion of the liver was immersed in 10% neutral buffered formalin solution for histological examination (Jacobs *et al.*, 2001 and Malhotra, 2003). Serum was carefully separated and transferred into dry clean ebendorf tubes and kept frozen at 20 °C until analysis (Turkdogan *et al.*, 2003). Hemoglobin, Serum total protein, Serum albumin, globulin ratio, Serum globulin were determined according to Drabkin, 1932, Gomai *et al.*, 1949, Doumas, 1971, Srivastava *et al.*, 2002 and Chary and Sharma, 2004, respectively. Serum Glutamate Oxaloacetate Transaminase and Serum Glutamate Pyruvate Transaminase were determined according to Reitman and Frankel, 1957. Serum Alkaline Phosphatase, Serum Urea, Serum Creatinine Uric Acid, were determined according to Rick *et al.*, 1990, Fawcett and Scott, 1960, Schimeister, 1964 and Yang, 2001, respectively. Serum (Total Cholesterol, Triglycerides, High-Density Lipoprotein, Very Low-Density Lipoprotein cholesterol and Low-Density Lipoprotein) were determined according to Richmond, 1973 and Allain, 1974, Fassati and Principe, 1982 Castelli 1977, Burstein, 1970 and Lopez, 1977, Srivastava *et al.*, 2002, respectively.

Serum (Alpha Feto Protein AFP and Lactate Dehydrogenase LDH) were determined according to Yang, 2001.

### **5. HISTOLOGICAL EXAMINATION:**

Liver specimens fixed in formalin were embedded in paraffin, sectioned, and stained with hematoxylin and eosin. The mitotic index of hepatocytes was determined by counting more than 3000 hepatocytes in each liver specimen (Wanless, 2002 and Abdel-Wahhab and Ali, 2005). Histological examination was carried out in Pathology Department, Faculty of Veterinary Medicine, Cairo University.

## **RESULTS AND DISCUSSION**

### **1. Effect of functional diets on white blood cells, red blood cells hemoglobin and platelets cells of rats pretreated with CCl<sub>4</sub>**

Table (2) points to the effect of functional diets on white blood cells and red blood cells of rats pretreated with CCl<sub>4</sub>. The mean value of control positive of white blood cells (WBC) was slightly lower than control negative (6.0±0.2 and 6.6± 0.8 1000/mm<sup>3</sup> respectively). While, the white blood cells of rats feeded on diets contained garlic 15%, and mix of garlic and onion 20% were lower than control positive (5.4±0.2, and 5.2±0.2 g/dl, respectively). Mean while the diets contained garlic 20%, onion 15%, onion 20%, mix of garlic and onion 15%, silymarin 15%, and silymarin 20% increased the white blood cells than control positive by (6.2±0.3, 6.2±0.3, 7.05±0.12, 6.7±0.12, 7.7±0.12 and 7.6±0.2, respectively). The same table illustrated that the mean value of red blood cells (RBCs) of control positive which was lower than control negative (4.5±0.2 and 5.1±0.8 g/dl, respectively). On the other hand, the red blood cells of rats feeded on diets contained 15% garlic and mix of garlic and onion 20% were lower than control positive (3.9±0.2 and 3.7±0.2 g/dl, respectively). While, diets contained onion 20%, silymarin 15%, and silymarin 20% showed higher red blood cells than control positive (7.05±0.12, 7.7±0.12 and 7.6± 0.2 g/dl, respectively).

**Table (2): Effect of functional diets on white blood cells, red blood cells hemoglobin and platelets cells of rats pretreated with CCl<sub>4</sub>:**

parameters Groups	WBC	RBC	Hb	PLT
	g/dl	g/dl	g/dl	g/dl
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Control Negative	6.6±0.8	5.1±0.8	13.9±0.2	290.2±9.3
Control Positive	6.0±0.2	4.5±0.2	11.3±0.3	240.0±6.2
Garlic 15%	5.4±0.2	3.9±0.2	14.3±0.5	421.5±29.7
Garlic 20%	6.2±0.3	4.7±0.3	13.8±0.3	477.3±6.07
Onion 15%	6.2±0.3	4.7±0.3	14.0±0.2	407.3±6.6
Onion 20%	7.05±0.12	5.5±0.12	13.6±0.5	483.5±9.3
G. & O. 15%	6.7±0.12	5.2±0.12	14.7±0.3	162.5±10.7
G. & O. 20%	5.2±0.2	3.7±0.2	15.9±0.3	182.5±6.5
Silymarin 15%	7.7±0.12	6.5±0.12	13.9±0.3	329.8±23.01
Silymarin 20%	7.6±0.2	6.1±0.2	14.2±0.2	352.5±26.3

Recently, researchers found that garlic supports our blood pressure in a second and totally different way. Garlic is rich in sulfur-containing molecules called polysulfides. It turns out, inside our red blood cells into a gas called hydrogen sulfide (H<sub>2</sub>S). H<sub>2</sub>S helps control our blood pressure by triggering dilation of our blood vessels. When the space inside our blood vessels expands, our blood pressure gets reduced (H<sub>2</sub>S is described as a "gas transmitter" and placed in the same category 0061s nitric oxide (NO) as a messaging molecule that can help expand and relax our blood vessel walls). Interestingly, our RBCs do not appear to use garlic in the same way that they use polysulfides in food-form garlic (*Galeone et al .2009*). The mean value of control positive of hemoglobin was lower than control negative, (11.3 ±0.3 and 13.9± 0.2 mg/dl, respectively) while all diets contained garlic 20%, garlic 15%, onion 15%, onion 20%, mix of garlic and onion

15%, 20%, silymarin 15%, and silymarin 20% showed a higher hemoglobin content compared with control positive.

The mean value of control positive was higher in platelets than control negative (290.2±9.3 and 240.0±6.2, 1000/mm<sup>3</sup> I, respectively). Mean while, diets contained garlic 15%, garlic 20%, onion 15%, onion 20%, silymarin 15%, and silymarin 20% had a higher platelets than control positive (except diets contained mix of garlic and onion 15%, and mix of garlic and onion 20% which was lower than control positive).

In addition to the ability of garlic to help prevent our blood vessels from becoming blocked, garlic may also be able to help prevent clots from forming inside of our blood vessels. This cardiovascular protection has been linked to one particular disulfide in garlic called a joene. A joene has repeatedly been shown to have anti-clotting properties. It can help prevent

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certain cells in our blood (called platelets) from becoming too sticky, and by keeping this stickiness in check, it lowers the risk of our platelets clumping together and forming a clot (Mulrow *et al.* 2000). Most randomized controlled trials have found that garlic supplementation results in significant reductions in measures of ex vivo platelet aggregation. Four out of five trials found that supplementation with dehydrated garlic or garlic oil macerates significantly decreased spontaneous platelet aggregation compared to placebo. More recently, supplementation with aged garlic extract inhibited ex vivo platelet aggregation induced by physiological activators in two separate trials (Steiner and Li, 2001).

**2. Effects of functional diets on serum protein (Total protein, albumin, globulin and A/G ratio) of rats pretreated with CCl<sub>4</sub>.**

Table (3) revealed the effects of functional diets on serum total protein and serum albumin in rats pretreated with CCl<sub>4</sub>.

The mean serum total protein value of control positive was slightly higher than control negative (8.3±0.2 and 5± 0.2 g/dl, respectively) while the mean serum total protein values of all diets was lower than control positive, while diets contained 15% and 20% mix of garlic and onion showed the lowest and the best effect on total protein compared with control positive.

The mean value of control positive lower than control negative (2.8±0.12 and 6.02±0.3 mg/dl, respectively). Generally, all diets showed a higher serum albumin than control positive, which were 4.02±0.2, 4.03±0.3, 3.9±0.12, 4.9±0.6, 3.6±0.2, 3.8±0.2, 4.9± 0.6, and 4.7±0.2 g/dl for garlic 15%, garlic 20%, onion 15%, onion 20%, mix of garlic and onion 15%, and mix of garlic and onion 20%, silymarin 15% and silymarin 20%, respectively compared with 6.02± 0.3 for control positive.

From the same table the best diet to improve the serum total protein was mix onion and garlic 15% and 20%.

**Table (3): Effect of functional diets on serum protein (Total protein, albumin, globulin and A/G ratio) of rats pretreated with CCl<sub>4</sub>.**

parameters	TP g/dl	Alb g/dl	Glb g/dl	A/G ratio
Groups	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
C. Negative	7.2±0.2	6.02±0.2	1.2±0.2	5.02±0.3
C. Positive	7.3±0.2	2.8±0.03	2.2±0.2	1.27±0.2
Garlic 15%	7.1±0.1	4.02±0.02	3.1±0.1	1.3±0.05
Garlic 20%	7.0±0.2	4.03±0.12	4.1±0.3	0.98±0.03
Onion 15%	7.6±0.2	3.9±0.12	3.8±0.3	1.03±0.1
Onion 20%	7.0±0.2	4.9±0.06	1.9±0.18	2.6±0.3
G.&O. 15%	6.7±0.1	3.6±0.01	1.8. ±0.3	2±0.4
G.& O.20%	6.3±0.2	3.8±0.2	1.5±0.3	2.5±0.09
Silymarin 15%	7.2±0.2	4.9±0.06	2.2±0.3	2.2±0.13
Silymarin 20%	7.2±0.1	4.7±0.02	2.5±0.2	1.9±0.02

The data in Table (3) showed the mean value serum globulin of control negative was higher than control positive, ( $2.2 \pm 0.2$  and  $1.2 \pm 0.2$  g /dl). Feeding rats on diets contain 15% and 20% of garlic and 15% onion improved the serum globulin to  $3.1 \pm 0.1$ ,  $4.1 \pm 0.3$ , and  $3.8 \pm 0.3$  g/dl, respectively compared with  $1.2 \pm 0.2$  and  $2.2 \pm 0.2$  g/L for both (control negative and control positive). These result might be an indicator for the important of using the diets contain 15% and 20% of garlic to improve the serum globulin than synthetic drug (silymarin)

The data in Table (3) showed that the mean value A/G ratio of control negative was higher than control positive, ( $5.02 \pm 0.3$  and  $1.27 \pm 0.2$  g/dl, respectively). While, diets contained 15% and 20% of garlic and 15% onion and silymarin 20% were lower than control positive. While, diets, diets contained onion 20%, mix of onion and garlic 15%, 20% and silymarin 15% were higher than control positive.

In conclusion, the diets contained mix of onion and garlic 15%, 20% and onion 20% remarkably improved serum globulin,

### 3. Effects of functional diets on liver functions of rats pretreated with CCl<sub>4</sub>.

Data in Table (4) represents the effect of functional diets on liver serum enzymes (GOT, GPT and ALP) of rats pretreated with CCl<sub>4</sub>. The Glutamate Oxaloacetate Transaminase (GOT) of normal rats (control positive) was  $36.1 \pm 1$  u/l which decreased in control negative to  $26.3 \pm 1$  (u/l). Generally, the highest concentration of GOT was detected in rats feeded on garlic 15%, garlic 20% and onion 20% ( $32.3 \pm 1.4$ ,  $30.3 \pm 1$  and  $34 \pm 1.4$  u/l) while the best effect which for groups feeded on mix of garlic and onion 15%, mix of garlic and onion 20% and onion 15% ( $27 \pm 1.3$ ,  $25.8 \pm 1$  and  $27.5 \pm 1.3$  u/l, respectively).

The same table illustrates that the mean value of Glutamate Pyruvate Transaminase (GPT) for control positive was higher than control negative ( $10.4 \pm 0.5$  and  $6.9 \pm 0.9$  u/l, respectively). The diet contented silymarin 15%, showed a higher GPT than control positive. While, diet contented mix of garlic and onion 20% was lower than control positive.

**Table (4): Effect of functional diets on liver functions of rats pretreated with CCl<sub>4</sub>**

parameters Groups	GOT u/l	GOT	GPT u/l	GPT	ALP u/l	ALP
	Mean $\pm$ SD	% of change	Mean $\pm$ SD	% of change	Mean $\pm$ SD	% of change
Control Negative	$26.3 \pm 1$	----	$6.9 \pm 0.9$	----	$90.4 \pm 0.6$	----
Control Positive	$36.3 \pm 1$	38.02	$10.4 \pm 0.5$	50.72	$189.9 \pm 2.1$	110.07
Garlic 15%	$32 \pm 1.4$	-11.84	$10.4 \pm 0.5$	0.00	$91.2 \pm 0.6$	-51.97
Garlic 20%	$30.3 \pm 1$	-16.52	$9 \pm 0.4$	-13.46	$61.2 \pm 0.8$	-67.77
Onion 15%	$27.5 \pm 1.3$	-24.24	$9.3 \pm 0.4$	-10.58	$82.3 \pm 0.9$	-56.66
Onion 20%	$34 \pm 1.4$	-6.33	$10.7 \pm 0.7$	2.88	$93.6 \pm 0.4$	-50.71
G.&O.15%	$27 \pm 1.3$	-25.61	$8.9 \pm 0.4$	-14.42	$116.2 \pm 1$	-38.81
G.&O.20%	$25.8 \pm 1$	-28.93	$7.9 \pm 0.3$	-24.04	$100.3 \pm 0.9$	-47.18
Silymarin 15%	$29 \pm 1.4$	-20.11	$11.3 \pm 0.5$	8.65	$94 \pm 0.7$	-50.50
Silymarin 20%	$28.5 \pm 1$	-21.48	$10.8 \pm 0.2$	3.84	$102 \pm 1.6$	-46.29

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Data from the same table showed that the mean value of ALP control positive was higher than control negative (189.9±2.1 and 90.4±0.6 u/l, respectively) .while, all diets showed a lower ALP than control positive.

In Conclusion, the best diets for improving GOT and garlic 20% was detected in mix onion and garlic 20%. Whereas, the diets contained 20% garlic had the best improve to ALP while the best effect (GPT) which for groups feeded on mix of garlic and onion 15% and mix of garlic and onion 20%.

**5. Effects of functional diets on lipoproteins of rats pretreated with CCl<sub>4</sub>:**

Table (5) represents the effects of functional diets on lipoproteins of rats pretreated with CCl<sub>4</sub>. The mean values of control positive HDL was lower than control negative (50.7±0.7 and 55.5±1.3 mg/dl,

respectively). While, the mean values of all diets, (except the diets were contained garlic 20% and onion 20 %,) were higher than control positive. However, diets contained mix of onion and garlic 15%, mix of onion and garlic 20%, silymarin 15% and silymarin 20%, showed a very high value HDL compared with control positive.

On the other side, the mean value of control positive LDL was higher than control negative (9.5±2.1 and 4.4±2.2 mg/dl, respectively.) In contrast, the mean values of diets contained garlic 15%, garlic 20%, onion 15%, onion 20% and Silymarin 15% (0.2±2.1, 8.2±0.6, 8.4±1.6, 5.6±0.9 and 7.1±0.7 mg/dl, respectively) were lower than control positive while diets contained mix of onion and garlic 15%, mix of onion and silymarin 20% (9.3 ±1, 9.9±1.4and 9±1.2 / mg/dl, respectively) were higher than control positive.

**Table (5): Effect of functional diets on lipoproteins of rats pretreated with CCl<sub>4</sub>**

parameters Groups	HDL mg/dl	HDL	LDL mg/dl	LDL	VLDL mg/dl	VLDL
	Mean ± SD	% of change	Mean ± SD	% of change	Mean ± SD	% of change
Control Negative	2.3±0.3	----	4.4±0.2	----	7.8±0.2	----
Control Positive	2.7±0.2	17.39	9.5±2.1	115.90	13.7±0.4	75.64
Garlic 15%	1.3±0.05	-51.85	6.2±2.1	-34.74	9.5±0.4	30.65
Garlic 20%	0.98±0.03	-63.7	8.2±0.6	-13.68	8.4±0.2	.38.68
Onion 15%	1.03±0.1	61.85	8.4±1.6	-11.57	11.3±0.2	-17.51
Onion 20%	2.6±0.3	-3.7	5.6±0.9	-41.05	13.3±1.6	-2.91
G. & O. 15%	2±0.4	-25.92	9.3±1	-2.01	15.6±0.2	13.86
G.. & O. 20%	2.5±0.09	-7.40	9.6±1.4	1.05	11.7±0.1	-14.59
Silymarin 15%	2.2±0.13	-18.51	7.1±1.7	-25.26	19.6±0.3	43.06
Silymarin 20%	1.9±0.02	-29.32	9± 1	-5.26	21.8±0.2	59.12

Concerning VLDL, the results refer to the mean value of control positive was lower than control negative ( $7.8 \pm 0.2$  and  $13.7 \pm 0.4$  mg/dl, respectively). While, the mean values of diets contained mix of onion and garlic 15%, mix of onion, Silymarin 15% and Silymarin 20%, ( $15.6 \pm 0.2$ ,  $19.6 \pm 0.3$  and  $21.8 \pm 0.2$  mg/dl, respectively) showed a higher VLDL value compared with control positive. Our result maintains several previous research which stated that's garlic's vitamin B6 helps to prevent heart disease via another mechanism: lowering levels of homocysteine. An intermediate product of an important cellular biochemical process called the methylation cycle, homocysteine can directly damage blood vessel walls. The selenium in garlic can become an important part of our body's antioxidant system. A cofactor of glutathione Peroxidase (one of the body's most important internally produced antioxidant enzymes), selenium also works with vitamin E in a number of vital antioxidant systems (*Gardner et al., 2007*).

Garlic is rich not only in selenium, but also in another trace mineral, manganese,

which also functions as a cofactor in a number of other important antioxidant defense enzymes, for example, superoxide dismutase. Studies have found that in adults deficient in manganese, the level of HDL (the "good form" of cholesterol) is decreased (*Mukherjee et al.2009*). In conclusion, the best diets for improving HDL were the mix of onion and garlic 20% and silymarin 20% mean while the diet showed the lowest effect in VLDL contained garlic 20%, while the best diets for improving LDL were garlic 15% and onion 20%.

### 6. Effects of functional diets on tumors markers of rats pretreated with CCl<sub>4</sub>.

Table (6) revealed the effects of functional diets on tumors markers of rats pretreated with CCl<sub>4</sub>. The mean value of control positive of Alfa Fetoprotein (AFP) was higher than control negative ( $5.7 \pm 0.3$  and  $2.5 \pm 0.4$  u/l, respectively). Generally, the mean values of all diets (except the diet contained garlic 20%) were lower than control positive.

**Table (6): Effect of functional diets on tumors markers of rats pretreated with CCl<sub>4</sub>.**

Parameters Groups	AFP u/l	AFP	LDH u/l	LDH
	Mean ± SD	% of change	Mean ± SD	% of change
Control Negative	$2.5 \pm 0.04$	---	$2598 \pm 7.25$	---
Control Positive	$5.7 \pm 0.3$	128	$3619 \pm 24.24$	39.29
Garlic 15%	$4.6 \pm 0.22$	-19.2	$2828.8 \pm 34.4$	-21.85
Garlic 20%	$5 \pm 0.9$	-12.2	$2809.5 \pm 14.9$	-22.36
Onion 15%	$4.5 \pm 0.3$	-21.05	$2903.3 \pm 15.7$	-19.77
Onion 20%	$4.2 \pm 0.6$	-0.96	$2419.5 \pm 13.7$	-33.14
G. & O. 15%	$4.5 \pm 0.8$	-21.05	$2549.5 \pm 14.8$	-29.55
G. & O. 20%	$4.5 \pm 0.3$	-4.26	$2422.8 \pm 14$	-33.05
Silymarin 15%	$4.6 \pm 0.3$	-19.29	$3519.3 \pm 22.6$	-2.76
Silymarin 20%	$4.3 \pm 0.2$	-24.56	$3406.8 \pm 18.2$	-5.86



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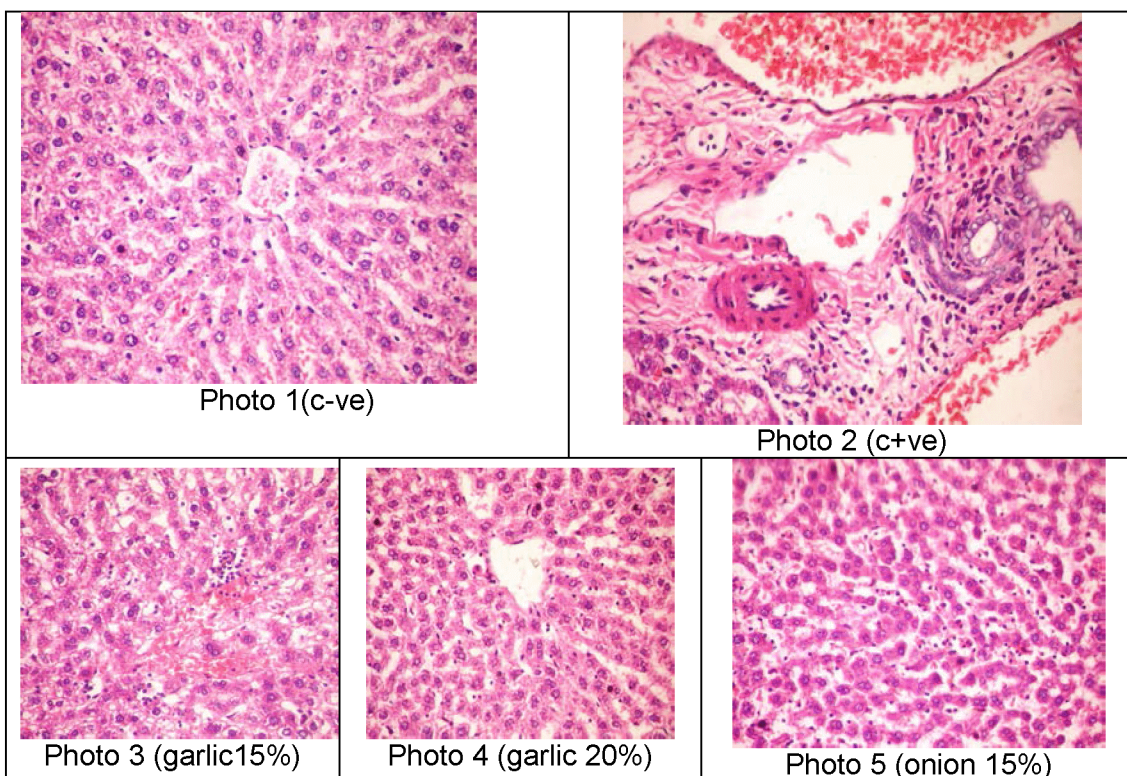
On the other side, the Lactate Dehydrogenase (LDH) mean value of control positive was higher than control negative ( $3619 \pm 24.24$  and  $2598 \pm 7.25$  u/l, respectively). While, all diets contained (garlic 15%, garlic 20%, onion 15%, onion 20% of mix of onion and garlic 15%, mix of onion and garlic 20%, silymarin 15% and silymarin 20%, ) were lower than control positive.

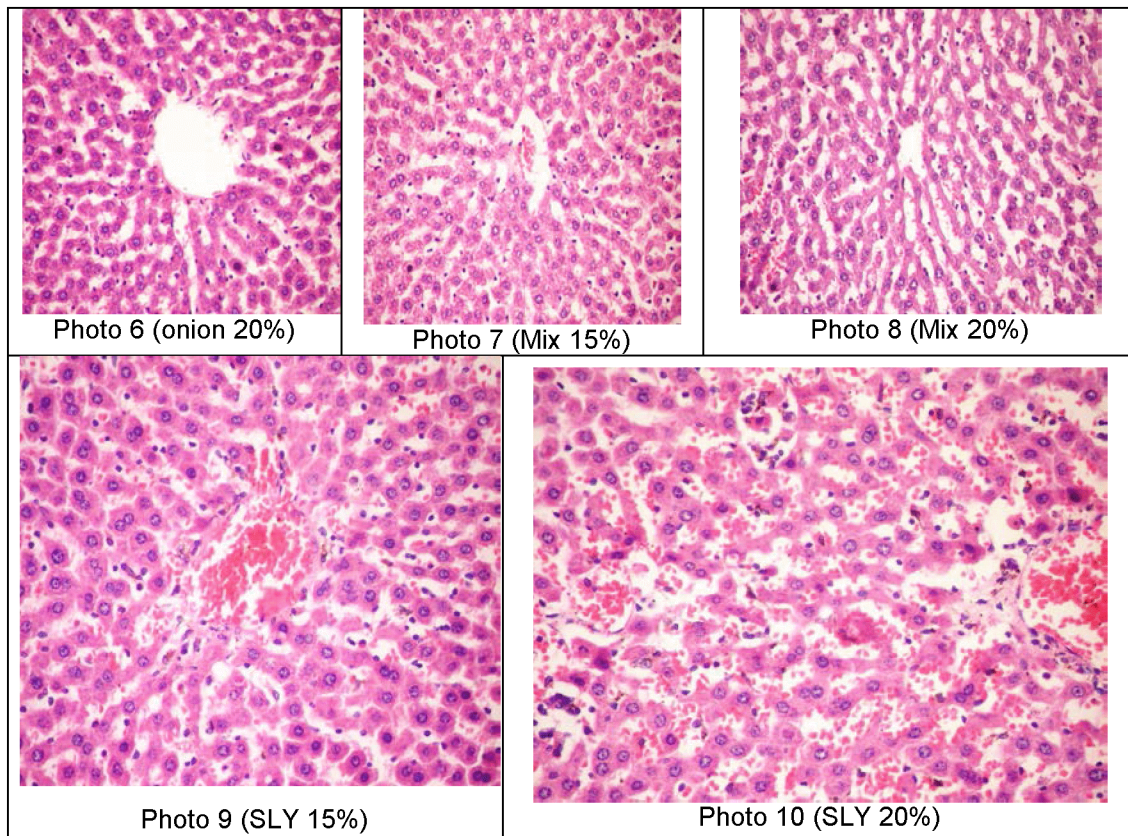
In conclusion, the best diets for improving (LDH) were onion 20%, mix of onion and garlic 15%, mix of onion and garlic 20%.

These results (with the results of histological parameter) give a good evidence that the garlic and onion powder could be a good assistance to the chemical drugs to inhibit the liver cancerous cells attempts to associate the consumption of onion with cancer inhibition. Among the sulphurous products, diallyl disulfide seems to be responsible in the inhibition of cancerous cells in stomach (*Furusawa et al., 2005*).

### **HISTOLOGICAL EXAMINATIONS:**

Microscopically, liver of rat from group (3) garlic 15% (Plate 1) revealed cytoplasmic vacuolization of hepatocytes and sinusoidal leucocytosis (Photo 3). Meanwhile, liver of rat from group (4) garlic 20% showed no histological changes (Photo 4). Also, liver of rat from group (5) onion 15% showed no histological changes (Photo 5). Kupffer cells activation was the only histological changes observed in liver of rats from groups (6, 7) onion 20% and mix15% (Photo 6, 7). Meanwhile, liver of rat from group (8) mix 20% revealed dilation of hepatic sinusoids (Photo 8). However, liver from group (9) silymarin 15% showed congestion of central vein (photo 9), Kupffer cells activation group (10) silymarin 20% revealed dilation of hepatic sinusoids (Photo 10). No histological changes were noticed in liver of rat from group1 (-ve) (Photo 1). Meanwhile, liver of rat from group 2 (+ve) revealed fibrosis in the portal triad (Photo 2).





**Histological changes of rats liver (pretreated with CCl<sub>4</sub>) as affected by different functional diet.**

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## تقييم البصل والثوم كأغذية وظيفية وعلاجية لسرطان الكبد

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### المخلص العربي

هدفت هذه الدراسة الي استخدام البصل والثوم المجففين بصورة فردية وبصورة خليط لتكوين توليفات نباتية لتقليل أعراض الإصابة بالسرطان الكبد باستخدام فئران التجارب؛ وذلك بعد معرفة المركبات الفعالة بها وكذلك النشاط الحيوي لهما، وقد اظهرت النتائج أن كل التوليفات المكونة من البصل 15% والخليط 15%، 20%، والسليمارين 15%، 20% أقل من المجموعة الضابطة الموجبة كما اظهرت تأثيرا جيدا بالنسبة لإنزيم GOT. أما بخصوص إنزيم GPT كانت التوليفات المكونة من الثوم 20% و البصل 15%، والخليط 15%، و 20% أقل في المتوسطات مقارنة بالمجموعة الضابطة الموجبة. بينما كانت التوليفات المكونة من الثوم 15%، والسليمارين 20% متساوية مع المجموعة الضابطة الموجبة، وكانت التوليفة المكونة من السليمارين 20% أعلى من المجموعة الضابطة الموجبة. بالنسبة لإنزيم ALP كانت كل المجموعات أقل في المتوسطات من المجموعة الضابطة الموجبة. أما بالنسبة لدلائل الاورام أبرزت النتائج الخاصة لإنزيم AFP أن كل التوليفات أقل من المجموعة الضابطة الموجبة ماعدا التوليفة المكونة من الثوم 20%. أما بالنسبة لإنزيم LDH أظهرت النتائج حدوث تحسن ملموس في مستوى ال LDH لكل التوليفات مقارنة بالمجموعة الضابطة الموجبة بينما اظهرت المجموعات المعاملة بالسليمارين 15%، 20% تحسن اقل من تلك المعاملة بالتركيزات المستخدمة من الثوم والبصل المجفف، مما يدل على تحسن ملحوظ في أعراض الإصابة بالسرطان. أظهرت نتائج الفحص الهستولوجي أن مجموعات الفئران التي تغذت على الثوم 20% و البصل 15% كانت الأكثر إستجابة لتأثير التوليفات الوظيفية على التغيرات الهستولوجية الحادثة في كبد الفئران المصابة (الأقرب إلى المجموعة الضابطة السالبة).