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An experimental study of different types of edible oils with reference to Cholesterol level in Albino Rats

Research Article

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Abstract

The aim of this study is to evaluate the effect of *Sunflower* Oil, *Safflower* Oil and Sesame Oil on the lipid profile of Wistar albino rats. Twenty Four healthy Wistar albino rats weighing between 96-110 g and aged between 6weeks to 8weeks were used. The rats were placed randomly into four groups of six animals each. Group 1 served as Normal control and no oil was fed. Group 2 animals were given *Sunflower* oil in 1ml quantity (1) each day through oral route. Group 3 Animals were given *Safflower* Oil (1ml each) daily orally and the group 4 Animals were given *Sesame* oil (1ml) orally as well. The experiment lasted for 14 days. The results showed that the animals had significant increase in body weight compared with the control. Triacylglycerol, phospholipid and total cholesterol level were significantly decreased in case of Sunflower and Sesame Oil groups, while the same parameters got increased in *Safflower* oil group. Very Low Density Lipoprotein (VLDL) and Low Density Lipoprotein (LDL) were significantly decreased in Sunflower and Sesame oil groups while increased in *Safflower oil* group. However High Density Lipoprotein (HDL) showed significant increase in both *Sunflower* and *Sesame* oil groups. Cholesterol, triacylglycerol and fatty acids are significant and independent risk factors of adverse cardiovascular events. The clinical and nutritional implication of these results are discussed through ayurvedic point of view.

Keywords: Sunflower, Safflower, Sesame, Sneha, Dhatu, HDL, LDL, VLDL, Cholesterol, Gunas, Triglycerides.

Introduction

Sneha kalpana (Oil/Ghee) is an important dosage form of Ayurveda which is helpful in treating wide range of diseases. From the term "Snih" dhatu the word "Sneha" is derived. Sneha means fat or fatty material. Today most of the people are having high fat diet and they tend to have more *kled dushti* (disturbances in the fluid connective tissues of the body related to increased fat levels) in their body, which has a significant impact on Cholesterol levels which then tends to cause various disorders. It is important to know about Gunas (properties) of some commonly used edible oils and check about their properties acting on *kleda* (lipids). This, literary study will focus on three edible oils named *Kusumbha taila* (Safflower Oil), *Suryaphool Taila* (Sunflower Oil), and *Tila Taila* (Sesame Oil). *Sneha* (lipids)-*Sneha* is any substance that produces unctuousness, softness, moisture, increased secretions etc. in the body (2). *Sneha* is predominantly composed of basic elements – *prithvi* (earth) and *jala* (water). Hence, it is responsible for moisture, providing softness to the body while also playing a major role in producing strength. Sneha qualities can be described using adjectives such as *guru* (heavy), *sheeta* (cold), *sara* (agility), snigdha (unctuous*), manda* (slow), *sukshma* (penetrating), *mradu* (soft), *drava* (fluid), and *pichchila* (slimy) (3). These qualities make oleation therapy a prerequisite for most of the *Panchakarma* (five purification) procedures. Since, they help in ejecting impurities out through the gut. All *dhatus* (body tissues) require s*neha* for growth and maintenance. *Sneha* adds unctuousness to food preparations, necessary in the process of digestion. *Kapha* and *pitta* are two basic *doshas* that have *snigdhata* i.e unctuousness. *Sneha* therapy is mainly indicated for alleviation of *vata dosha*, which is the main etiological factor responsible for most of the neurological diseases. Modern medical science also gives importance to fats Vitamins A, D. E. and K are fat-soluble meaning they can only be digested, absorbed and transported using fats (4). Fats are also sources of essential fatty acids, an important dietary requirement. Fats play a vital role in maintaining healthy skin and hair insulating body organs against shock maintaining body temperature, and promoting healthy cell function.

Cholesterol is the major steroid found in animal tissues in the form of lipoproteins either in free forms inside the cells or combined form as esters in the blood

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circulation. Free cholesterol is usually converted to bile acids, while the cholesterol esters are the major storage and transport forms of cholesterol (4).

Unsaturated fatty acids in phospholipids of the cell membrane are important in maintaining membrane fluidity. The transport of cholesterol to and fro the liver is mediated by Low Density and High Density Lipoproteins (LDH and HDL). HDL is called the 'good cholesterol since it can exchange it with other lipid carriers and transports it to the liver for disposal in bile (4).

Major 4 Types of Sneha

According to *Charak Samhita Sutrasthana* (Ch su 13/13), *Ghrita* (clarified butter), oil (of sesame), *vasa* (muscle fat) and *majja* (bone marrow) are considered the best *sneha*. Among these, *ghrita* is superior as it possesses the qualities of *samskara* i.e. blending with other substances having different properties without losing its own properties.

- *Ghrita* alleviates *pitta* and *vata*, and is beneficial for *rasa, shukra and ojas*. Provides relief from burning sensation, softens the tissues, Improves voice and complexion.
- *Taila* alleviates vitiated *vata*, does not aggravate *kapha* (rather, it improves strength). It is very beneficial for the skin, *ushna virya*, increases stability, and purifies or cleanses the vaginal uterus.
- *Vasa* (muscle fat) is useful in healing punctured wounds, fractures, accidental trauma, prolapsed vagina, pain in ear and head, enhancing virility, oleation and for those doing physical exertion.
- *Majja* (bone marrow) improves strength, semen, *rasa, kapha*, *meda* and *majja* It especially strengthens bones and useful for oleation(5).

Among all varieties of oils, *Sesame* oil is considered the best and is ideal for giving strength and unctuousness. Castor oil is the best for *virechana* (purgation). It is pungent, *ushna virya* (hot potency), alleviates vitiated *vata* and *kapha,* guru (dense, viscous or heavy) in nature and when used with astringent, sweet, bitter drugs it also helps mitigate aggravated *pitta*.(6) Since the oil intake is directly proportional to the increase in the lipid profile, it is proposed to study the changes in lipid profile with various edible oil intake. Hence, the present study, is aimed to know the amount of the changes that occur in the lipid profile after consuming it continuously.

Materials and methods

Drug Standardization

Seeds of *Sunflower, Safflower and Sesame* were bought from an authorised Ayurvedic store and their powdered form was made. They were then used for standardization at Satara College of Pharmacy, Satara, under the guidance of Ms Sparsha Bandekar and factors such as Foreign Matter, Total Ash, Acid Insoluble Ash, Water and Alcohol Soluble Extractive, Thin Layer Chromatography were determined as per reference from Indian Ayurvedic Pharmacopoeia 2010.(7)

Oil Extraction

The three oils were extracted by cold press method without harming their natural contents in a local factory in Satara.

Animal Experimentation

The animal experimentation was carried out at Yashoda College of Pharmacy, Satara under the supervision of Dr. Vitthal Chaware Sir. Total 24 healthy Wistar albino rats were Selected for experimentation. The permission of Animal Ethical Committee was taken as per CPCSEA I before the experimentation. The animals were kept in a safe, clean and well ventilated animal house which also had light and temperature controlling system.

The Animals were divided into 4 groups, each group contained 6 animals. The first group has Normal Control which were not provided with any oil and they were kept on normal pellet diet and water. The second group was fed with *Sunflower* Oil 1ml orally daily with the help of rat needle and syringe. The same was carried out with 1ml of *Safflower* Oil and *Sesame oil* in Group 3 and 4 respectively for a period of 2 weeks, while also being on pellet diet and water.

Blood Collection

The blood was collected from each rat at the end of 7th day and 14th day. The blood was collected through the method of Retro Orbital Puncture (ROP), whereby the blood is collected by puncturing the retro-orbital plexus in rats by capillary tube. The animals were given mild anesthesia before the blood was collected. The blood was then collected in 5ml blood collection tubes which contained CAT serum clot activator.

Blood Reports

The blood samples were then sent to Bokil Metropolis for evaluating their lipid profiles.

Statistical analysis

All values are expressed as mean±S.D. and all changes were tabulated and presented.

Results and Discussion

The lipid profile of rats expressed as mean of 6 animals is being shown in table after 2 weeks of oil supplementation.

Table 1: Changes in lipid profile after 1st Week

Factor (mg/dl)	Control Group	Sunflower Group	Safflower Group	Sesame group
Total Cholesterol	57±3	59±1	69±5	60±1
Triglycerides	42±6	79.5±5	47±3	64.5±4.5
HDL	32.6±9	50±6	52±1	38±2.8
VLDL	8.4±1.2	16±3	26.2±3.8	12.9±0.9
LDL	7±2	13.5±1.5	16±2	14.5±1.5

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These results after 1st week of oil supplementation in the diet of albino rats were compared with the results of the second week values for the same diet supplementation.

The lipid profile of rats expressed as mean of 6 animals is being shown in table after 2 weeks of oil supplementation.

Table 2: Changes in lipid profile after 2nd Week

Factor (mg/dl)	Control Group	Sunflower Group	Safflower Group	Sesame Group
Total Cholesterol	61±4	50.5±5.5	79.5±2.5	54±1
Triglycerides	49.5±5.5	67.5±7.5	61±6	46.5±1.5
HDL	32±8	60.7±6	42.25±1.25	43±3.2
VLDL	11.3±1.3	18.5±3.5	27.8±3.5	9.3±0.3
LDL	8.5±2.5	12.3±1.3	20.5±1.5	12.5±15

The blood was collected through ROP procedure by capillary tube.

As per the tabular representation, the results were compared and inference was made.

Comparison of Total Cholesterol

The *Sunflower* and *Sesame oil* group animals shown significant decrease in total cholesterol levels and they almost has same amount of reduce in cholesterol levels while the *Safflower* controlled animals shown a significant increase in total cholesterol values. The normal control animals also shown slight increase in cholesterol as they were on normal pellate diet.

Comparison of Triglycerides

In this case *Sesame* group Animals shown highest amount of reduce in Triglycerides level followed by *Sunflower* controlled animals. While the *Safflower* Controlled animals shown increase in triglycerides levels along with slight increase in normal controlled animals.

Comparison In HDL Levels

In HDL levels, *Sunflower* oil group animals have shown greatest increase in HDL levels followed by *Sesame* oil while the *Safflower* group animals and Normal Control group Animals shown decrease in HDL values.

Comparison of VLDL Values

In the VLDL values, only *Sesame* Oil have shown decrease in the values while the rest three has shown slight increase in the VLDL values.

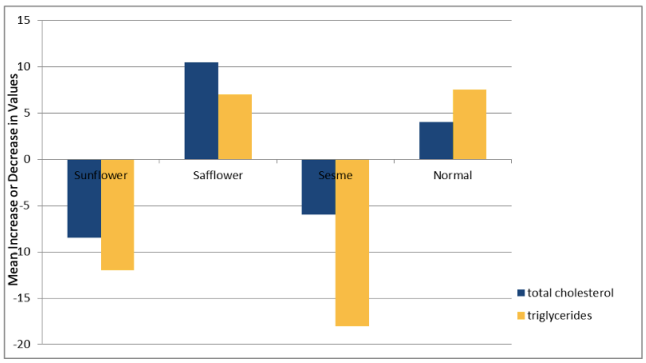
Comparison Of LDL values-

Sesame and *Sunflower* Oil have shown significant decrease in LDL values while Normal and *Safflower* Oil have shown an increase in LDL levels.

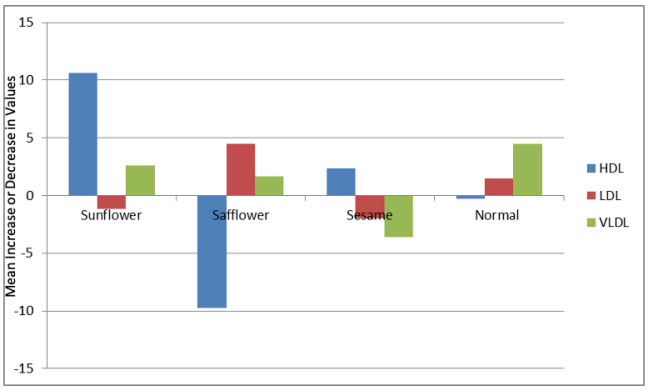
Graphical Evaluation of The Results

Graphs showing the mean values of oils lipid values as found out during the experimentation.

Graph 1



Graph 2



As per the above results, it is clear that *Sesame* oil does not offer better lipid profile control than *Sunflower* oil, while the *Safflower* oil is more worst option to consume.

Good amount of *Sesame* intake will promote digestion, prevents certain types of cancers, provides heart health, reduces the risk of obesity and controls type 2 diabetes. Sesame seeds are anti-inflammatory foods, because of the chemical content Sesamin. It is a rich compound found both in seeds and oil. Chronic inflammation can lead to obesity, cancer and ups the risk of heart diseases and kidney ailments. Sesamin can help control the inflammation and protects the heart and kidneys. Hence, it is recommended to take around 40 grams of sesame seeds daily, to witness around 10 per cent of reduction in total triglycerides.

Since ages, Sesame oil or tila tailam has been used for its extensive therapeutic applications and curative uses and hence it was mentioned time and again in several *Puranic* texts and Ayurvedic scriptures like *Charaka Samhita, Sarangadhar Samhita, Ashtanga Hrudaya, Bhaisajya Ratnavali* etc. The holistic science of Ayurveda acknowledges this powerful oil for the following main indications which include; *Kustha* (treats skin disorders), *Deepana* (enhances stomach fire), *Keshya* (treats hair problems), *Pachana* (helps in digestion), *Rochana* (stimulates appetite), *Vranahara* (helps treat wounds), *Shramahara* (relieves tiredness), *Krumihara* (relieves worms), *Sulaghnam* (relieves pain), *Rasayana* (rejuvenates the whole body, anti-

ageing), *Balya* (improves muscle strength), *Anila Shodhanam* (flushes morbid *Vata*), *Virechana* (treats constipation), *Gulmahara* (treats abdominal tumors), *Jwara hara* (treats fevers), *Medhakara* (improves intelligence), *Smritikara* (improves memory), *Dahahara* (relieves burning sensation), and *Varnya* (improves complexion).(8)

From *Yukti Pramana* we can use its compounds and some preparations in PCOS, Dental Health, Baby Growth, Ligament tear etc.

Sunflower seeds are rich in oleic and linoleic acid and low in saturated fats and sodium. They also contain magnesium, potassium and fibre. They help to lower blood pressure and serum cholesterol levels. Consuming them also reduces the occurrence of arrhythmias. All these effects help to protect our body from occurrence of cardiovascular disorders. Since the health benefits of *sunflower* oil are huge, it can also be used as alternative oil. It has almost same health benefits as of *Tila Taila* but still not as greater as *Tila Taila.*

The *Safflower* oil has shown very negative impact on health hence it should be avoided. It has- *Sarvadosh Prakopaka* (increases all the *doshas*), Guru (heavy to digest), *vidahi* (causes burning sensation in the stomach), *Ushna* (hot), *Sara* (spreads easily), *teekshna* (penetrating), *Raktapitta karaka* (increases blood and pitta), causes *Twacha Rogas* (Skin disorders) and many properties that can produce ill effects on health. (10)

Conclusion

Thus from the present study it can be concluded that Sesame oil can be used effectively for the reduction of all the components of the lipid profile. Whereas Sunflower oil is used to reduce the total cholesterol and Safflower oil controlled the triglycerides.

Future Scopes And Implementations-

As this study if an animal experimentation, the same may be carried out on the human subjects and conclusion can be drawn with adequate number of the patients.

This research will also help Practitioners to ease the communication between patients who cannot understand ayurvedic texts.

This research will be the baseline for further researches of this type that will take place at grand levels.

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References

1. *Safflower* Oil Intake Increases Total Cholesterol and LDL levels in an experimental model of metabolic syndrome-Lidiani Figueiredo,Espirito Santo,Brazil.
2. Sushruta. Sushruta Samhita. Edited by Jadavaji Trikamji Aacharya. 8th ed. Varanasi: Chaukhambha Orientalia;2005.
3. Vagbhata. Ashtanga Hridayam. Edited by Harishastri Paradkar Vaidya. 1st ed. Varanasi: Krishnadas Academy;2000.
4. Weber F, Absorption mechanisms for fat-soluble vitamins and the effect of other food constituents, Progress in clinical and biological research, 1981;77:119-35
5. Charak Samhita Chakrapani Teeka Sutrasthana Adhyaya 13 shlok 14/15/16/17
6. Charak Samhita Chakrapani Teeka Sutrasthana Adhyaya 13 shlok 12
7. Indian Ayurvedic Pharmacopoeia Part 1 vol 4 pg no 128.
8. Sri Bhavamisra, Bhavaprakasha, Edited with Vidyotini Hindi Commentary, vol I, Chaukhamba Sanskrit Sansthan, Varanasi, 9th edition 2005, chapter 20/shlok-1to7, p541.
9. Kaiyadev nighatu-kusumbha3/86-87,bhavaprakash nighantu purva khand-2/168.

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