The impacts of milk butter from iraqi-bred cows fed on a diet mixed with fenugreek seed on the lipid profile of wistar rats in al-diwaniyah city, Iraq

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Abstract
The current study was carried out to study the impacts of milk butter from Iraqi-bred cows fed on a diet mixed with fenugreek seed on the lipid profile of Wistar rats in Al-Diwaniyah City, Iraq. The experiment contained the recruitment of 10 lactating locally-bred cows (LLBCs) fed with 12.5gm/animal/day for 24months of soaked fenugreek seeds (SFSs), SFS group. As a cow control (CC) group, 10 LLBCs were used with no treatment. After the end of this experiment, the milk was utilized to produce butter. Then, the SFS-originated butter (SFSB) was orally-administered to 10 rats at 0.08mg/kg daily for 30 days, SFS group. For the rat control (RC) group, 10 rats were orally-administered with CC-originated butter (CCB) at 0.08mg/kg daily for 30 days, CCB group. After the end of the rat experiment, the body weight and serum profile of lipids of rats for both SFSB and CCB groups were measured. The result showed that the oral supply of the butter from SFS cows induced potentially (p<0.05) increased in the HDL levels in the SFSB rats. In addition, the LDL and VLDL from the same rats revealed no significant (p>0.05) changes after using the butter originated from the cows treated with SFS. Significant (p<0.05) elevations were recorded in the levels of TC, TG, and weights in the rats treated with the butter produced from the SFS cow milk. The study concludes that feeding cows with fenugreek seeds has successful impacts in increasing the levels of HDL "good lipid" and decreasing the levels of LDL and VLDL "bad lipids" in the rats treated orally with butter produced from these cows.

Keywords: Atherosclerosis, blood hypertension, cow milk, fenugreek seeds.

Introduction
Fenugreek, or Trigonella, is a member of the Fabaceae family and gets its name from the Latin word for "little triangle" because of the shape of its flowers. Trigonella foenum-graecum L., commonly known as fenugreek, has been used medicinally since at least 4000 B.C. In 1500 B.C. Egypt, the Ebers Papyrus (one of the oldest known preserved medicinal documents) described the herb and its advantages. Indian, Pakistani, Afghan, Iranian, Nepalese, Egyptian, French, Spanish, Turkish, Moroccan, North African, Middle Eastern, and Argentine farmers all cultivate it commercially [1]. Fenugreek seeds (FSs) are loaded with useful compounds like phospholipids and glycolipids, oleic, linolenic, and linoleic acids, choline, vitamin A, B1, B2, C, nicotinic acid, niacin, and many others [2,3].

The health benefits of fenugreek have been connected to the herb's potent antioxidant characteristics. Notably, sprouting seeds outperform dry seeds that haven't sprouted in this regard. But fenugreek's aqueous fraction shows much stronger antioxidant potential than flavonoids and phenolics [4]. To name a few, fenugreek includes flavonoids, alkaloids, saponins, and other antioxidants in relatively high concentrations. Among the many phenolic compounds found in the seed extract are gallic acid, protocatechuic acid, catechin, gentisic acid, chlorogenic acid, vanillic acid, and syringic acid. The alkaloids in fenugreek, mostly trigonelline, make up 35% of the endosperm. All of these chemicals are considered biologically active because they produce pharmacological impacts in the human body after ingestion [5]. Therefore, as they have hypoglycemic, antilipidemic, anticarcinogenic, and cholagogic characteristics, their utilization should be encouraged in daily diet for the management of hypercholesterolemia, cancer, and diabetes mellitus. The volatile oils and alkaloids that contribute to the plant's unpleasant odor and bitterness and flavor can be removed prior to consumption [6,7].

The current study was carried out to study the impacts of milk butter from Iraqi-bred cows fed on a diet mixed with fenugreek seed on the lipid profile of Wistar rats in Al-Diwaniyah City, Iraq.

Materials and Methods
Ethical procedures
All ethical criteria involving the care and use of cows and rats were followed according to national and international guidelines.

Experiments
The experiment contained the recruitment of 10 LLBCs fed with 12.5gm/animal/day for 24 months of SFSs, SFS group;
dose was the quarter of the dose used by Kirar et al. [8], who used SFS for 90 days only, and because the long period of treatment in the current study, which lasted for 24 months, a low dose was recommended. As a CC group, 10 LLBCs were used with no treatment. After the end of this experiment, the milk was utilized to produce butter. Then, the SFSB was orally-administered to 10 rats at 0.08mg/kg daily for 30 days, SFSB group. For the RC group, 10 rats were orally-administered with CCB at 0.08mg/kg daily for 30 days, CCB group. The initial weight for all rats were between 162 to 185gm. All animals, cows and rats were housed under standard conditions and randomly assigned for the experimental groups. After the end of the rat experiment, the body weight and serum profile of lipids (high density lipoprotein (HDL), low density lipoprotein (LDL), very low density lipoprotein (VLDL), triglycerides (TG), and total cholesterol (TC)) of rats for both SFSB and CCB groups were measured.

Statistical procedures
The GraphPad Prism v7.0 was used to analyze the finding data, which were presented, elsewhere, as mean±SEM, and computed for any significance in differences between groups using student-t-test. The value of less than 5% was considered as significance.

Results
The lipid profiles of cow serum and milk were not changed after the end of the cow experiment (data not shown). The result showed that the oral supply of the butter from SFS cows induced potentially \((p<0.05)\) increased in the HDL levels in the SFSB rats. In addition, the LDL and VLDL from the same rats revealed no significant \((p>0.05)\) changes after using the butter originated from the cows treated with SFS. Significant \((p<0.05)\) elevations were recorded in the levels of TC, TG, and weights in the rats treated with the butter produced from the SFS cow milk (Table 1).

![Graph showing lipid profile changes](image)

**Table 1:** The concentrations of lipid profile and body weights in rats orally-treated with butter produced from milk of cows fed with soaked fenugreek seeds.

Discussion
There are a number of natural food supplements that have been utilized to improve product quality and safety, such as lowering cholesterol in milk, as well as animal health and efficiency. Plants from the leguminous family, like fenugreek, are used to create feed additives. It can be observed in every region of the world. These seeds have many uses, including as a source of nutrition for humans, cattle, and sheep, as well as a means of enhancing lactation and milk production in female ruminants [8].

The lipid profiles for both cow serum and milk were not altered due to the use of SFS and this agrees with Kirar et al. [8], who also didn’t recognize changes in any of these parameters in buffalos after using SFS for 90 days. Expanding the fenugreek threshold to 15% in Nubian goats led to a reduction in blood glucose level, but the difference was not proportionally meaningful, as published by Babekir [9]. A significant reduction in serum cholesterol and total protein presence was also noted after dosage with FSs at doses of 5%, 10%, and 15%. Hamdani ewes had no noticeable difference in cholesterol and globulin concentrations when FSs were added to their basal ration at levels of up to 1.2 g/kg live body weight, as revealed by Al-Sherwany [10]. Although, the present work didn’t find changes in the lipid profiles of cow serum and milk, the study revealed significant changes in the levels of some serum lipids of the rat treated with SFSB. These changes could be due to important modifications in the lipid quality and structures of the milk belonged to the cows treated with SFS for 24 months. For example, the saturation, carbon length, and isometry of fatty acyl moieties in phospholipids all have unique effects on health. Physical and biological membrane characteristics including surface packing of lipids, thickness of bilayer, lipid lateral mobility, distribution of microdomain are all influenced by alterations in membrane lipids. Thus, the electric charge, curvature of membrane, existence of particular lipids, etc., of a given membrane determine the excess and category of peripheral signaling proteins available at that membrane. Therefore, these changes in the signals may affect the type of blood lipoproteins present in certain animals, especially those rats treated with SFSB [12–15].

Conclusion
The study concludes that feeding cows with fenugreek seeds has successful impacts in increasing the levels of HDL “good lipid” and decreasing the levels of LDL and VLDL “bad lipids” in the rats treated orally with butter produced from these cows.

References


