



THE EFFECT OF COW GHEE ON LOWERING THE BLOOD GLUCOSE LEVELS IN DIABTEIC SUBJECTS & ITS FATTY ACID ANALYSIS

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Abstract: Ghee, also known as clarified butter has been utilized for thousands of years in Ayurveda as therapeutic agent. In ancient India, ghee was preferred as cooking oil. It's widely accepted in India due its flavor, aroma, nutritional properties and is considered as sacred food of India. Ghee is rich in antioxidants, fat soluble vitamins (vitamin A, E, K), calcium, protein and serve many health benefits such as wound healing, digestibility, lowering the risk of non-communicable diseases such as cancer, diabetes, cardiovascular diseases. The present thesis titled "THE EFFECT OF COW GHEE ON LOWERING THE BLOOD GLUCOSE LEVELS IN DIABTEIC SUBJECTS & ITS FATTY ACID ANALYSIS." focus on health benefits associated with ghee consumption among general population. Role of ghee in controlling blood glucose levels in clinically diagnosed cases of diabetes. Comparison of nutrient composition of cow ghee and buffalo ghee by proximate analysis was also done. 50 subjects were selected randomly for interviewing through online questionnaire from Hyderabad region. The questionnaire analyzed physiological, clinical and individual life factors. The outcome of the study showed that, blood glucose levels of clinically diagnosed cases of diabetes turned down after inclusion of cow ghee in their diet. This study also explored that cow ghee is healthier than buffalo ghee in terms of fatty acid composition.

Key words: therapeutic agent, antioxidants, diabetes, cow ghee, buffalo ghee.

I. Introduction:

Ghee is a form of highly-clarified butter that is traditionally used in Asian cooking. Like butter, ghee is typically made from cow's milk.

Ghee is made by melting regular butter. The butter separates into liquid fats and milk solids. Once separated, the milk solids are removed, which means that ghee has less lactose than butter.

Traditionally, ghee has been used as cooking oil, an ingredient in dishes, and Ayurveda therapies. Ghee is still used in Ayurvedic massage and as a base for herbal ointments to treat burns and rashes. Ghee is one of the important cooking mediums because the taste it adds to food is absolutely pleasant and also promotes good health. It remains a top choice among households in India in comparison to other fats or oils, with some trusted brands [milk food, Amul, Govardhan, Patanjali, and Britannia] having their stronghold in the market. Ghee deterioration may occur as a result of development of oxidized and / or rancid flavours. Basically, the thermal processing involved in ghee manufacturing lowest down the moisture content which plays an important role in destruction of most bacteria and further restricts them to grow. The shelf life of ghee may be off six - 8 months, even at ambient temperatures. Although, some studies reported it up to two years. However, such variations in shelf life could be due to regional preferences in the taste and many other factors. Furthermore, the storage stability of ghee depends on the low moisture content [0.2%] and high content of phospholipids and perhaps the free amino acids, which are liberated from the phospholipid-protein complex into the fat phase. The low acidity of the ghee and the presence of natural antioxidants are also believed to contribute to extend its shelf life. Cow ghee is apparently more shelf stable than the Buffalo ghee due to the higher content of natural antioxidants indeed former. Ghee (butter oil) is one of the most popular traditional dairy products in India. Since Vedic era, it has been used for religious rites, cooking, cosmetic, and medicinal purposes. In Ayurveda, ghee is placed under most sattvic foods and which help to promote positivity, growth and growth of consciousness.

AYURVEDIC POINT OF VIEW:

Ghee is heavily utilized in Ayurveda for several medical applications, inclusive of the therapy of hypersensitive reaction skin and respiratory diseases. In spite of its numerous health benefits, over the past few years, ghee has obtained unfavourable publicity due to its high cholesterol content and saturated fatty acid contents. However, it is vital for good health up to some extent, consuming it beyond the limit might also show detrimental health effects. The American coronary heart affiliation recommends limiting the consumption of saturated fats to less than 7% of energy to reduce the threat of cardiovascular disease. Ghee is a rich source of vitamins, antioxidants, and healthy fats. While fat should be consumed in moderation, studies show that eating fatty foods such as ghee can help the body absorb some essential vitamins and minerals. Cooking healthy foods and vegetables with ghee may help you absorb more nutrients.

1.1 NUTRITIONAL ANALYSIS COMPARISION OF COW GHEE AND BUFFALO GHEE:

Ghee mainly consists of fatty acids, saturated fat, monosaturated fat, poly saturated fat, trans fat, omega fatty acids, cholesterol, vitamin A, B, D, K, E and very less amount of water. Ghee contains essential fatty acids and fat-soluble vitamins which cannot be synthesized in our body, are supplied

by ghee. The milk fat components like CLA, sphingomyelin, butyric acid, other lipids having anti-carcinogenic potential are also supplied by ghee. It contains antioxidants like Vitamin E and beta carotene (600 IU) besides other nutrients like phospholipids, diglycerides and triglycerides.

Cow Ghee is recognized to be digested 96% which is very best as compared to all different vegetable or animal supply fats.

1.1.1 COW GHEE:

Cow ghee is yellow in colour, lighter in texture, taste delicious, and is amazing for health and possess innumerable amounts of vitamins, minerals, protein and calcium. Cow ghee is often considered as nectar, which have numerous kinds of attributes that work as medicine in ayurveda. It possesses a high amount of saturated fat [7.9 grams per serving] and is rich in essential nutrients with anti-bacterial, antifungal, antioxidant properties. Healthy organic cow help soothe conditions such as cough and cold, and phlegm issues. One can even massage cow's ghee (after heating) onto the chest to improve breathing. It enables us to maintain metabolism rate in the body as it contains conjugated linoleic acid. Consuming cow ghee for skin is extremely beneficial as its rich in antioxidants, which retains glowing skin and fight free radicles. Cow ghee which is most known and remembered as desi ghee. Many avoid having desi ghee thinking it will make them gain weight, it's actually a powerhouse of health benefits. Desi ghee is a rich source of protein, healthy fats, vitamin A, E and K. Desi ghee is good for your skin, hair, digestive and heart health. The white variety of ghee is made from buffalo's milk, the yellow one is made from cow's milk. Cow ghee is good for weight loss, it helps in reducing obesity in adults and children and is easy to digest. Cow milk has A2 protein, which is missing in buffalo milk. A2 protein is only available in cows' ghee. Cow ghee has an innumerable amount of protein, minerals, calcium, vitamins. Cow ghee helps the heart to perform well, reduces fatal blood cholesterol levels and improves the adequate blood cholesterol level

1.1.2 BUFFALO GHEE:

Buffalo ghee is white in colour and provides essential elements such as phosphorus, calcium and magnesium. It does not provide much health benefits but it has 100% fat content with no additional healthful nutrients. Buffalo ghee lacks properties which are present in cow ghee such as antibacterial, antifungal and antioxidant properties. As it is rich in fats, this key can be stored for longer durations. When it comes to the health benefits people who consume Buffalo ghee are said to have lesser cholesterol issues, more calories and more fat. It is amazing for maintaining healthy bones, gaining weight [because of additional calories], enhancing cardiovascular muscle activity. Buffalo ghee should be taken only by those who are engaged in physical, strenuous work. Buffalo ghee creates extra fat in the body. Buffalo ghee provides essential elements such as magnesium, calcium and phosphorus. Buffalo milk is more decadent in consistency as compared to cow milk.

Buffalo ghee has more fats and calories as compared to cow ghee. It also helps in cold, cough and phlegm issues and in retaining the joints and has anti-ageing effects.

1.2 TO EVALUATE THE ROLE OF GHEE IN CONTROLLING BLOOD GLUCOSE LEVELS IN CLINICALLY DIAGNOSED CASES OF DIABETES MELLITUS:

Diabetes is a chronic disease that causes blood sugar levels in the body to increase. It occurs when the pancreas does not produce enough insulin to break down and metabolise glucose, leading to excessive levels of blood glucose in the body. It's a progressive disease and can also lead to many complications in the body, such as heart diseases, kidney diseases, skin problems, eye disorders, etc. however, if managed properly, it may delay and even prevent these complications altogether. One of the most crucial tools to manage diabetes is a healthy diet. Eating a healthy and balanced diet helps to ensure that the optimum amount of glucose is provided to the body without increasing the blood sugar levels.

According to ayurveda, ghee is a medicine for diabetes. The fatty acids present in ghee help metabolize and balance high blood sugar levels in the body. Therefore, diabetes patients are often recommended to add a teaspoon of ghee to their diet.

AYURVEDIC POINT OF VIEW:

Dietitian advice ghee, especially Vedic ghee from cow's milk is medicine for diabetic people and proven to balance blood sugar level as the fatty acids present in it helps in glucose metabolism. Ghee is rich in linolenic acid which reduces the chances of acquiring cardiovascular disease and ensures healthy and smooth gut. The vitamin-A, D and K and antioxidants present in ghee help boost immunity, which is generally weakened in diabetes.

II. REVIEW OF LITERATURE:

2.1 Characterization of Desi Ghee Extracted by Different Methods Using Fluorescence Spectroscopy

In the current study, the effect of ghee extraction methods (direct cream DC, milk butter MB and milk skin MS) on its molecular composition has been investigated using Fluorescence spectroscopy. The excitation wavelength of 300 nm was found the best to produce pronounced spectral signatures of beta-carotene, vitamins and conjugated linoleic acid (CLA) in both cow and buffalo ghee types. Principal component analysis (PCA) has been applied on the spectral data to visualize the classification among ghee samples extracted by three methods. Both cow and buffalo ghee contain spectral signatures of vitamin A, E, K, D and CLA which has been verified through plotting loading vectors. The analysis of loading plots has been suggested that for cow ghee, MS extraction method conserve relatively higher concentration of beta carotene while DC and MB methods are a good choice for preserving relatively more concentrations of vitamins D, E and K. Similarly, for buffalo ghee, MS extraction method appear with higher concentration of CLA, whereas DC extraction method looks to preserve relatively higher concentration of vitamin A while MB method retains relatively low concentration of CLA and vitamins as compared to other two methods.

2.2 Cultural and Religious Influences in Diabetes Care in Great Britain

Type 2 diabetes is four times more common in people originating from the Indian subcontinent (Asians) than in white English Caucasians. British Asians with diabetes have been shown to have poorer blood glucose control, awareness of diabetes management, and knowledge of complications. The present study examined some of the dietary customs that can affect glucose control, problems with communication and diabetic education, and a brief description of health beliefs commonly held by Asian patients that may help the physician understand why some patients appear to show poor compliance with accepted Western medicine. Patients must always be approached as individuals with their own unique needs within the context of their cultural backgrounds.

2.3 Health benefits of ghee (clarified butter) - A review from ayurvedic perspective

Ghee is identified as valuable natural source of food which has several health benefits entirely beneficial to the human population. It is one of the popular ingredients in the Indian diet and takes prevalent position in the dairy industry market. The focus of the present review paper is the demonstrated and potential health benefits associated with the consumption of ghee. Consumption of ghee in an adequate amount, imparts various health benefits such as binds toxins, enhances complexion and glow of the face and body, an amazing rejuvenator for the eyes, increases physical and intellectual stamina etc. in addition to imparting sustaining energy.

2.4 High-monounsaturated-fat diets for patients with diabetes mellitus: a meta-analysis

The most recent position statement on nutrition from the American Diabetes Association recommends an individualized approach to nutrition that is based on the nutritional assessment and desired outcomes of each patient and that takes into consideration patient preferences and control of hyperglycemia and dyslipidemia. To achieve these nutritional goals, either low- saturated- fat, high carbohydrate diets or high mono unsaturated fat diets can be advised. A meta-analysis of various studies comparing these two approaches to diet therapy in patients with type 2 diabetes reveal that high mono unsaturated fat diets improve lipoprotein profiles as well as glycemic control. High mono unsaturated fat diets reduce fasting plasma triacylglycerol and VLDL cholesterol concentrations by 19% and 22%, respectively, and cause a modest increase in HDL cholesterol concentration without adversely affecting LDL cholesterol concentrations. Furthermore, there is no evidence that high mono unsaturated fat induce weight gain in patient with diabetes mellitus provided that energy intake is controlled. Therefore, a diet rich in cis-mono unsaturated fat can be advantageous for both patients with type one or type 2 diabetes who are trying to maintain or lose weight.

2.5 EVALUATION OF EFFECTS OF MILK LIPID (GHEE) SUPPLEMENTATION AND THERMAL ENVIRONMENT ON THE METABOLIC PROFILE OF ALLOXAN-DIABETIC RABBITS (*Oryctolagus cuniculus*)

The type of dietary fat and thermal environment may influence the metabolic profile and insulin sensitivity in normal and diabetic conditions. The objective of this study was to evaluate the effects of supplements with anhydrous milk fat, G [FS] and season [summer versus winter] on blood metabolites and body weight [BW] in alloxan-diabetic and non-diabetic rabbits. In each season, 20 rabbits were assigned to four groups of five animals each. Two groups were rendered diabetic using alloxan monohydrate injection. Two groups, a normal and a diabetic received orally 2.5g/kg/ body weight of ghee daily for eight weeks. Blood samples collected weekly were used for determination of insulin and blood metabolite concentrations. During summer, insulin level for the diabetic and non-diabetic fat supplemented rabbits was higher than the non-diabetic rabbits fed lucerne. Diabetic fat supplemented rabbits had 24% slightly higher insulin level than diabetic group fed Lucerne. Glucose level was significantly higher in diabetic groups and glucose level of fat supplemented diabetic rabbits were significantly higher than respective values of diabetic group fed Lucerne only. Glucose level of diabetic groups was significantly higher in summer. In both seasons, serum total lipids were significantly higher in diabetic than non-diabetic groups. Total lipids were significantly higher in fat supplemented diabetic group in summer. Fat supplementation increase triglyceride levels in diabetic and non-diabetic animals, triglyceride level was significantly lower in winter in non-diabetic groups of rabbits. In both seasons, the fat supplemented diabetic significantly higher serum cholesterol level than the diabetic control and non-diabetic groups of rabbits. The cholesterol level in fat supplemented non diabetic rabbits were significantly higher during winter. In both seasons, serum urea level was significantly higher in diabetic groups. Diabetic groups showed significantly higher serum urea during winter when compared to summer values. Creatinine level of fat supplemented non diabetic group was higher during summer. During summer, diabetic groups showed significantly lower mean body weight than non-diabetic groups, while with fat supplemented, non-diabetic group showed significantly greater mean body weight than the other groups. Diabetic fat supplemented group had significantly lower mean body weight during winter. The findings have implications in pathophysiology and nutritional management of diabetic mellitus.

III. METHODOLOGY:

3.1 Aim: To evaluate the role of ghee in controlling blood glucose levels of diabetic people and to know nutrient comparison between cow ghee and buffalo ghee.

3.2 Objectives:

- To know the Prevalence of ghee consumption among various age groups categorized randomly.
- To assess the Knowledge and misconceptions about ghee among the general population.

- To evaluate the role of ghee in controlling blood glucose levels in clinically diagnosed cases of diabetes.
- To compare the nutrient composition of cow ghee and buffalo ghee by proximate analysis.
- To create awareness among people about how ghee plays a role in improving various health issues like gastric problems, lowering diabetes, wound healing properties, maintaining bone health etc.

3.3 METHODOLOGY:

Research approach: Experimental-analytical study

Selection of area: A correlational study is done in Hyderabad city.

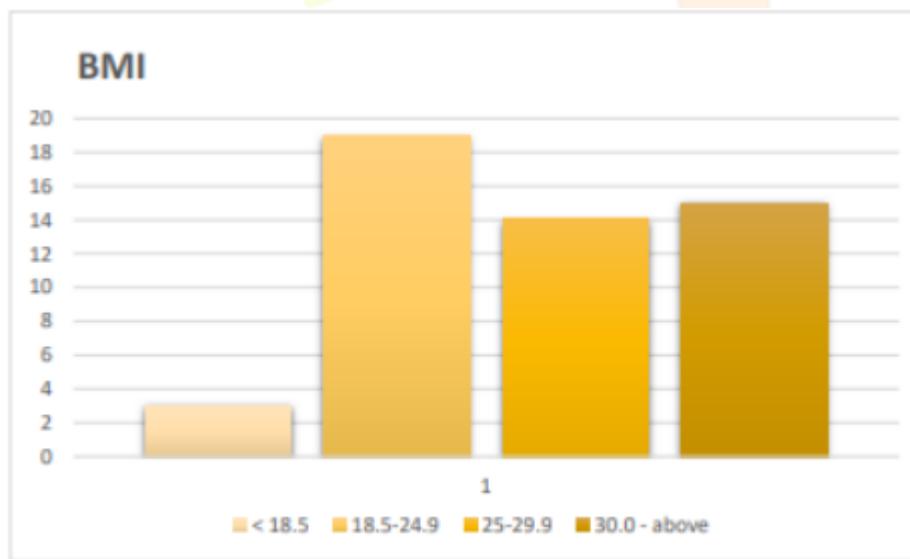
Selection of sample: 50 samples were selected randomly to create awareness.

Research period: 75 days (1st June 2022 to 15th August 2022)

Collection of data:

Questionnaire: The questionnaire contained questions related to general information, complete ghee consumption details, knowledge of ghee consumption among diabetic people.

IV. RESULTS AND DISCUSSION:



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Figure 4.1 - it is noticed that 3 members of the population have the BMI of < 18.5, 19 members are with the BMI between 18.5 – 24.9, 14 members are with the BMI between 25 – 29.9 and 15 members are with the BMI of 30.0 – above respectively.

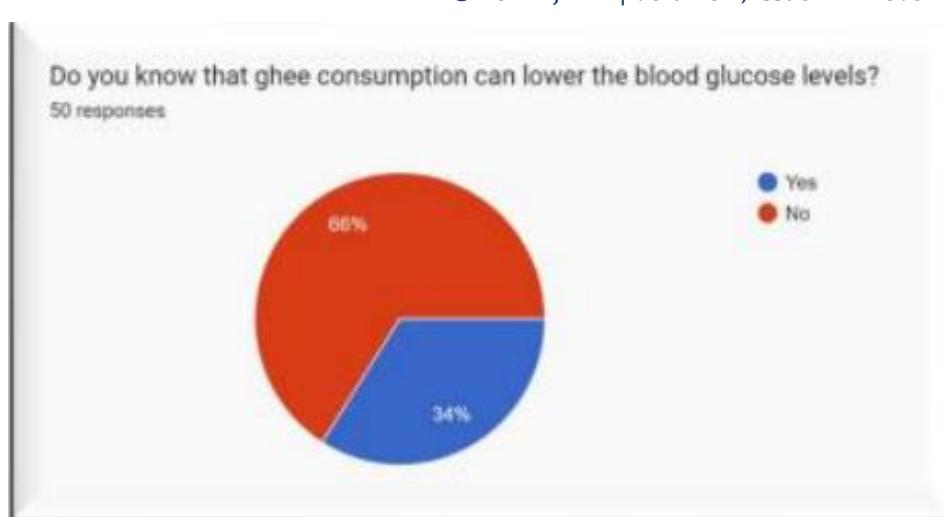


Figure 4.2 - from the above figure, it is perceived that 66% of the population are unaware that ghee helps to reduce the blood glucose levels of clinically diagnosed diabetes people. 34% of them are aware that ghee helps to reduce the blood glucose levels of clinically diagnosed diabetes.

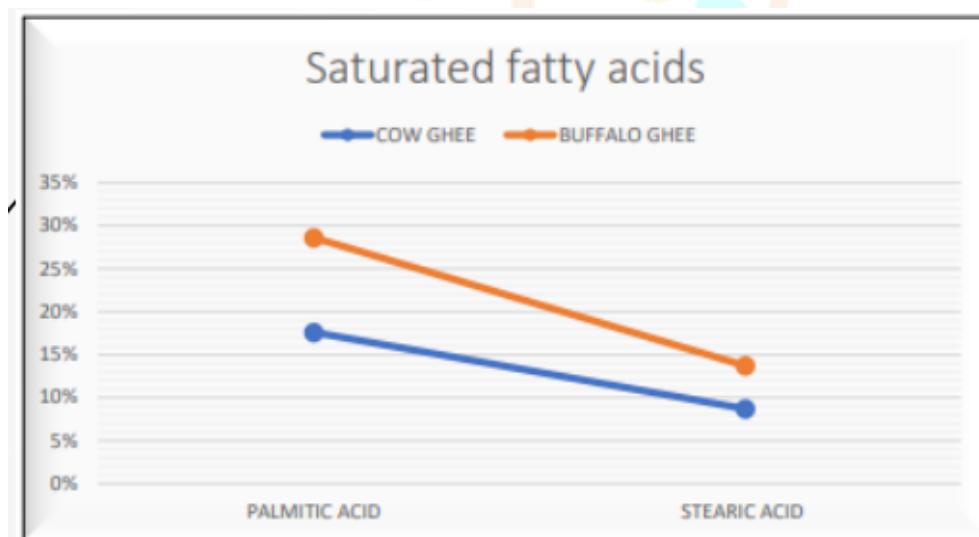


Figure 4.3 - Saturated fatty acids chosen for analysis are palmitic acid and stearic acid. From the above graph, it is perceived that buffalo ghee has more saturated fatty acids compared to cow ghee.

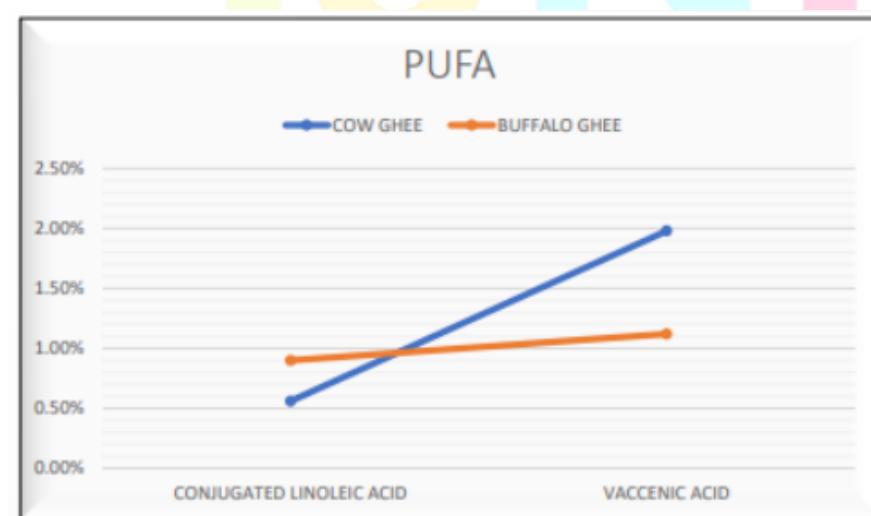


Figure 4.4 - The PUFA chosen for analysis are conjugated linoleic acid and vaccenic acid respectively. From the above line graph, it is observed that cow ghee is rich in polyunsaturated fatty acids than buffalo ghee.

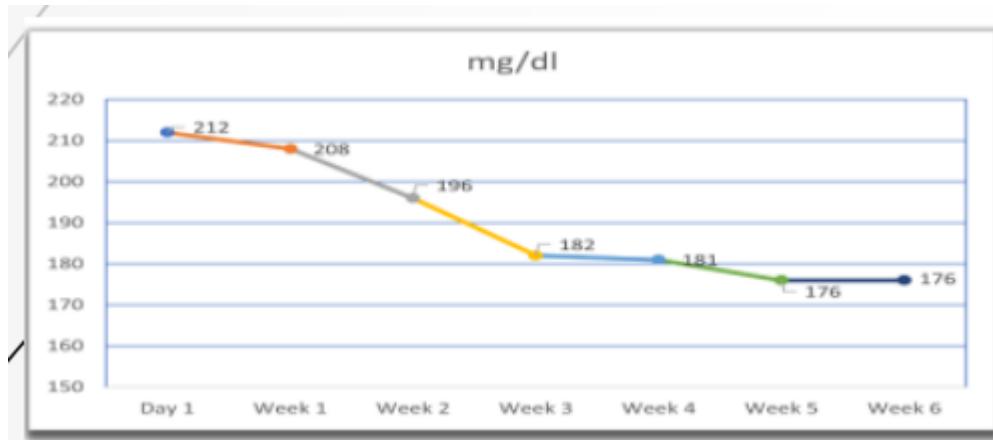


Figure 4.5 – Random blood glucose levels of a male patient, on day1 it was 212mg/dl and gradually it came down to 176mg/dl on week 6. By following a strict diabetic diet and using cow ghee his levels were managed.

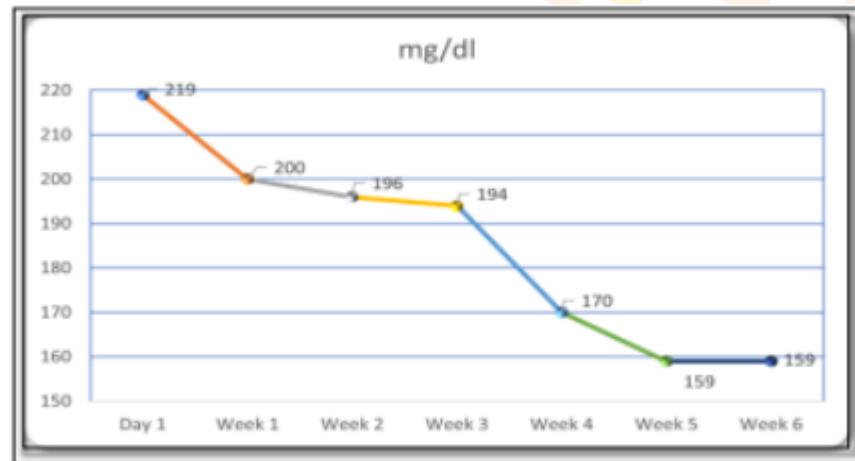


Figure 4.6 – Random blood glucose levels of a female patient, on day 1 it was 219mg/dl and it gradually came down to 159mg/dl, by following a strict diet and consuming cow ghee.

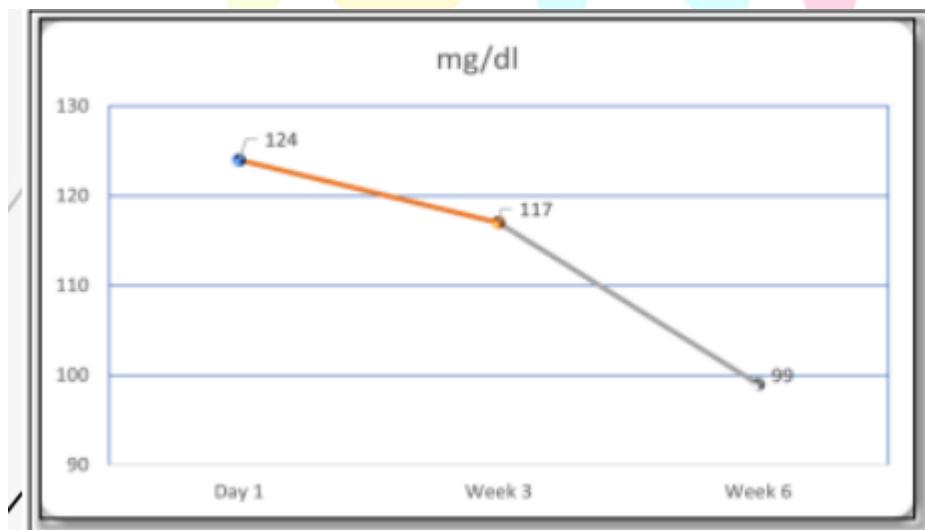


Figure 4.7 – Fasting blood glucose levels of a male patient, on day 1 it was 124 mg/dl and it was 117 on week 3 and it gradually came down to 99mg/dl, by following a strict diet and consuming cow ghee.

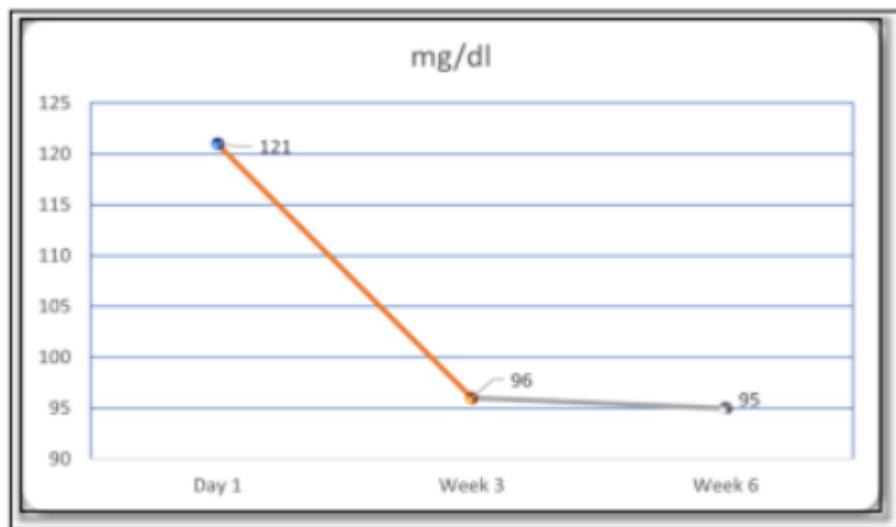


Figure 4.8 – Fasting blood glucose levels of a female patient, on day 1 it was 121mg/dl on week 3 and it gradually came down to 96mg/dl and 95mg/dl, by following strict diet and consuming cow ghee.

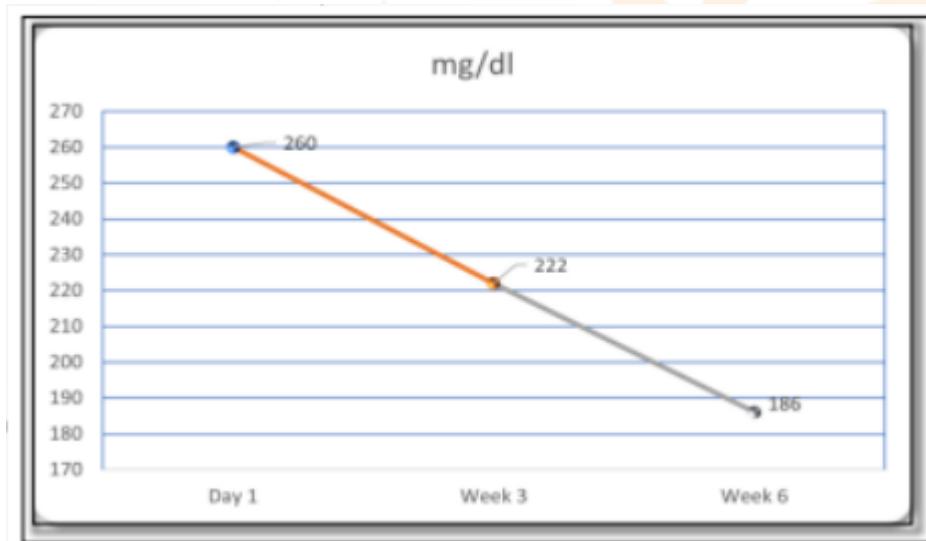


Figure 4.9 – Post prandial blood sugar levels of a male patient, on day 1 it was 260 mg/dl and it was 222 mg/dl on week 3 and it gradually came down to 186 mg/dl, by following a strict diet and consuming cow ghee.

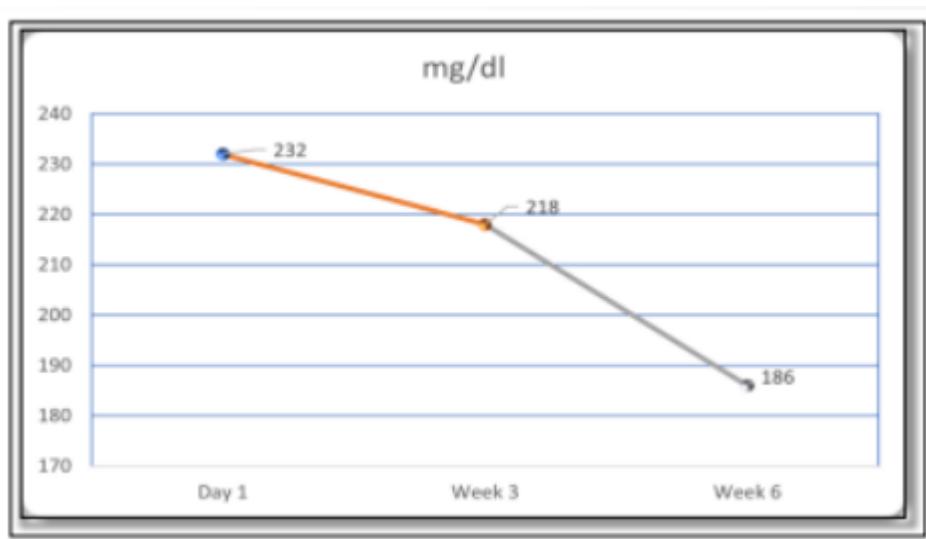


Figure 4.10 – Post prandial blood sugar levels of a female patient, on day 1 it was 232 mg/dl and it was 218 mg/dl on week 3 and it gradually came down to 186 mg/dl, by following a strict diet and consuming cow ghee.

V. SUMMARY AND CONCLUSION:

Ghee, a healthy saturated fat, is one of the most popular traditional dairy products in India. It's a form of highly-clarified butter typically made from cow's and buffalo milk. Ghee, made by melting butter for a longer period of time which provides a strong and nuttier flavour to it. Its well-recognised for its nutritional, functional and organoleptic properties. Like other food products, ghee can also deteriorate due to the development of rancid flavours and lasts for 6-8 months. In Ayurveda, ghee is placed under sattvic foods, which help increase positivity and growth of consciousness. Its rich in many vital fat-soluble vitamins, energy and essential fatty acids. It has anti-oxidant properties and also beneficial for human health in various ways such as treating burns and swellings, wound healing, lowering the risk of cancer, controlling blood sugar levels, cataracts. Cow ghee and buffalo ghee differ among each other in terms of nutrients present in them. Cow ghee is considered as "desi ghee" is yellow in colour and light in texture and is rich in many fat-soluble vitamins such as vitamin-A, E, K, protein and minerals such as calcium. It has significant effects in promoting weight loss, heart muscle function, controlling blood sugar levels in diabetes etc. Buffalo ghee called as white ghee, rich source of phosphorus, magnesium, calcium and fats. Maintain healthy bones, helping to gain weight, treating stomach ulcers are some of their benefits. Diabetes, a chronic disease that increases the blood sugar levels in the body leading to accumulation of excess of glucose in the body. Important tool for people clinically diagnosed with diabetes, is a healthy feeding habit and ghee is considered as a medicine for diabetes, especially cow ghee. Cow ghee is rich in calcium, magnesium, fat-soluble vitamins such as vitamin A, E, K which has anti-diabetic properties. Therefore, 1 teaspoon of ghee is advised in the diet of diabetic people. The objectives of the thesis were to know the prevalence of ghee consumption among the various age groups and

to access the knowledge and misconceptions about ghee, also to evaluate role of ghee in controlling blood glucose levels in clinically diagnosed cases of diabetes. The study also focuses on comparing nutritional composition of Cow ghee and Buffalo ghee by proximate analysis and to create awareness among people about how ghee plays an important role in improving various health issues like gastric problems, lowering diabetes, wound healing, maintaining bone health. The study was experimental- analytical study conducted in the region of Hyderabad. Samples were collected among random population of 50 subjects through an online questionnaire. The results are as follows:

The first objective of the study was to know the Prevalence of ghee consumption among various age groups categorized randomly. The results show that Majority of them covered in the survey consume ghee, 86% respectively and 8% of them doesn't consume.

The next objective of the study was to assess the Knowledge and misconceptions about ghee among the general population. The results show that 88% of the population recognize ghee as a healthy fat and 12% of them believes that ghee is an unhealthy fat. Ghee consumption can increase body weight was accepted by 40% of the population. 38% of them did not agree with the point that ghee consumption can induce weight gain and 22% are not sure about the relation of ghee consumption and weight gain.

The next objective is to evaluate the role of ghee in controlling blood glucose levels in clinically diagnosed cases of diabetes. The outcomes depicted were, 44% of the population covered are aware about the health benefits of ghee in diabetes and 56% are unaware. 34% of the people are aware that ghee helps to reduce the blood glucose levels of clinically diagnosed diabetes and 66% are unaware. 34% of them are knowledgeable about beneficial effect of ghee in reducing cholesterol and 42% are not knowledgeable and 24% are not sure.

The next objective is to compare the nutrient composition of cow ghee and buffalo ghee by proximate analysis. the results revealed were, the lipid content present in cow ghee is 97.6%. It had 0.6% of water present in it and other than these, remaining particles are SNF (solid not fat) which are 1.8%.⁶⁷ The lipid content present in buffalo ghee is 99.2% and the water content present is 0.3%. Other than these, remaining particles 0.5% are SNF particles.

The next objective is to create awareness among people about how ghee plays a role in improving various health issues like gastric problems, lowering diabetes, wound healing properties, maintaining bone health etc. the results revealed were, most of the people, 52% are unaware of the fact that key consumption can decrease acidity. 28% are aware that ghee helps in lowering acidity and 20% are not sure. 34% of the people are aware that ghee helps to reduce the blood glucose levels of clinically diagnosed diabetes and 66% are unaware.

From the above study, it can be concluded that, ghee is a healthy saturated fat which has many health benefits such as lowering diabetes, helps in wound healing, promoting weight loss and weight gain, treating stomach ulcers. In terms of nutrients present and benefits specified, cow ghee is healthier than buffalo ghee. Cow ghee

also play a major role in lowering clinically diagnosed cases of diabetes. Being rich in polyunsaturated fatty acids, cow ghee helps in metabolising and balancing blood glucose levels which are proven to be beneficial in people with diabetes. Buffalo ghee show similar health benefits, as its rich in saturated fatty acids such as palmitic acid and stearic acid, it plays a major role in increasing weight, helps treat ulcers, enhancing cardiovascular muscle activities.

VI. BIBLIOGRAPHY:

- A Mahakalkar P Kashyap R Bawankar B Hathwar, 2020. The versatility of cow ghee- An ayurveda perspective Am J Drug Delivery and Ther2014112834. <https://www.jnmhs.com/article-details/12521>
- Achaya, KT (1997). Ghee, vanaspati and special fats in India. In , Lipid Technologies and Applications, eds F.D. Gunstone and F.B. Padley. Marcel Dekker Inc., New York: 369-390. https://www.researchgate.net/publication/339499398_Ghee_Its_Properties_Importance_and_Health_Benefits
- Andrewes, P., 2012. Changes in maillard reaction products in ghee during storage. Food Chem., 135: 921-928. <https://scialert.net/fulltext/?doi=pjn.2019.1107.1114>
- Anil Kumar Shreya Tripathi Nidhi Hans Falguni pattnaik Satya Narayan Naik. Ghee: Its Properties, Importance and Health Benefits. Research gate.net publication2018 <https://www.jnmhs.com/article-details/12521>
- <https://livayur.com/can-ghee-be-used-for-diabetics-management/nutritiousfood>
- <https://onlinelibrary.wiley.com/doi/10.1111/j.1464-5491.1993.tb01989.x>
- <https://pubmed.ncbi.nlm.nih.gov/9497173/>
- <https://www.anveshan.farm/blogs/anveshan-blog/ghee-for-diabetes>
- J Agric Food Chem. 2005 Feb 9;53(3):759-66 - PubMed <https://pubmed.ncbi.nlm.nih.gov/31758370/>
- Jequier, E., 1998. Effect of lipid oxidation on glucose utilization in humans. Am. J. Clin. Nutr., 67: 527S-530S. <https://scialert.net/abstract/?doi=jbs.2013.196.206>
- K Chinnadurai H Kanwal A Tyagi C Stanton P Ross, 2020. High conjugated linoleic acid enriched ghee (clarified butter) <https://www.jnmhs.com/article-details/12521>

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