Original Research Article

A STUDY ON BIOCHEMICAL PROPERTIES AND EFFECTS OF DIFFERENT VEGETABLE OILS ON BLOOD INDICES IN WISTAR RATS.

ABSTRACT

Mustard oil is popular edible oil in Bangladesh. It contains about more than fifty percent erucic acid which is toxic to human beings. This study evaluated the determination of biochemical properties (acid value, iodine value, saponification value and unsaponifiable matter %) of mustard oil, virgin coconut and sesame oil and toxicity determination of these oils through blood indices targeting of these oil by mixing with normal diet as a dietary supplementation. This study found acid value of mustard, sesame and virgin coconut oil was 0.92, 0.312, 0.52 respectively. Iodine value of mustard, sesame and virgin coconut oil were 110.2, 105.2, and 11 respectively. Saponification value of wild mustard, sesame and virgin coconut oil was 171.1, 187.2 and 240 respectively and unsaponifiable matter % of mustard, sesame and virgin coconut oil was 1.19, 0.31 and 0.92 respectively. Also in vivo experiment we divided wistar male rats were 4 groups such as normal diet 12 gm/day/rat, mustard oil (MO) 0.6 gm/day/rat, virgin coconut oil (VCO) 0.6gm/day/rat and sesame oil (SO)0.6gm/day/rat. In this study the vegetable oil causes the effect on average body weight gain, Food Efficiency Ratio (FER), and lipid profiles [Total cholesterol (Tch), HDL- Cholesterol LDL - Cholesterol, Triglyceride (TG)] and serum enzymes [SGOT (AST), SGPT (ALT)] of different groups of rat also been estimated. The study found that mustard oil significantly ($p<0.05$) increase lipid profile and enzymes SGOT, SGPT level in blood serum which is an indication of heart and liver disorder. The study found that coconut and sesame oil consumption in rat significantly ($p<0.05$) decrease of these parameters.

Key words: Vegetable oils, biochemical properties, blood serum indices.

Introduction

Vegetables oils are used over and over again and even added to gravies and sauces. Although a lot of people in the world consume vegetables oil in order to fulfill their fat requirement by supplementing both omega-6 and omega-3 fatty acids, it has also been observed that a larger proportion of people depend on vegetable oil for this purpose. In this context the best example is Bangladesh. Mustard oils are most popular oils but sesame oil and coconut oils are also used for culinary purposes specially costal area **[1].** Among this mustard oils contains high levels of erucic acid (51.56-67.98%), which is poorly metabolized and consequently fats could be accumulated in heart muscle and evidently causes multiple organ dysfunctions especially heart and liver **[2,3,4],** besides some fatty materials could be deposited in the adrenal gland and ovarian tissues leading to some serious troubles on human **[5].** Coconut oil contains approximately 90 % saturated fat. However, most of this oils are medium chain fatty (MCT) having 10 to 12 carbon atoms which are preferentially transported through the portal venous system to the liver. These fatty acids are available for oxidation and provide rapid source of energy **[6].** The important feature of coconut oil is that it is responsible for increasing serum HDL cholesterol concentrations more profoundly than other sources of saturated fat **[7, 8].** This is just because coconut oil is composed of a group of unique fat molecules known as medium-chain fatty acids (MCFA) **[9,10].** Although they are technically classified as saturated fats, this fat can actually protect from heart attack or suffering a stroke. Natural, non-hydrogenated coconut oil tends to increase HDL cholesterol and improve the cholesterol profile. The study undertaken by Dr.T. Rajamohan and Nevin KG 2004 has also revealed that consumption of coconut oil in the general population did not elevate total cholesterol, LDL cholesterol or LDL cholesterol/ HDL cholesterol ratio. Consumption of coconut kernel with coconut oil had a beneficial effect that it

reduced total cholesterol and lowered triglycerides. It also raised HDL cholesterol levels and lowered the LDL cholesterol /HDL cholesterol ratio. The dietary practice of Kerala population consuming fresh coconut kernel and coconut oil reduces the risk of coronary artery disease **[11].** Kaunitz and Dayrit (1992) have reviewed some of the epidemiological and experimental data regarding coconut-eating groups and noted that the available population studies show that dietary coconut oil does not lead to high serum cholesterol or to high coronary heart disease mortality or morbidity **[12].**

Sesame oil belongs to the oleic-linoleic acid group. It has less than 20% saturated fatty acid, mainly palmitic (7.9-12%) and stearic (4.8-6.1%) acids. Oleic acid and linoleic acid constitute more than 80% of the total fatty acids in sesame oil. Unlike other vegetable oils the percentages of oleic acid (35.9–42.3%) and linoleic acid (41.5–47.9%) in the total fatty acids of sesame oil are nearest **[13].** Sesame oil was reported to lower the absorption of fatty acid and cholesterol in lymph by 50% when rats were fed diet containing 24% sesame oil as compared with control diet containing no sesame oil **[14].** As the lymphatic system is the major route for the transport of absorbed fatty acids and cholesterol, serum and liver cholesterol levels were significantly reduced, especially LDL-cholesterol. Crude lignan fraction separated from sesame oil was found to have a weak but significant hypocholesterolemic activity **[15].** The cholesterol-lowering activity depended on the dietary level of the lignans. Sesamin lowered intestinal absorption of cholesterol by precipitating cholesterol from the bile acid micelles, and thus the serum cholesterol level is reduced. The hypocholesterolemic effect of sesamin could be enhanced by α-tocopherol**[16].** The combination of α-tocopherol with sesamin has a practical value for the treatment of hypercholesterolemia. The cholesterol-lowering effect of sesamin has also been demonstrated in humans with dietary supplementation of sesamin at 64.8-mg/day level **[17].** In the present study the chemical characteristics of mustard oils, coconut and sesame oils are comparatively determined and then a group of adult male wistar rats have been treated with these oils for effects on blood parameter .

Materials and Methods

The following oils were taken under investigation:

1. Mustard oil
2. Coconut oil
3. Sesame oil

Collection of mustard and preparation of powder

Collection of sample is the main factor to start the whole research process. If the collection becomes erroneous then the whole task will be useless. At first fresh, healthy and good quality mustard seeds were collected from the local market of Kushtia, Natore and Pabna district in Bangladesh. The seeds were cleaned properly and sun dried to avoid contamination. Then the seeds were stored at 4ºC in refrigerator with sealed plastic packet to avoid the microbial contamination. During preparation of experimental diet, stored mustard was taken out from the refrigerator (4ºC) and weighed amount of seeds were crushed and grinded by using electrical blender machine to obtain mustard powder (MO). Mustard powder was used as a reservoir of mustard oil during the study.

Collection of coconut

Mature, healthy and good quality coconut was collected from the local market of Kushtia and Khulna district in Bangladesh. After removal of husk, the hard outer layer was broken traditionally and the coconut water was drained away. Then the mature, white and fresh flesh of coconut, which is known as virgin coconut kernel was collected.

Preparation of coconut oil

The coconut kernel was sundried continuously for 3 weeks to remove moisture content at 6% approximately. The dried coconut kernel is known as "copra". At this level, mold growth in copra is inhibited. Then the coconut meats were cut by copra cutter to create a pulverized version of coconut meat. The resulted pulverized copra was pressed in the mill to obtain oil. This is done with the help of small-scale expellers. The oil expeller is essentially a mechanical screw press in which the copra is fed continuously and pressed twice until oil is expelled from the copra by the pressure exerted by a continuous rotating warm shaft in the barrel or cage of the press. The barrel is built with openings to allow the escape of oil and these can be adjusted according to the type of seed being crushed. The combined oil from the first and the second pressing is collected in a tank.

Collection of Sesame Seed

Matured sesame seeds were collected from the local market of Kushtia and Khulna district in Bangladesh.

Preparation of Sesame oil

The collected seeds were then cleaned and dehulled manually. Then these dehulled seeds were passed through the power driven mill. The machine squeezed the oil seed and oil from the kernel was collected in a bottle. After milling the sesame oil were strained with a cloth and then allowed to settle. Finally clean layer of oil collected and preserved for use.

Determination of biochemical properties of rapeseed oil

Iodine value

The iodine value of rapeseed oil was measured by the method of Hansberry et al., 1947**[18].**

Saponification value

Rapeseed oils were saponified with a known amount of potassium hydroxide, excess of which was determined by titration **[19].**

Acid value

A weighed amount of materials were titrated with a suitable solvent in aqueous sodium hydroxide solution under specific conditions, which did not saponify the neutral portion (Hansberry et al., 1947) **[18].**

Unsaponifiable matter

The unsaponifiable matter is a fraction of fat or oil that remains insoluble after saponification of the fat sample by alkali which was determined by titration **[20].**

Chemicals

Analytically grade biochemical kits for the estimation of total cholesterol (TC), high density lipoprotein (HDL),low density lipoprotein (LDL), triglycerides (TG), Serum glutamic oxaloacetic transaminase (SGOT) or, aspartate aminotransferase (AST) and Serum glutamic pyruvic transaminase (SGPT) or alanine aminotransferase (ALT) were procured from Atlas medical, Cambridge, CB4 OWX, UK. Analytical process was done according to manufacturer's protocol.

Experimental animals and diet

Adult healthy Wistar male rats of age 5 weeks and average body weight of 90 to 110 g were purchased from the Department of Jahangirnagar University, Savar Dhaka, Bangladesh. They were housed in poly carbonate cages with steel wire tops and wood-cube bedding (5 rats per cage) at constant room temperature with relative humidity

(55+5%) and 12h:12h dark-light cycle with available supply of distilled water and feed. The normal diet of the rats was the mixture of wheat flour (which contributes 30% of diet), molasses (which is a rich source of sugar mainly sucrose, glucose and fructose), and fish-meal that is an excellent source of protein.

Animal experimental design

After one week of acclimatization with normal diet, Wistar rats were divided into four groups (n=5) named as A, B, C and D, Group-A is considered as control (normal diet) and Group-B to D groups were given 0.6 g mustard , 0.6 g coconut and 0.6 g sesame oil respectively per day with normal diet. According to Chakraborty (2003) 15% of erucic acid rich rapeseed oil is responsible for the development of heart lesion and Kramer (1992) 400 to 1500 mg/kg erucic acid significantly increased myocardial lipidosis in rats **[42, 43].** This study was carried out over a six week period and body weight, supplied foods and water ad libitum were recorded daily.

Determination of average body weight gain and food efficiency ratio (FER)

After 6 weeks, the average body weight gain and FER of each rat was calculated by the following equation: Cardiac lipidosis muscle and Body weight gain = (Final weight of average rat) – (Initial body weight) and Food efficiency ratio = Body weight gain / Food consumed.

Statistical analysis

Statistical analysis was performed with SPSS for windows, version 11.5. Data were expressed as mean ± standard deviation (SD) or mean ± standard error (SE). Differences between the body weight of all groups and differences between serum indices of different groups of rats were analyzed using T-test. Significance was accepted at the $p<0.05$ and highly significance was accepted at the $p<0.01$ levels.

RESULTS

This study indicated the biochemical properties of various vegetables oil have been determined. After conducting research study acid value of mustard , sesame and virgin coconut oil were 0.52, 0.312, and 0.392 respectively, iodine value of mustard , sesame and virgin coconut oil were 110.2, 105.2, and 11 respectively. Saponification value of wild mustard , sesame and virgin coconut oil were 171.1, 187.2 and 240 respectively and unsaponifiable matter of wild mustard , sesame and virgin coconut oil was 1.19, 0.31, 0.92 respectively**[Table 1].** Among these comparatively coconut and sesame are more suitable oils than mustard oil.

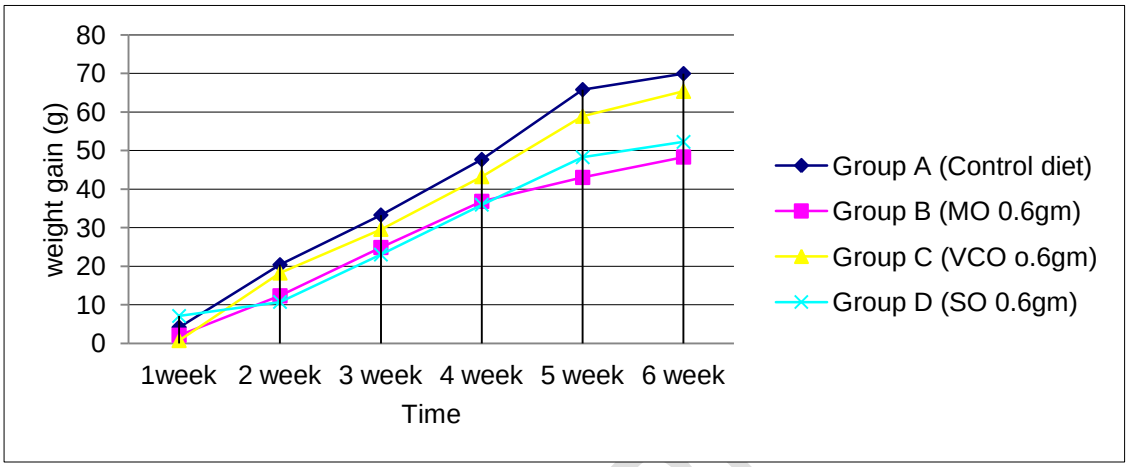
Table 1: Biochemical properties of different vegetable s oils

Vegetables oils	Acid value ±SD	Iodine value ±SD	Saponification value ±SD	Unsaponifiable matter (%) ±SD
Wild mustard oil	0.52±0.07	110.2±0.70	171.1±3.20	1.19±0.18
Sesame oil	0.312±0.06	105.2±0.90	187.2±1.90	0.31±0.12
Virgin coconut oil	0.392±0.05	11.0±1.00	185.3±1.60	0.92±0.17

In this study average weight gain of group A, B, C, and D are indicated in **table-2** and plotted in the **Figure-1** were observed that after six weeks of feeding of rats. After this time we investigated weight gain were 69.93, 48.3, 65.33 and 52.22 g for normal diet , mustard oil diet , coconut and sesame oil diet respectively . Which indicated that

mustard oil supplemented diet can reduce weight. On the hand coconut and sesame oil increased weight of rats. Possibly reasons are mustard oils groups rat consumption sufficient food but nor absorb and metabolized properly.

Figure 1: The average weight body gain of the rats was measured for 6 weeks. The figure illustrates the mean values of body weight gain of the rats fed diet combination with mustard oil, sesame oil, and virgin coconut oil.



Body weights measured as mean ± SD. Group A= normal diet 12 gm, B= mustard oil diet o.6gm, C= virgin coconut oil o.6gm, D= sesame oil diet 0.6gm.

Table 2 (FER) also showed the effect of mustards oils on food efficiency ratio (FER) of rats. The FER of Group A, B, C, and D were 0.115, 0.067, 0.131, and 0.100, respectively. The FER is significantly ($p<0.05$) reduced of mustard oil supplemented diet group where as significantly improved of coconut and sesame oil groups (Group C and D).

Table 2: Body weight gain and food efficiency ratio of rats.

Group	Initial Body Weight (g) ±SD	Final Body Weight (g) ±SD	Body weight gain (g) ±SD	Change In body Weight (%)±SD	Food Intake ±SD (g)	FER ±SD
Group A (normal diet as control)	100.225 ±11.63	170.15 ± 26.80	69.93± 15.78	69.18 ±9.14	606.43±2.08	0.115 ±0.02
Group B (MO 0 .6gm)	110.17±5.77	158.47 ±14.81	48.3±9.99	43.54^{**a}±7.09	757.08±1.97	0.067*^{a}±0.01
Group C (VCO 0.6gm)	106.83±5.67	172.16±19.52	65.33±15.19	61.16^{*b}±4.13	496.05±2.44	0.131^{**b}±0.01
Group D (SO 0 .6g)	110.83±14.45	163.05±18.04	52.22±10.85	47.72±6.39	522.39±1.28	0.100^{**b}±0.01

Values are mean ± SD, n=5
*Significant values p<0.05 a Values significant differ from the normal diet
**High significant values p<0.01 b values significant differ from the mustard

Blood Serum Estimation

After feeding of rats for 6 weeks we evaluated lipid profile and serum enzymes from blood found that total cholesterol were 35.59, 46.32, 33.33 and 35.65 mg / dl, HDL –cholesterol were 35.33, 38.24, 60.40 and 50.15 mg/dl , LDL –cholesterol were 7.00, 8.20, 6.66 and 6.43 mg/dl , Triglyceride level were 72.73,78.45,65.29 and 65.19 mg/ dl, SGOT level were 110.04, 150.66, 107.36 and 105 u/l and SGPT level were 43.00,45.00, 40.00 and42.07 u/l respectively for normal diet , mustard oil group , coconut and sesame oil supplemented diet groups **[Table 3].** Mustard oil groups showed significant ($p<0.05$) adverse effect on both lipid profile and serum enzymes where as significant ($p<0.05$) positive effect on coconut and sesame oil treated groups on rats.

Table 3: Effects of vegetable oils on blood indices, total cholesterol(Tch), HDL-cholesterol LDL-cholesterol, triglycerides (TG), SGOT (AST)and SGPT (ALT).

Group	T.Ch. (mg/dl)	HDL (mg/dl)	LDL (mg/dl	TG (mg/dl)	SGOT(u/l)	SGPT (u/l)
Group A (Normal diet12g)	35.59 ±3.09	35.33±1.97	7.00±1.00	72.73±2.80	110.04±7.85	43.00±8.18
Group B (MO 0.6gm)	46.32**[a] ±1.51	38.24±7.57	8.20±2.52	78.45±8.86	150.66*[a] ±1.92	45.00±1.00
Group C (VCO 0.6gm)	33.33*[b] ±5.85	60.40**[b] ±4.76	6.66**[b] ±3.53	65.29±3.19	107.36**[a]**[b] ±2.08	40.00±4.35
Group D (SO 0.6gm)	35.65**[b] ±4.87	50.15±7.48	6.43±1.40	65.19**[b] ±12.41	105**[a]**[b] ±8.84	42.07±0.39

Values are mean ± SD, n=5

*Significant values $p<0.05$ a Values significant differ from the normal diet

**High significant values $p<0.01$ b values significant differ from the mustard

Table 3 shows the biochemical analysis such as lipid profile (total cholesterol, HDL-cholesterol, LDL- cholesterol, triglycerides, , SGPT/ALT, and SGOT/AST of the serum of rats fed normal diet, MO and along with coconut oil and sesame oil with diet for 6 weeks.

Discussion

Biochemical properties are important indicator for quality of oil. In this study various vegetables oil has been determined. The study evaluated the acid value, iodine value, saponification value, unsaponifiable matter of mustard , sesame and virgin coconut oil . Acid value of mustard oil was higher than sesame and virgin coconut oil more susceptible to oxidation and tend to rancidity than other oil, where sesame oil contain certain natural antioxidant to prevent oxidation so acid value may lower due to this reason, where coconut oil is mainly composed of saturated fatty acid and lower unsaturation present in the carbon chain, where iodine value of virgin coconut oil was lower than mustard and sesame oil due to little unsaturation (double bond) present in the carbon chain. Saponification value of mustard oil was lower than sesame and virgin coconut oil which is an indication of good oil among these three oil. Unsaponifiable matter was higher in mustard oil than virgin coconut and sesame oil contain lower unsaponifiable matter . So from the view point of unsaponifiable matter of oil sesame oil is best among these three oils.

In this study average weight gain of group A, B, C, and D are indicated in **table-2** and plotted in the **Figure-1** were observed that after six weeks of feeding of rats. Normal diet groups rats weight gain highest in comparison to other vegetable oils groups. Whereas mustard oil group rats decline weight than other groups**[Table 2].** These have been indicated that the mustard oil induced rats began to lose weight after 6 weeks of treatment, possibly due to growth retarding activity caused by erucic acid. This result agreed with many researcher in previous studies **[21,22,23,24].** Several mechanisms may be responsible for diminishing weight by mustard oil. There were many report published that erucic acid rich oil may cause cardiac lipidosis by accumulation of substantial fat in the heart muscle, induces myocardial lesion, affects peroxisomal β-oxidation enzyme system **[25,26,27].** These injuries rats tend to consume

sufficient amount of food, but leading to ultimate weight loss. It might be caused metabolic disorders they could not able to digest it.

Table 2 also showed the effect of mustards oils on food efficiency ratio (FER) of rats. The FER of mustard oils were significantly reduced than those of control rats (Group A) which satisfied the previous result [**28].** This might be due to the adverse effect of erucic acid. On the other hand, virgin coconut and sesame oil diet (Group C and D) showed highly significant raised FER as compared to mustard oils diet (Group B). So, it could be suggested that coconut oil and sesame oil supplemented food has positive effect over the negative impact of erucic acid containing mustards oils supplemented foods group.

The lipid profile is a group of tests that are often ordered together to determine risk of coronary heart disease. They are tests that have been shown to be good indicators of heart attack or stroke caused by blockage of blood vessels or hardening of the arteries (atherosclerosis). Cholesterol travels through the blood attached to a protein. This cholesterol-protein package is called a lipoprotein. Lipoprotein analysis (lipoprotein profile or lipid profile) measures blood levels of total cholesterol (Tch), LDL- cholesterol, HDL- cholesterol, and triglycerides (TG). Rats were fed experimental diet which was prepared by mixing mustard oil, virgin coconut oil and sesame oil 0.6g, 0.6g and o.6g respectively and the result presented **in table-3.** Mustard oil had showed highest elevation of total cholesterol level than all other groups showed significant ($p<0.05$) increased in Tch compared to normal diet group. This results have similarities with previous studied **[29,30].** Many reporters have been reported that feeding high levels of rapeseed oil to rats significantly increased cholesterol levels in the adrenal glands and lipidosis in the cardiac tissue and also found that erucic acid may cause some adverse effect in lipid profile of serum **[31].** Additionally when rats were fed to diet in combination with coconut oil and sesame oil exhibited significant depletion of serum cholesterol level as compared to mustard oil and slightly increased than control group result showed in **table-3.**

HDL is often called the good cholesterol that promotes cholesterol profile and helps to protect against heart disease by scavenging and removing LDL cholesterol. HDL cholesterol helps to remove fat from the body by binding with it in the bloodstream and carrying it back to the liver for disposal. The effects of different oils on serum HDL of rats were shown in **table 3** . The results found that there was no significant changes between mustard oil diet (Group B) and control diet (Group A). But when rats were fed a diet in combination with coconut oil showed significant ($P<0.05$) elevation of HDL compared with mustard diet and also elevation of sesame oil supplemented diet compared to mustard oil and normal diet **(Table 3).** According to Ajayi et.al, 5% sesame oil fed to rats increased HDL-C in blood serum **[32].** These findings indicated that coconut oil and sesame oil supposed to increase the HDL level over erucic acid containing mustard oil .

The test for LDL cholesterol is used to predict the risk of developing heart diseases. Of all the forms of cholesterol in the blood, the LDL cholesterol is considered the most important form in determining risk of heart disease. LDL carries mostly fat and only a small amount of protein from the liver to other parts of the body. It is sometimes called "bad cholesterol." A high LDL cholesterol level may increase the chances of developing heart disease. **Table 3** depicted the effect of experimental diets on blood serum LDL level in the experimental rats. The table showed that mustard oil group increased LDL moderately while other groups (Group C and Group D) decreased LDL cholesterol. Virgin coconut oil group significantly decrease LDL compared to mustards oil group (Group B and C). The erucic acid containing mustard oil might be causative factor for increasing LDL. Other researcher also showed this same phenomena **[31].** In this study, it was found that sesame oil was decreased LDL than mustard oil group.

Triglyceride is a part of a lipid profile, it may be used to monitor those who have risk factors for heart disease, Only sesame oil diet had significantly lowest TG content ($p<0.05$) than mustard oil group while other diets had greater ones**[Table 3].** Although mustard oil group elevated triglyceride (TG) level. The sesame oil reduced TG ($p<0.05$) which indicated the reduction of heart disease risk. The falloff this TG level may be due to the Linoleic acid and α-linolenic acid which were found enormously in sesame oil and were involved in the metabolic pathway of prostaglandin synthesis **[33].** Another important component of sesame oil was lignin sesamin which also had an effect on lipid metabolism **[34].** Thus, this result indicated that mustard oil raised serum TG level and sesame oil is supposed to minimize the TG level by the anti-lipidemic effect of sesame oil itself.

SGOT (AST) also an important inflammatory marker for heart inflammation. Mustard oil group showed significant elevation of SGOT level than normal diet group (Group A) where as Coconut oil (Group C) and sesame oil group (Group D) found significantly)$p<0.05$) depletion over than normal diet and mustard oil group **[Table 3]**. This result also holds up the previous study **[35]**. But when rats were treated with coconut oil and sesame oil, SGOT level was significantly ($P<0.05$) reduced. Thus, this result indicated that coconut oil or sesame oil had anti-inflammatory

effect of heart which may be due to its HDL-C that mediates cholesterol efflux from the vasculature by reverse cholesterol transport process and promotes antioxidant, anti-inflammatory, and anti-thrombotic effects **[35, 22].**

In addition, SGPT (ALT) was considered as a useful quantitative marker to describe the extent and type of hepatocellular damage **[36].** Elevated activity of liver enzymes represents the liver dysfunction. When the plasma membrane of liver cell is damaged, the enzyme SGPT normally found in the cytosol is released into blood stream. In our study, we also tried to evaluate the effect of mustard oil, coconut oil and sesame oil on the alteration of SGPT enzyme activity. Results showed that elevation of SGPT level when rats were fed with mustard oil containing diet. Surprisingly, food supplemented with coconut oil or sesame oil abrogated the elevation of SGPT activity level than mustard oil rats**[Table 3]** . So it might be suggested that elevated level of SGPT by mustard oil on the other hand coconut oil and sesame oil have its anti-inflammatory properties **[37].** Sesame and coconut that have decreased the SGPT level, possible it might be sesame oil contains lignan: sesamin, sesamolin and high percentage of natural antioxidant linolenic acid **[38],** those were active ingredient of sesame. Although coconut oil was considered as saturated oil, many researchers recommended its antioxidant and anti-inflammatory properties **[39,40, 41].** In our study, we found that coconut oil could be more effective for prevention of myocardial lesion and hepatocellular damage.

Conclusion

Mustard oil contains erucic acid which is harmful for health. The people of Bangladesh as well as India consume this oil. Especially in rural area of our country use this oil. Our study showed among different varieties of vegetable oils like mustard, coconut and sesame oil in Bangladesh. Though there is no significance changes of biochemical characteristics among all vegetable oils but coconut and sesame are more preferable than mustard oil . On the other hand in vivo experiment found that in mustard oil causes the weight loss as well as FER of the rats but when rat fed food with virgin coconut and sesame oil causes the lifting of weight of rat also increase FER. Serum lipid profile such as total cholesterol, LDL, TG which is raised by the incorporation of mustard oil where Sesame and mustard oil decrease Tch, LDL, TG, and increase HDL level in serum which is good for cardiac health remove excess LDL cholesterol from blood which is an indicator of heart diseases. Mustard oil also raised serum SGOT and SGPT level which is an indicator of liver damage where virgin coconut and sesame oil decrease SGOT and SGPT level. Virgin coconut and from the biochemical properties sesame and coconut oil consumption is preferable than mustard. Because both oil less susceptible to oxidation and causing rancidity. This study suggests that if virgin coconut and sesame oil used to eat regularly, it may protect toxic effect cause by erucic acid in human but must be consume after proper purification for health safety.

Conflicts of Interest : The author(s) declare(s) that there is no conflict of interest regarding the publication of this manuscript.

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