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RESEARCH ARTICLE

ANALYSIS ON EFFECTIVENESS OF SELECTED HERBAL EXTRACTS IN CHOLECYSTITIS
PREVENTION AND TREATMENT IN RATS

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ABSTRACT

A gallstone is a crystalline concretion formed within the gallbladder by accretion of bile components. These calculi are formed in the gallbladder, but may pass distally into other parts of the biliary tract such as the cystic duct, common bile duct, pancreatic duct or the ampulla of Vater. Presence of gallstones in other parts of the biliary tract can cause obstruction of the bile ducts, which can lead to serious conditions such as ascending cholangitis or pancreatitis. Either of these two conditions can be life-threatening, and are therefore considered to be medical emergencies. Thirty-two rats were divided into an experimental and a control group, with 16 hamsters in each group. Fenofibrate, cholestyramine and a low protein and high cellulose diet will be given for 6 weeks to induce the formation of pigment gallstones in the experimental group and a normal diet was given to the control group. Ursodiol will be given to control treatment group and plant extract such as leaves of *Borreriaarticularis*, Peppermint leaf extract and Ginger root extract has been given separately to test treatment group. Liver function tests, Lipid profile, renal function tests has been assessed and statistically interpreted after 6 weeks. All the values are statistically treated.

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INTRODUCTION

Gallstones may be asymptomatic even for years. These gallstones are called "silent stones" and do not require treatment (Heuman *et al.*, 2010). Symptoms commonly begin to appear once the stones reach a certain size (>8 mm). A characteristic symptom of gallstones is a "gallstone attack", in which a person may experience intense pain in the upper-right side of the abdomen, often accompanied by nausea and vomiting, that steadily increases for approximately 30 minutes to several hours. A positive Murphy's sign is a common finding on physical examination. Gallstone risk factors include overweight, age near or above 40, female or pre-menopausal the condition is more prevalent in caucasians than in people of other races. A lack of melatonin could significantly contribute to gallbladder stones as melatonin inhibits cholesterol secretion from the gallbladder enhances the conversion of cholesterol to bile and is an antioxidant, capable of reducing oxidative stress to the gallbladder (Koppiseti *et al.*, 2008). No clear relationship has been proven between diet and gallstone formation however, low-fiber, high-cholesterol diets and diets high in starchy foods have been suggested as contributing to gallstone formation. Other nutritional factors that may increase risk of gallstones include rapid weight loss, constipation, eating fewer meals per day, eating less fish and low intakes of the nutrients folate, magnesium, calcium, and vitamin C. (Ortega

et al., 1997). On the other hand; wine and whole-grain bread may decrease the risk of gallstones (Misciagna *et al.*, 1996). Pigment gallstones are most commonly seen in the developing world. Risk factors for pigment stones include hemolytic anemias (such as sickle-cell disease and hereditary spherocytosis), cirrhosis and biliary tract infections (Trotman *et al.*, 1980). People with erythropoietic protoporphyria (EPP) are at increased risk to develop gallstones. Additionally, prolonged use of proton pump inhibitors has been shown to decrease gallbladder function, potentially leading to gallstone formation (Cahan *et al.*, 2008).

Cholesterol gallstones develop when bile contains too much cholesterol and not enough bile salts. Gallstones may recur, however, once the drug is stopped. Obstruction of the common bile duct with gallstones can sometimes be relieved by endoscopic retrograde sphincterotomy (ERS) following endoscopic retrograde cholangiopancreatography (ERCP). Gallstones can be broken up using a procedure called extracorporeal shock wave lithotripsy (often simply called "lithotripsy"), (Jensen, 2010), which is a method of concentrating ultrasonic shock waves onto the stones to break them into tiny pieces. They are then passed safely in the feces. However, this form of treatment is suitable only when there are a small number of gallstones. Cholecystectomy (gallbladder removal) has a 99% chance of eliminating the recurrence of cholelithiasis. Only symptomatic patients must be indicated to surgery.

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MATERIALS AND METHODS

Experimental

Rats were divided into 6 groups as follows. Each group consists of 6 animals.

Group I: Control – Normal diet

Group II: Control –Lithogenic diet (0.5% cholesterol, 0.15% sodium cholate and 0.15% Lecithine)

Group III: Lithogenic diet + *Borreriaarticularis* leaf extract was given orally

Group IV: Lithogenic diet + Peppermint leaf extract was given orally

Group V: Lithogenic diet +Ginger rhizome extract was given orally

Group VI: Lithogenic diet +Standard drug (Ursodiol) was given orally.

After the experiment the blood samples were subjected to haematological studies. The serum samples were subjected for biochemical markers and the bile duct was dissected and observed for cholesterol crystal and aggression of microcrystals.

Statistical Analysis

All the data were analyzed as per the method of Pillai and Sinha (1968).

RESULTS AND DISCUSSION

Tables (1 and 2) indicate the results obtained in the present study. In table 1 cholesterol microcrystals were analyzed and found to be abnormal in lithogenic diet group (induced animals) (David *et al.*, 2002). Whereas they are almost normal in induced animals that are treated with plants extract. The results represented that, the number of cholesterol microcrystals were significantly more in bile of rats under lithogenic diet group; this showed that they are induced with gall stones. In treatment group, the rats which are induced with gall stones are treated with herbal plants such as *Borreriaarticularis*, Peppermint and Ginger extract.

It resulted that Cholesterol concentration was significantly decreased in bile of treatment group relative to those of lithogenic group. The formation of cholesterol crystal and aggression of microcrystals were not visible indicating the plant extracts could significantly reduce the possibility of gallstone formation. In normal and standard group rats showed the normal results. From the above results it is clearly noted that the selected plants extract are capable to control cholesterol microcrystals.

In Table 2 the biochemical parameters such as Total Cholesterol, Triglyceride, High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL), Serum Glutamic Pyruvate Transaminase (SGPT), Serum Glutamic Oxaloacetic Transaminase (SGOT) and Alkaline Phosphatase (ALP) were carried out. In case of lithogenic group the total cholesterol level found higher when compared to normal, treatment and standard groups. Whereas they are almost normal in induced animals treated with plant extracts such as *Borreriaarticularis*, Peppermint and Ginger extracts. Among the three herbal plants *Borreriaarticularis* (Dibyajyoti Saha and Swati Paul, 2012) is more effective in controlling the cholesterol level, the result of this particular plant showed with approximate value compared with normal and standard group. The other two plants are also effective in reducing the cholesterol level (Paula Gardiner, M.D., 2000 and Latona *et al.*, 2012). In lithogenic group all other biochemical parameters showed with abnormal values, whereas they are normal in treatment group when compared with normal and standard group rats.

From the above all results it is indicated that the selected herbal plants extract are more effective in reducing the cholesterol crystals.

Conclusion

The results have clearly indicated that the plant extract could be used as an effective medicine for gallstone after further investigation related to toxicity and dose studies of those extracts.

Table 1. Biochemical parameters in rats with induced gallstone. Results for Biochemical parameters (Cholesterol crystals, Aggression of microcrystals)

S.No	Biochemical parameters	Control	Lithogenic diet	<i>Borreriaarticularis</i>	Peppermint	Ginger	Ursodiol
1.	Cholesterol crystals	Nil	Coarse	Very lesser	Very lesser	Very lesser	Nil
2.	Aggression of microcrystals	Nil	Coarse	Very lesser	Very lesser	Very lesser	Nil

Table 2. Biochemical parameters in rats with induced gallstone. Results for Biochemical parameters (Total Cholesterol, Triglyceride, HDL, LDL, SGPT, SGOT and ALP)

S.No	Biochemical parameters	Control	Lithogenic diet	<i>Borreriaarticularis</i>	Peppermint	Ginger	Ursodiol
1.	Total Cholesterol (g/dl)	64.39±1.98	61.97±4.50	63.36±3.23	61.94±1.34	63.92±3.84	62.42±3.33
2.	Triglyceride (g/dl)	42.16±1.51	39.05±3.79	38.90±3.65	37.02±2.50	38.17±3.69	41.37±2.91
3.	HDL (g/dl)	35.0±3.48	37.94±1.50	38.31±3.15	36.41±1.09	37.32±2.18	34.11±2.60
4.	LDL (g/dl)	12.16±1.51	19.05±3.79	13.90±3.65	13.02±2.50	11.17±3.69	11.37±2.91
5.	SGPT	42.16±1.51	139.05±3.79	38.90±3.65	37.02±2.50	38.17±3.69	40.37±2.91
6.	SGOT	35.0±3.48	137.94±1.50	38.31±3.15	36.41±1.09	37.32±2.18	31.11±2.60
7.	ALP	64.39±1.98	141.97±4.50	63.36±3.23	61.94±1.34	63.92±3.84	60.42±3.33

Values are mean±SD of 6 individual observations.

Values are significant at P<0.001.

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