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**EFFECT OF SOME DRUGS AND HERBS ON EXPERIMENTAL  
RATS SUFFERING FROM OBESITY.**

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## **EFFECT OF SOME DRUGS AND HERBS ON EXPERIMENTAL RATS SUFFERING FROM OBESITY.**

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### **Abstract**

The present study investigated the effect of some drugs (*Orlistat and Chitosan*) and herbs (*Neopuntia and Jamu Tea*) on weight, lipid fractions, glucose, liver function and kidney functions of obese rats fed on high fat diet. Healthy male albino rats weighing ( $200\pm 5$  g) were divided into two main groups. The first group ( $n = 6$ ) fed on a basal diet B.D., while the second main group 30 rat were fed for 6 weeks on high fat diet to induce the obesity in rats. After these period, rats were divided into 5 subgroups ( $n = 6$ ). As a following: Subgroup (1) fed on high fat and high protein diet (20% fat and 20% protein) as a positive control. Subgroup (2) fed on high fat and high protein diet and treated daily with 5 mg orlistat/ rat. Subgroup (3) fed on high fat and high protein diet and treated daily with 5 mg chitosan/ rat. Subgroup (4) fed on high fat and high protein diet and treated daily with 5 mg *Neopuntia* / rat. Subgroup (5) fed on high fat and high protein diet and treated daily with 5 ml *Jamu tea* / rat.

Body weight was decreased in all treated groups. All parameters of lipid profile (cholesterol, triglycerides, HDL-c, LDL-c and VLDL-c), liver function (AST & ALT enzymes), glucose and kidney functions improved with treated the obese rats with *Orlistat* , *Chitosan* , *Neopuntia and Jamu Tea* , especially when using 5 mg orlistat/ rat followed by 5 mg chitosan / rat, and other herbs (*Neopuntia and Jamu Tea*), respectively . It was concluded that, treating obese rats which fed on high fat and high protein diet with *Orlistat* , *Chitosan* , *Neopuntia and Jamu Tea* decreased the weight of obese rats and improved the body functions.

**Key words:** rats, obese, *Orlistat* , *Chitosan* , *Neopuntia* , *Jamu Tea* , lipid profile, liver functions, glucose and kidney function.

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### ***Introduction:***

Over the past 20 years obesity has become a worldwide concern of frightening proportion. The World Health Organization estimates that there are over 400 million obese and over 1.6 billion overweight adults, a figure which is projected to almost double by 2015. This is not a disease restricted to adults – at least 20 million children under the age of 5 years were overweight in 2005(**WHO, 2006**).

Obesity is a major public health concern because it increases the risk for many chronic conditions, such as cardiovascular diseases, diabetes, hypertension, coronary artery disease, and cancer (**Zhang &Reisin 2000; Lyznicki et al., 2001 and Calle et al., 2003**).

Obesity is becoming a fast growing public health problem, and a high percentage of the population is facing this problem, especially in the developed countries. It can be successfully controlled by weight loss to reach the recommended ideal weight. Most obese patients are under cardiovascular risk factors (**Lucas et al., 2003**).

Dietary fat is considered to be one of the important environmental factors contributing to the obesity (**Peters, 2003**). Fat content is one of the main factors influencing the energy density of diets and an increase in energy density was shown to result in excess intake of calories; passive over consumption in humans in turn promotes the development of obesity (**Westerterp-Plantenga, 2004**).

Clinical intervention studies have provided sound evidence that an ad libitum high-protein diet from mixed sources in free-living overweight

people increases the amount of weight lost in a 6-month weight-loss program (by 3.8 kg), compared with a high-carbohydrate diet by enhancing satiety (Skov et al., 1999). A higher protein intake during weight loss may also prevent some of the inevitable loss of lean body mass and, thus, may enhance insulin sensitivity (Baba et al., 1999).

Different medications have been employed in the pharmacological treatment of obesity. Orlistat (tetrahydrolipstatin) is a covalent inhibitor of digestive lipases . Orlistat is derived from lipstatin, a natural product of *Streptomyces toxytricini* . It is an active site -directed inhibitor that reacts with the nucleophilic serine residue from the catalytic triad of pancreatic lipase (Tiss et al., 2002) . Orlistat helps to lose weight by inhibiting and subsequently preventing the digestion and absorption of dietary lipids. One of the side effects of orlistat is gastrointestinal symptoms. It caused increment of defecation, liquid and lipid feces in 10-30% of obese patients who took 360 mg/day dose Orlistat (Joyce et al., 1998).

Chitocal (Chitosan) is an extraordinary fat binder and carbohydrate bluster. It is an amino polysaccharide that has the ability to bind the lipid in the intestine so it reduces the absorption of fat, by in return it reduces the blood lipid profile and prevents obesity and heart diseases (Keiji et al ., 1994). Under optimal conditions, Chitosan can bind an average of 8 to 12 times its weight with all the lipid aggregates tested (Nauss et al., 1993).

NeOpuntia is a natural fiber made from dehydrated leaves of a cactus (*Opuntia ficus indica*) . NeOpuntia is a complex of insoluble dietary fibers " Neofibers " and soluble polysaccharide dietary fibers " Neomicel " (Stintzing and Carle, 2005).

Jamu Tea is extracted from plant essence taken from roots, foliage, barks and other ingredients that contain vitamins and minerals which have traditionally been used in the Far East for centuries and have been passed on through generations. The ingredients of Jamu tea is from, folium extract (80%), parameriae extract (6%), guazumae extract (6%), foeniculum vulgars (4%), and curcumae extract (4%) (Lily and Judith,1999).

Therefore, the present work was conducted to study the effect of *Orlistat* , *Chitosan* , *Neopuntia* and *Jamu Tea*, on weight loss, lipid profile, liver function, glucose and kidney functions of obese rats fed on high protein high fat diet.

## **MATERIALS AND METHODS:**

### **Materials:**

- Casein, all vitamins, minerals, cellulose, L -Cystine and choline chloride were obtained from El-Gomhoriya company, Cairo, Egypt.
- Beef tallow, sucrose, starch and corn oil were obtained from local market, Cairo, Egypt.
- Xenical as source of Orlistat, chitocal as source of chitosan were obtained from the pharmacies , Cairo Egypt.
- NeOpuntia and Jamu Tea were obtained from local market, Saudi Arabia.
- Normal male albino rats (36) of Sprague Dawley Strain obtained from the Laboratory Animal Colony. Ministry of Health and Population, Helwan, Cairo, Egypt.
- Kits: kits used to determine serum cholesterol, triglycerides, LDL-c, HDL-c, VLDL-c, glucose , AST, ALT, uric acid, urea nitrogen, creatinine are obtained from Gama tread Company, Cairo, Egypt.

### **Methods:**

#### **Preparation of Jamu tea:**

A Jamu Tea extracted according to the method described by (Jonathan et al., 2000), 3 bags from Jamu Tea will be extracted, by putting the tea bags, for 4 min in 250 ml boiled water, then herbs beverages were extracted from the mixture after this step. Water extracts were prepared freshly every day.

#### **Biological Investigation:**

Male albino rats sprague Dawley Strain (36 rats) weighing ( $200 \pm 5$  g) were housed in well aerated cages under hygienic condition and fed on basal diet for one week for adaptation. The basal diet consists of 14 % protein from casein ( $\geq 80$  %), 5% soya oil , 0.25 % choline chloride, 1 % vitamin mixture, 3.5% salt mixture, 5 % cellulose, 0.18 % L – cystine and the remainder (71.07 %) is corn starch (Reeves et al ., 1993). The salt mixture was prepared according to Hegsted et al., (1941) and the vitamin mixture was prepared according to (A.O.A.C. 1975).

After adaptation period, the rats were divided into two main groups as follows : **The first main group (6 rats)** fed on basal diet (as a control negative group). **The second main group (30 rat)** was fed 6 week on high fat diet HFD containing (beef tallow 19%, corn oil 1% to provide essential fatty acids, sucrose 10%, casein 20%, cellulose 5%, vitamin mixture 1%, salt mixture 3.5%, choline chloride 0.25% and the remainder is corn starch) to induce obesity in rats (*Min et al., 2004*) to induce obesity.

After these periods, the mean value of body weight % was estimated in the two main groups, also blood samples were collected from all rats to estimate the levels of cholesterol and triglycerides (healthy rats was  $135.284 \pm 4.531$  mg/dl cholesterol and  $55.852 \pm 2.773$  mg/dl triglycerides), while the second main group recorded ( $175.664 \pm 5.658$  mg/dl cholesterol and  $70.278 \pm 5.862$  mg/dl triglycerides), then the rats were divided into five subgroups (n = 6 each) according to the following scheme: Subgroup (1) fed on high fat and high protein diet (20% fat and 20% protein) as a positive control. Subgroup (2) fed on high fat and high protein diet and treated daily with 5 mg orlistat/ rat. Subgroup (3) fed on high fat and high protein diet and treated daily with 5 mg chitosan/ rat. Subgroup (4) fed on high fat and high protein diet and treated daily with 5 mg Neopuntia / rat. Subgroup (5) fed on high fat and high protein diet and treated daily with 5 ml Jamu tea / rat.

During the experimental period (4 week), the diets consumed and body weights were recorded twice weekly.

**At the end of the experiment, the animals were fasted overnight, then the rats were anaesthetized and sacrificed, and blood samples were collected from the aorta. The blood samples were centrifuged and serum was separated to estimate some biochemical parameters, i.e. serum cholesterol according to (*Allain et al., 1974*), triglycerids (*Foster and Dumns, 1973*), high density lipoprotein HDL-c (*Lopes-Virella et al., 1977*), low density lipoprotein LDL-c and VLDL-c (*Fried Wald et al., 1972*), aspartate amine transaminase (AST) and alanine amine transaminase (ALT) (*Ritman and Frankel, 1957*), glucose (*Trinder 1959*), uric acid (*Fossati et al., 1980*), urea nitrogen (*Patton & Crouch 1977*) and creatinine Bohmer (1971).**

**Results of biological evaluation of each group were statistically analyzed (mean  $\pm$  standard deviation and one way ANOVA test) using**

**SAS package and compared with each other using the suitable test (least significant differences at  $P < 0.05$ . (SAS, 1996).**

### ***Results and Discussion:***

Effect of some drugs and herbs on food intake and weights of obese rats.

The effect of some drugs (***Orlistat and Chitosan***) and herbs (***Neopuntia and Jamu Tea***) on food intake (g/day for each rat) and weights in obese rats are presented in table (1).

#### **Food intake (g/day for each rat).**

The mean value of food intake in health group fed on basal diet in (control –ve group) increased than that of obese group fed on diet containing 20% protein and 20% fat (17.857 vs. 16.369 g/day for each rat, respectively).

Food intake in obese groups which were treated with (5 mg orlistat/ rat), (5 mg chitosan / rat), (5 mg Neopuntia / rat) and (5 ml Jamu Tea / rat) had the lowest food intake, compared with the normal group (Control –ve group). The mean value of food intake in obese groups fed on diet containing (20% protein and 20% fat) and treated with Orlistat and chitosan increased, while treated obese rats with neopuntia and jamu Tea led to decrease in the mean value of food intake as compared to the positive control group.

#### **Weights of rats (g).**

Table (1) showed the follow-up development in weight of normal, obese and obese rats which were treating with orlistat, chitosan, neopuntia and jamu tea during the experiment. Data in this table showed significant decrease ( $p < 0.05$ ) in the weight of normal group (control –ve group) in the initial of the experimental period, as compared to obese group (control +ve group) and obese groups which were treated with the two types of (drugs and herbs).

Feeding obese groups with diet containing 20% protein and 20% fat and treating with (5 mg orlistat/ rat), (5 mg chitosan / rat), (5 mg Neopuntia / rat) and (5 ml Jamu Tea / rat) led to significant decrease ( $p < 0.05$ ) in the weight at the medium and final of the experiment, as compared to the positive control group. On the other hand, all treated groups

with drugs or herbs showed significant increase in the weight, as compared to the negative control group.

Group of rats which were treated with (5 mg orlistat/ rat), (5 mg chitosan / rat) recorded significant decrease ( $p < 0.05$ ) in the weight, as compared to treated groups with (5 mg Neopuntia / rat) and (5 ml Jamu Tea / rat).

### **Body Weight Gain % (BWG%).**

Body weight gain % of obese rats fed on diet containing 20% protein and 20% fat (control +ve) increased significantly  $p < 0.05$ , as compared to the negative control group fed on basal diet (Table 1). Treated groups with (5 mg orlistat/ rat) or (5 mg chitosan / rat) resulted in the highest decrease in BWG%, as compared to (control +ve) and other treated groups.

In this respect, (**Wickelgren, 1998**) defined the obesity, as an increase in mass of adipose tissue, confers a higher risk for metabolic diseases such as non-insulin-dependent diabetes, cardiovascular disease, and stroke and an increased incidence of morbidity.

**Sjostrom et al., (1998)** showed that orlistat is minimally (<1%) absorbed from the gastrointestinal tract, promotes significant weight loss when used in conjunction with a mildly hypoenergetic diet, and lowers blood lipid concentrations. On the other hand, **David, (2003)** reported that, orlistat is the only approved inhibitor of the gastrointestinal lipases, predominantly pancreatic lipase, necessary for the hydrolysis of triglyceride to free fatty acids in the lumen of the gut. Because this agent can reduce the absorption of dietary fat by up to 30%, it produces weight loss comparable to or greater than that obtained by placing an individual on a fat-restricted diet.

Chitosan is an aminopolysaccharide, derived from "Chitin". Chitin is found in plankton and the exoskeletons (shells) of crustaceans such as shrimp, lobster or crab. Researchers have been doing clinical studies on chitosan as a natural weight loss agent and as a fiber for adding bulk to the digestive system and for colon cleaning (**Shahram, 1992**). Our results agree with **Abelin and Lassus (1994)** who showed that individuals taking chitosan lost an average of 8 percent of their body weight in a 4-week period.

**Ennouri et al., (2005)** evaluate some biological parameters in rats fed with a supplemented diet with *Opuntia ficus indica* powder seeds. Feed intake and body weight of rats were measured every two days during nine weeks of treatment. The results indicated a significant decrease in body weight of rats receiving a diet partially substituted with *O. ficus indica* powder seeds, probably due to a significant decrease in serum-free thyroxin (FT<sub>4</sub>) compared to the control group.

Green tea in the presence of Jamu Tea is a metabolic stimulant and has been used for weight loss, its polyphenol content aids in body fat loss; prevents free-radical damage; is an anticoagulant; lowers LDL cholesterol and raises HDL; lowers blood cholesterol; maintains blood sugar levels and reduces the effects of food poisoning (**Kirschmann, 1996**).

**Merina, (2005)** reported that, Standardized green tea extract is found to be very effective for reducing obesity and abdominal fat in human volunteers. The other advantage of standardized extracts is that the dosage can be defined. The average dosage of green tea extract is 500-1500 mg/day.

#### **Effect of some drugs and herbs on lipid profile (mg/dl) of obese rats.**

The effect of some drugs (orlistat and chitosan) and herbs (neopuntia and Jamu tea) on serum cholesterol and triglycerides on obese rats are presented in table (2). The data in this table showed that, total cholesterol in obese rats fed on diet containing 20% protein and 20% fat increased the mean value of serum cholesterol significantly  $p < 0.05$ , as compared to healthy rats fed on basal diet (control -ve group). Feeding obese group on a diet containing (20% protein & 20% fat) and treated with (5 mg orlistat/rat), (5 mg chitosan / rat) and (5 mg neopuntia / rat) resulted in decrease in total cholesterol, while treated rats with (5 ml Jamu Tea / rat) showed nonsignificant differences, as compared to the positive control group.

Treating obese rats which fed on diet containing (20% protein & 20% fat) with orlistat achieved the highest decrease in serum cholesterol, as compared to other tested groups.

Table (2) illustrated that, feeding obese rats on diet containing 20% protein and 20% fat increased serum triglycerides and VLDL-c significantly  $p < 0.05$ , as compared with the negative control group. Serum triglycerides and VLDL-c in obese groups fed on diet containing (20% protein & 20% fat) and (treated with orlistat, chitosan and neopuntia) decreased significantly  $p < 0.05$ , while treated obese rats with jamu tea showed

nonsignificant changes in this parameter, as compared to the positive control group.

The highest decrease in serum triglycerides and VLDL-c recorded for the treated group with chitosan, following by orlistat, while the lowest decrease in this parameter recorded for the treated group neopuntia and jamu tea.

Untreated obese rats fed on diet containing 20% protein and 20% fat (control +ve group) revealed significant decrease  $p < 0.05$  in the mean value of serum HDL-c, compared with the healthy group fed on basal diet. Data in this table showed that, feeding obese rats on diet containing (20% protein and 20% fat) and treated daily with (5 mg orlistat/ rat, 5 mg chitosan / rat, 5 mg neopuntia / rat or 5 ml Jamu Tea / rat) led to significant increase  $p < 0.05$  in the mean value of serum HDL-c, as compared to the positive control group.

The best results in HDL-c recorded for the group fed on diet containing (20% protein and 20% fat) and treated daily with (5 mg chitosan / rat), followed by the groups which treated daily with (5 mg orlistat/ rat and 5 mg neopuntia / rat), respectively.

Low density lipoprotein cholesterol LDL-c, increased significantly in the positive control group fed on diet containing (20% protein and 20% fat), as compared to the negative control group fed on basal diet. Results in this table revealed that, all treated groups with (5 mg orlistat/ rat, 5 mg chitosan / rat, 5 mg neopuntia / rat or 5 ml Jamu Tea / rat) decreased the mean value of serum LDL-c, as compared to the positive control group.

Treating obese rats daily with (5mg orlistat/ rat, 5 mg chitosan / rat and 5 mg neopuntia / rat) led to decrease the mean value of LDL-c by about (17.708 mg/dl to 20.825 mg/dl), than that of the positive control group.

From our results, it could be observed that, treating obese rats with Orlistat, chitosan, neopuntia and jamu tea improved the lipid fractions. In this respect, *Pi-Sunyer (1996)* reported that, improvement in concentrations of cholesterol and triacylglycerols resulted from therapy with orlistat. As a result of its effect on the body's ability to absorb dietary fats, orlistat is known to be associated with an increased incidence of gastrointestinal events in its users.

Orlistat is a gastric and pancreatic lipase inhibitor that alters energy balance by reducing the absorption of triglyceride and cholesterol from the gastrointestinal tract (*Mittendorfer et al., 2001*). In adults, orlistat, at the standard dose of 120 mg three times daily, inhibits ~ 30% of triglyceride absorption (*Guerciolini, 1997*).

In placebo-controlled studies, adults treated with orlistat for periods as long as 2 years exhibited greater average weight loss, better weight maintenance, lower total and low density lipoprotein-cholesterol (LDL-cholesterol), and improved glycemic control for patients with type 2 diabetes (*Rossner et al., 2000*). Also (*Zhi et al., 1994 and Muls et al., 2001*) reported that, during weight loss, orlistat reduced fat absorption, as shown by a decrease in serum LDL cholesterol that was expected, and that corresponds to an ~25% decrease in cholesterol absorption and a 30% decrease in fat absorption.

**Macchi (1996)** demonstrated that chitosan is useful in the treatment of obesity because it enhances the loss of body fat and acts to normalize plasma cholesterol and triglycerides levels, possibly with an increase of HDL-cholesterol. Greater effects are obtained when chitosan is associated with a hypocaloric diet.

One clinical study showed that in five weeks, total cholesterol as reduced by a whopping 32% when using chitosan (**Kobayashi et al., 1999**). Another study showed that rats fed chitosan had decreased liver cholesterol levels 60% lower than the control group after 4 weeks (**Sugano et al., 1998**).

Alternatively, it is possible that the cholesterol-lowering effect of chitosan is due to an increase in the viscosity of intestinal contents. Increased intestinal contents supernatant viscosity is highly correlated with reduced plasma and liver cholesterol (**Gallaher et al. 1993<sup>a</sup> and 1993<sup>b</sup>**) and reductions in cholesterol absorption (**Carr et al. 1996**) in hamsters. Recently, chitosan (CS) has been examined as an alternative therapy, since oral administration of CS leads to decreased serum cholesterol levels (**Ylitalo et al., 2002**).

The consumption of fresh or dehydrated leaves of *Opuntia ficus-indica* has been studied in animal models, in order to evaluate the effects on lipid metabolism. One of the first studies was performed on laboratory rats, showing that consumption of *Opuntia ficus-indica* induced a decrease in

low-density lipoprotein cholesterol (LDL-C) levels of 34%, without affecting high-density lipoprotein cholesterol (HDL-C) levels (**Cardenas et al., 1998**). A more recent study demonstrated, a significant reduction in cholesterol, LDL-C, and triglyceride plasma levels in hypercholesterolemic rats following daily administration of lyophilized leaves of *Opuntia ficus-indica* (**Galati et al.,2003**).

The green tea and curcumin presented on Jamu tea affect on lipid metabolism. In this respect, **Yuan et al.,(2006)** studied The anti-obesity and lipid-lowering effects of green tea consumption in middle-aged adults. A total of 3317 individuals were included. Consumption of green tea significantly decreased serum total cholesterol ( $p<0.01$ ), low density lipoprotein ( $P<0.01$ ) and triglycerides ( $P<0.01$ ); the incidence of obesity was also lowered by green tea consumption ( $P<0.05$ ). The relation was enhanced after adjusting for age, sex, smoking habits, alcohol intake and exercise time.

#### **Effect of some drugs and herbs on serum glucose and liver enzymes of obese rats.**

##### **Serum glucose (mg/dl).**

The effect of some drugs (orlistat and chitosan) and herbs (Neopuntia and Jamu tea) on serum glucose (mg/dl) and AST & ALT enzymes (U/L) on obese rats are presented in table (3). The data in this table showed that, serum glucose in obese rats fed on diet containing 20% protein and 20% fat increased significantly  $p < 0.05$ , as compared to healthy rats fed on basal diet.

Feeding obese group on a diet containing (20% protein & 20% fat) and treated daily with (5 mg orlistat/ rat), (5 mg chitosan / rat), (5 mg Neopuntia / rat) and (5ml jamu tea/rat) resulted in decrease the mean value of serum glucose, as compared to the positive control group. On the other hand, statistical analysis revealed that, treating obese rats daily with (5mg orlistat or 5mg chitosan / rat) led to significant decrease  $p<0.05$ , as compared to treated groups with (5 mg neopuntia / rat or 5ml jamu tea/rat).

##### **Aspartate and Alanine Amine Transaminase AST& ALT (U/L) :**

Table (3) illustrated that, feeding obese rats on diet containing 20% protein and 20% fat increased serum AST & ALT enzymes significantly

$p < 0.05$ , as compared with the negative control group ( $20.333 \pm 2.251$  and  $7.667 \pm 0.517$ ) vs. ( $15.667 \pm 1.211$  and  $6.167 \pm 0.753$ ), respectively.

Serum AST enzymes in all obese groups fed on diet containing (20% protein & 20% fat) and treated daily with (orlistat, chitosan, neopuntia and jamu tea) decreased significantly  $p < 0.05$ , as compared to the positive control group. On the other hand, all tested groups which treated with drugs or herbs recorded nonsignificant differences in AST enzymes, except group of rats which treated with chitosan, as compared to the negative control group.

Concerning ALT enzymes. The results indicated that, some treatment showed nonsignificant changes in ALT enzymes, as compared to the negative and positive control groups such as, (the treatment with chitosan and neopuntia), while other treatment showed significant decrease  $p < 0.05$  in ALT, as compared to the positive control group i.e. (orlistat and jamu tea).

In this respect, (Steven et al., 2000) reported that, the addition or orlistat to a conventional weight loss regimen significantly improved oral glucose tolerance and diminished the rate or progression to the development of impaired glucose tolerance and type 2 diabetes.

Sugiyama et al., (1999), who reported that feeding rats on diet supplemented with the powder of green tea GT extract showed a significant decrease in serum AST and ALT compared with control. Studies by Arteel et al., (2002) also noted that there was a significant lowering in the activities of AST and ALT in rats treated with GT extract in the diet. Recently, curcumin has been considered a potentially important chemopreventive agent against cancer and raising the possibility that it might be useful in preventing alcoholic liver disease (Shukla & Arora 2003 and Amin et al., 2003).

### **Effect of some drugs and herbs on kidney function of obese rats.**

The effect of some drugs (orlistat and chitosan) and herbs (neopuntia and Jamu tea) on serum uric acid, urea nitrogen and creatinine (mg/dl) of obese rats are presented in table (4).

### **Uric acid (mg/dl).**

The data in this table showed that, serum uric acid in obese rats fed on diet containing 20% protein and 20% fat increased significantly  $p < 0.05$ , as compared to healthy rats fed on basal diet (control -ve group).

Feeding obese groups on a diet containing (20% protein & 20% fat) and treated daily with (5 mg orlistat/ rat), (5 chitosan/ rat), (5 mg neopuntia / rat) and (5ml jamu tea/rat) led to significant decrease ( $p < 0.05$ ) in the mean value of serum uric acid, as compared to the positive control group. Statistical analysis in this table revealed that, the lowest mean value of serum uric acid recorded for the treated obese rats daily with (5 mg orlistat/ rat), followed by the groups treated with (5 chitosan/ rat) and (5 mg neopuntia / rat), while the highest mean value of serum uric acid recorded for the group treated daily with (5ml jamu tea/rat).

### **Urea nitrogen (mg/dl).**

Table (4) illustrated that, feeding obese rats on diet containing 20% protein and 20% fat increased serum urea nitrogen significantly  $p < 0.05$ , as compared with the negative control group. Serum urea nitrogen in all obese groups fed on diet containing (20% protein & 20% fat) and treated daily with (orlistat, chitosan, neopuntia and jamu tea) decreased significantly  $p < 0.05$ , as compared to the positive control group. On the other hand nonsignificant differences in serum urea nitrogen were observed between all treated obese groups with drugs and herbs used in this study.

### **Creatinine (mg/dl).**

The comparison between the negative control group (- ve), the positive control groups (obese group fed on diet containing 20% protein and 20% fat) and treated obese groups with orlistat, chitosan, neopuntia and jamu tea in the levels of serum creatinine, are summarized in table (4). All treated obese groups with the drugs or herbs used in this study showed significant decrease  $p < 0.05$  in serum creatinine, as compared to the positive control group. The highest decrease in serum creatinine recorded for the groups treated daily with (5 mg orlistat/ rat) and (5 chitosan/ rat), followed by other treated groups.

**Henegar et al., (2001)** reported that, obesity and high-fat diets are linked with kidney dysfunction in rats and dogs. Also **Jing, et al., (2003)** confirm that high dietary fat worsens early disease progression in this model

of renal disease, and further demonstrate that diets with oils containing (n-3) fatty acids ameliorate some of the detrimental effects of a high fat diet.

The effects of chitosan have been investigated on eighty patients with renal failure undergoing long-term stable haemodialysis treatment. The patients were fed 30 chitosan (45 mg chitosan/tablet) three times a day. Significant reductions in urea and creatinine levels in serum were observed after a weeks of chitosan ingestion. The feeling of physical strength, the appetite and the sleep of patients in the treatment group had improved significantly after 12 weeks of ingestion, compared with those of patients in the control group (**Jing et al., 1997**).

**Yokozawa et al. (2003)** reported that green tea GT polyphenol is effective against renal failure in rats. GT polyphenol administered to rats at a daily dose of 50 or 100 mg/kg body weight for 30 days with a 2% arginine diet decreased serum levels of creatinine and urea nitrogen. The protective effect can be attributed to a decrease in uremic toxins and nitric oxide production and an increase in the renal activities of the oxygen species-scavenging enzymes, superoxide dismutase and catalase.

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Table (1): Effect of some drugs and herbs on food intake and weights of obese rats.

Parameters Groups		Food Intake (g/day)	Weight in the			BWG%
			Initial of the experiment	Mid of the experiment	Final of the experiment	
Control (-ve)		١٧,٨٥٧	213.50 <sup>b</sup> ± 5.010	234.667 <sup>d</sup> ± 4.967	254.333 <sup>d</sup> ± 8.430	19.147 <sup>c</sup> ± 3.688
Obese rats (+ve) fed on diet containing 20% Protein and 20% Fat		١٦,٣٦٩	259.333 <sup>a</sup> ±5.922	304.333 <sup>a</sup> ±6.055	356.667 <sup>a</sup> ± 8.406	37.550 <sup>a</sup> ± 2.512
containing 20% Protein & 20% Fat	Orlistat	١٦,٦٦٦	259.000 <sup>a</sup> ± 9.960	274.500 <sup>c</sup> ± 10.483	289.333 <sup>c</sup> ± 11.039	11.718 <sup>d</sup> ±1.230
	Chitosan	١٦,٥٤٧	260.667 <sup>a</sup> ± 12.723	279.667 <sup>c</sup> ± 11.075	297.167 <sup>c</sup> ± 13.182	14.073 <sup>d</sup> ± 3.723
	Neopuntia	١٦,٠٧١	259.333 <sup>a</sup> ± 8.140	293.167 <sup>ab</sup> ± 10.477	318.667 <sup>b</sup> ± 12.832	22.903 <sup>b</sup> ± 4.113
	Jamu Tea	١٥,٧٧	260.000 <sup>a</sup> ±8.222	291.833 <sup>b</sup> 12.303	318.605 <sup>b</sup> ± 11.832	22.550 <sup>bc</sup> ± 2.317

Values are expressed as mean ± SD. Significance at  $p < 0.05$ . BWG% :

Body weight gain %.

Values which don't share the same letter in each column are significantly different.

**Table (2): Effect of some drugs and herbs on lipid profile of obese rats.**

Parameters		mg/dl				
		Cholesterol	TG	HDL-c	LDL-c	VLDL-c
Normal rats (-ve) fed on basal diet.		163.417 <sup>d</sup> ± 2.913	71.933 <sup>d</sup> ± 2.070	52.633 <sup>a,c</sup> ± 1.177	106.330 <sup>d</sup> ± 1.550	14.453 <sup>d</sup> ± 0.461
Obese rats (+ve) fed on diet containing 20% Protein and 20% Fat.		193.267 <sup>a</sup> ± 5.100	91.850 <sup>a</sup> ± 3.631	41.050 <sup>e</sup> ± 2.108	133.847 <sup>a</sup> ± 4.035	18.370 <sup>a</sup> ± 0.726
Obese rats fed on diet containing 20% Protein & 20% Fat and treated with	Orlistat	180.050 <sup>c</sup> ± 3.803	81.892 <sup>c</sup> ± 3.445	50.650 <sup>a,d</sup> ± 1.656	113.022 <sup>c</sup> ± 4.115	16.378 <sup>c</sup> ± 0.689
	Chitosan	182.617 <sup>b,c</sup> ± 2.231	74.883 <sup>d</sup> ± 2.852	53.450 <sup>a</sup> ± 5.703	114.190 <sup>c</sup> ± 5.176	14.977 <sup>d</sup> ± 0.570
	Neopuntia	186.433 <sup>b</sup> ± 4.475	86.473 <sup>b</sup> ± 3.382	53.000 <sup>a,b</sup> ± 3.099	116.139 <sup>c</sup> ± 4.617	17.295 <sup>b</sup> ± 0.676
	Jamu Tea	192.150 <sup>a</sup> ± 5.622	89.383 <sup>a,b</sup> ± 3.262	49.300 <sup>b,c,d</sup> ± 3.720	124.973 <sup>b</sup> ± 2.526	17.877 <sup>a,b</sup> ± 0.652

Values are expressed as mean ± SD. Significance at  $p < 0.05$ .

BWG%: Body weight gain %.

Values which don't share the same letter in each column are significantly different.

TG: Triglycerides. HDL-c: High density lipoprotein cholesterol

LDL-c: Low density lipoprotein cholesterol

VLDL-c: Very low density lipoprotein cholesterol

Table (3): Effect of some drugs and herbs on serum glucose and liver enzymes of obese rats.

Parameters Groups		Glucose mg/dl	U/L	
			AST	ALT
Normal rats (-ve) fed on basal diet.		70.467 <sup>e</sup> ± 2.286	15.667 <sup>c</sup> ± 1.211	6.167 <sup>b</sup> ± 0.753
Obese rats (+ve) fed on diet containing 20% Protein and 20% Fat.		91.400 <sup>a</sup> ± 2.228	20.333 <sup>a</sup> ± 2.251	7.667 <sup>a</sup> ± 0.517
Obese rats fed on diet containing 20% Protein & 20% Fat and treated with	Orlistat	72.950 <sup>d e</sup> ± 1.898	17.500 <sup>b c</sup> ± 1.761	6.000 <sup>b</sup> ± 1.095
	Chitosan	75.038 <sup>d</sup> ± 2.266	18.500 <sup>b</sup> ± 1.643	6.667 <sup>a b</sup> ± 1.033
	Neopuntia	86.300 <sup>b</sup> ± 1.510	17.167 <sup>b c</sup> ± 0.753	6.500 <sup>a b</sup> ± 1.049
	Jamu Tea	83.220 <sup>c</sup> ± 3.026	16.333 <sup>c</sup> ± 0.817	6.167 <sup>b</sup> ± 1.169

Values are expressed as mean ± SD.

Significance at  $p < 0.05$ .

Values which don't share the same letter in each column are significantly different.

Table (4): Effect of some drugs and herbs on kidney functions of obese rats.

Parameters		mg/dl		
		Uric Acid	Urea Nitrogen	Creatinine
Normal rats (-ve) fed on basal diet.		0.705 <sup>d</sup> ± 0.030	28.000 <sup>c</sup> ± 2.828	0.511 <sup>d</sup> ± 0.018
Obese rats (+ve) fed on diet containing 20% Protein and 20% Fat.		1.130 <sup>a</sup> ± 0.062	35.600 <sup>a</sup> ± 0.921	1.037 <sup>a</sup> ± 0.051
Obese rats fed on diet containing 20% Protein & 20% Fat and treated with	Orlistat	0.853 <sup>c</sup> ± 0.031	31.758 <sup>b</sup> ± 1.243	0.705 <sup>c</sup> ± 0.116
	Chitosan	0.947 <sup>b,c</sup> ± 0.130	31.917 <sup>b</sup> ± 1.243	0.771 <sup>b,c</sup> ± 0.065
	Neopuntia	0.916 <sup>b,c</sup> ± 0.131	32.133 <sup>b</sup> ± 1.332	0.820 <sup>b</sup> ± 0.089
	Jamu Tea	0.977 <sup>b</sup> ± 0.116	32.733 <sup>b</sup> ± 2.153	0.850 <sup>b</sup> ± 0.071

Values are expressed as mean ± SD. Significance at  $p < 0.05$ .

Values which don't share the same letter in each column are significantly different.

## تأثير بعض الادوية والاعشاب علي فئران التجارب المصابة بالسمنة

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### المستخلص

تهدف هذه الدراسة الي معرفة تأثير بعض الادوية (الاورليستات و الشيتوزان) و الاعشاب (نيوبنتيا وشاي جامو) علي وزن وجزئيات الدهن ومستوى الجلوكوز و ووظائف الكبد و ووظائف الكلي للفئران البدينة المغذاة علي غذاء عالي البروتين والدهون. استخدمت في هذه الدراسة فئران ذكور من نوع الالبينو اوزانهم ( $200 \pm 5$  جرام) قسمت الي مجموعتين رئيسيتين. المجموعة الرئيسية الاولى (٦ فئران) تم تغذيتها علي غذاء اساسي، في حين تم تغذية المجموعة الرئيسية الثانية (٣٠ فأر) علي غذاء عالي الدهن لمدة ٦ أسابيع لاحداث السمنة للفئران. تم تقسيم المجموعة الرئيسية الثانية بعد هذه الفترة الي ٥ مجموعات فرعية (٦ فئران لكل منهم) كالتالي: المجموعة الفرعية (١) تم تغذيتها علي غذاء مرتفع البروتين مرتفع الدهن (٢٠% بروتين + ٢٠% دهون) واستخدمت كمجموعة ضابطة ايجابية (+). المجموعة الفرعية (٢) تم تغذيتها علي غذاء مرتفع البروتين مرتفع الدهن وعوملت يوميا بمستحضر الاورليستات (٥ ملجم / فأر). المجموعة الفرعية (٣) تم تغذيتها علي غذاء مرتفع البروتين مرتفع الدهن وعوملت يوميا بمستحضر الشيتوزان (٥ ملجم / فأر). المجموعة الفرعية (٤) تم تغذيتها علي غذاء مرتفع البروتين مرتفع الدهن وعوملت يوميا بالنيوبنتيا (٥ ملجم / فأر). المجموعة الفرعية (٥) تم تغذيتها علي غذاء مرتفع البروتين مرتفع الدهن وعوملت يوميا بشاي جامو (٥ مللي / فأر).

أوضحت النتائج حدوث انخفاضاً في كل المجموعات المعاملة بالاورليستات و الشيتوزان و النيوبنتيا وشاي جامو، كذلك حدوث تحسناً في صورة الدهن (كولسترول - جلسريدات ثلاثية - كولسترول الليبوبروتينات عالية ومنخفضة الكثافة) ووظائف الكبد ومستويات الجلوكوز ووظائف الكلي، خاصة عند استخدام الاورليستات (٥ ملجم / فأر) ويليهِ الشيتوزان ثم البيوبنتيا وشاي جامو علي التوالي.

ويستخلص من هذه الدراسة أن معاملة الفئران البدينة المغذاة علي غذاء مرتفع البروتين مرتفع الدهن بالاورليستات، الشيتوزان، النيوبنتيا وشاي جامو ادى الي تقليل وزن الفئران البدينة وحسنت وظائف الجسم.

**الكلمات المفتاحية:** فئران، أورليستات، شيتوزان، نيوبنتيا، شاي جامو، صورة الدهن، وظائف الكبد، الجلوكوز و ووظائف الكلي.