INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACY AND CHEMISTRY

Available online at www.ijrpc.com

Review Article

DOI: https://dx.doi.org/10.33289/IJRPC.10.1.2020.10(23)

FENUGREEK (*TRIGONELLA FOENUM GRAECUM*) AS ANTI-HYPERLIPIDEMIC AGENT AND LACTATIONAL AID: A REVIEW

K. Sai Chandra Mohan*, CH. Sowmya, K. Neelima,

P. Subhramanyeswari and P. Srinivasbabu

Vignan Pharmacy College, Vadlamudi-
522 213, Andhra Pradesh, India.

ABSTRACT

Herbs are used as medicine in various countries by around 80% of people around the world principally in developing countries. Fenugreek (Trigonella foenum graecum) commonly known as Methi is an annual herb belonging to the family Papilionaceae. Its seeds are rich source of protein, minerals, vitamins, alkaloids and volatile compounds. In addition, it has broad spectrum of therapeutic properties. It has been used for varied indications in aiding digestion and as general tonic to improve metabolism and health. Human and animal trail suggest that possible antihyperlipidemic and lactation induced properties of oral fenugreek seed powder. Primary active compound of fenugreek is diosgenin, a steroid sapogenin it also contains alkaloids, including trigonelline, gentianine, and carpaine compounds. The seeds also contain fiber 4-hydroxyisoleucine and fenugreekine which are responsible for the anti-hyperlipidemic and lactation effects of fenugreek. The aim of this review is to revel the therapeutic uses of fenugreek mainly inducing lactation and cholesterol lowering action.

Keywords: Fenugreek, Lactation, Cholesterol and Anti-hyperlipidemic.

INTRODUCTION

Fenugreek (Trigonella foenum graecum) is an annual plant from the family Papilionaceae widely cultivated in India and Mediterranean region. Fenugreek seeds are well known for their pungent aromatic properties as a spice. Recently spice therapies are seen useful and effective. For centuries it has been used in folk medicine to heal a range of ailments.

Abnormalities in lipid metabolism are associated with dyslipidemia, obesity, cardiac diseases and associated disorders[1]. Treatment of dyslipidemia and other related metabolic disorders include modern anti-hyperlipidemic drugs which cause side-effects and impose economic burden[2]. Fenugreek seeds are good sources of soluble dietary fiber (SDF) and their composition have earlier bean shown to bring about a significant reduction in serum and liver cholesterol levels[3].

Breast milk is a complex physiologic group linking significant and stimulating factors and they make contact with quite a lot of hormones. Galactagogue's or lactogogues are medications believed to support commencement, maintenance, or rise of milk production in animals and humans[4,5]. Frequent botanicals have been used as galactagogue's in folk medicine. The most universally used is fenugreek.

ANTI-HYPERLIPIDEMIC ACTION

Hyperlipidemia is characterized by elevated serum total cholesterol low density and decreased high density lipoproteins levels which is the main causative factor in the development of cardiovascular diseases like Atherosclerosis, Coronary Artery Diseases (CAD) and many other cardiac conditions like Angina, Myocardial

infraction etc.[6] Cholesteryl esters and triglycerides, water insoluble lipids are the fundamental components and apoproteins phospholipids and unesterified cholesterol water soluble components are positioned on the surface and perform regular functions but due to defect in the lipid metabolism whether genetically or due to sedentary life style, there is a disturbance in the lipoprotein lipase activity or due to absence of surface Apoprotein C-II, the end result is hyperlipidemia[7].

Categorization of Lipids

The lipids describe the entire class of fats and fat like substances in the blood. The most important lipids in the blood are[8]

1. Fatty acids
2. Cholesterol
3. Cholesterol esters
4. Tri-glycerides
5. Phospholipids

Lipoproteins

Lipoproteins are majorly classified into five types based on their physico-chemical properties. The various type of lipoproteins are classified in the Figure 1.

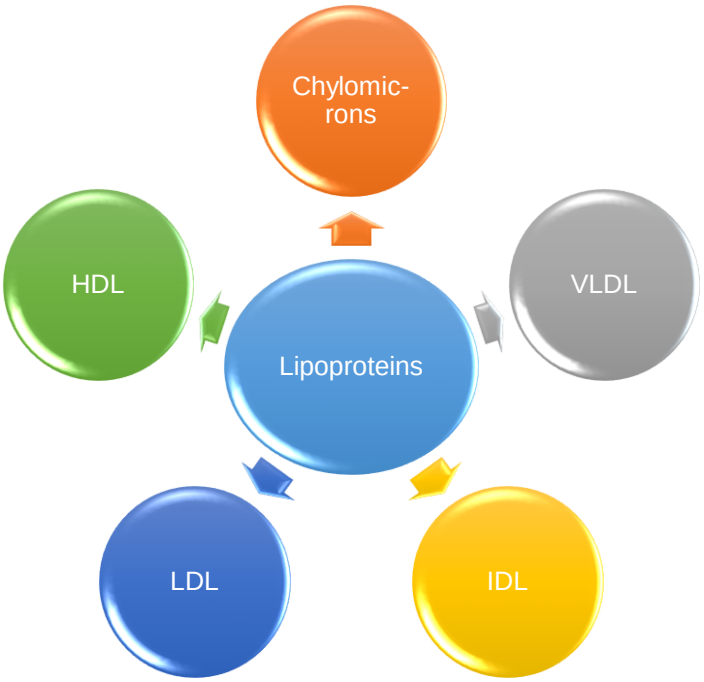

Fig. 1: Classification of lipoproteins

They are macromolecular complexes that carry hydrophilic plasma lipids. They are spherical particles made up of hundreds of proteins and lipid molecules. The major lipids of lipoproteins are cholesterol, triglycerides (TGs) and phospholipids[9]. Some of the lipoproteins with different function are discussed in the Table 1: Table 1: Physical properties of lipoproteins.

Hyperlipidemia is basically classified as of primary and secondary type based on the cause of the disease in individual. The pathology of both types of hyperlipidemia was summarized in the Figure 2.

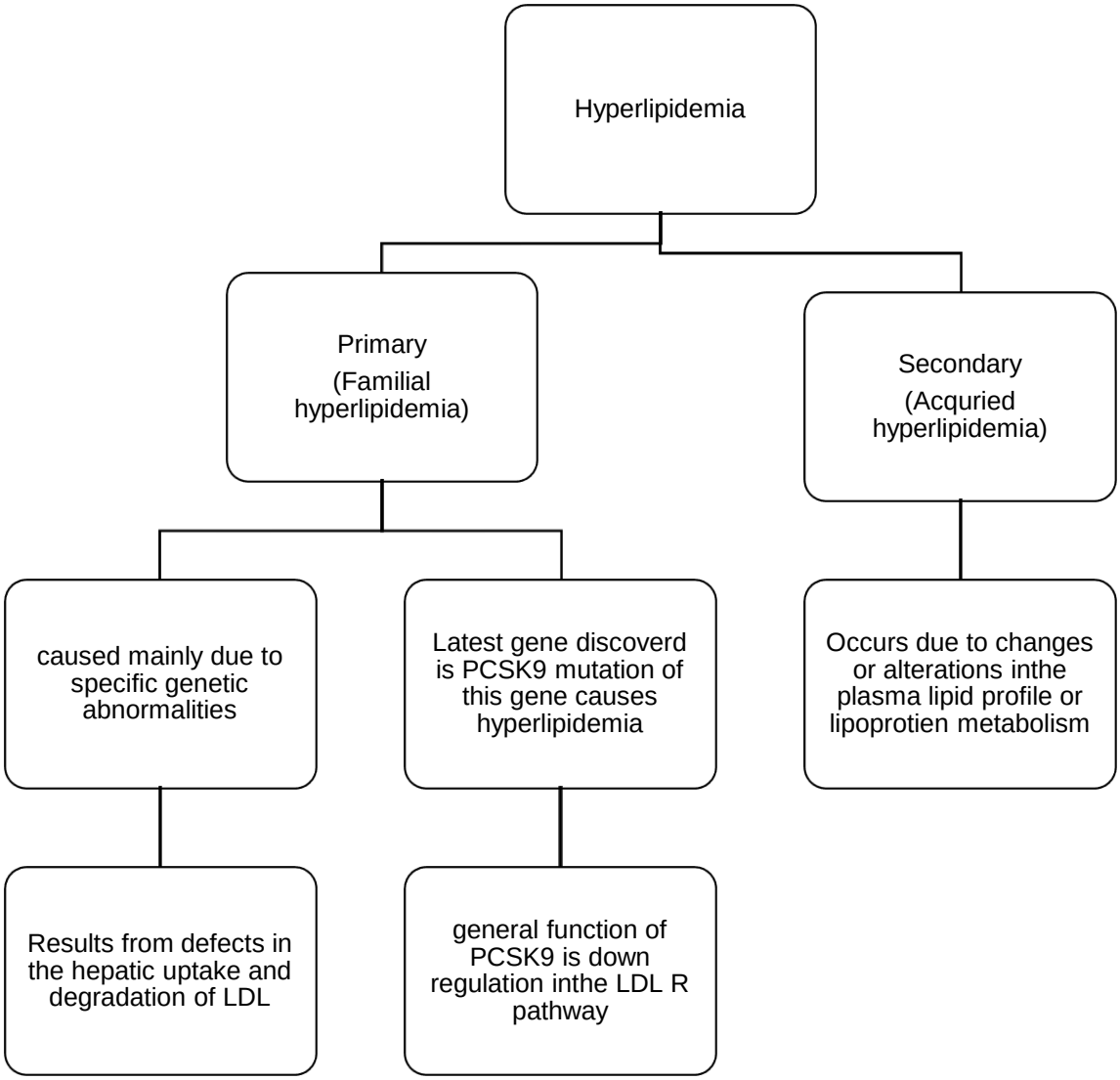

Fig. 2: Classification of hyperlipidemia

Anti-Hyperlipidemic action of Fenugreek

Fecal bile acid and cholesterol excretion are increased by fenugreek administration. Fenugreek also contains a biologically significant level of saponins[10]. Cholesterol excretion may be secondary to a reaction between the bile acids and fenugreek derived saponins causing the formation of micelles too large for the digestive tract to absorb. Another theory suggests that cholesterol lowering activities to the fibre rich gum portion of the seed that reduces the rate of hepatic synthesis of cholesterol. The hypolipidemic effect of fenugreek is might be largely due to its high content of soluble fiber, which acts to decrease the rate of gastric emptying there by delaying the absorption of lipid from the small intestine[11].

Fenugreek as Lactational booster

The use of fenugreek as an agent in increasing the production of breast milk dates back to centuries[12] Many cultures believe that certain foods increase human milk production during breast feeding. These foods are believed to have galactagogue's properties[13].

Breast milk is recognized as a gold standard for infant nourishment. Breast milk is primary sources of nutrition for newly born baby. Breast milk contains protein, fat, vitamin, minerals and essential elements. Breast milk nutrition is vital for newly born as well as young baby[14,15].

Although world health organization recommends exclusively breast feeding for 6 months of life[16]. Breast milk production regulated by prolactin and oxytocin. Prolactin is a peptide hormone primarily synthesized and secreted by adenohypophysis. Prolactin is secreted into blood stream to receptor site on acini cells and begin to milk production after giving birth. Oxytocin is used in uterine contraction during baby birth. If a mother does not breast feed well it means she posses' low level of oxytocin. There is a protein in milk which causes the acini cells to ignore the signal from prolactin when the breast is full.

Transitional milk and mature milk

The initial substance produced by alveolar secretory cell is colostrum which are present during few days after delivery. Colostrums are gradually replaced by transitional form of milk which contains higher amount of protein fat vitamin minerals and essential element[17].

Galactogogues

Galactogogues are substances thought to assist in the initiation,continuation or augmentation of breast milk production. Many medications,foods,and herbal therapies,herbs have been recommened as galactogogues[18]. Many galactogogues including shatavari,fenugreek,fennel milk thistle,chaste berry,and goats rue,are used as herbal medicines and food supplements to improve human milk[19]. Fenugreek is the most commonly used herbal galactogogue[20].There are few evidence available to support claims of the galactogogue effect of fenugreek by enhancing production of milk within 1-2 days of use[21]. Previously (Gupta and Shaw) and (Turkyilmaz et al) hypothesized that galactogogue might increase milk volume by ane estrogenic effect[22,23]. It is thought that fenugreek stimulates sweat production, and since the breast is a modified sweat gland fenugreek may effect breast milk production in this manner[24].

Galactogogues action of Fenugreek

A study using invitro assays found that fenugreek seeds contain estrogen like compounds and that they stimulate pS2 expression in MCF-7 cell lines. pS2 is frequently used as a marker for assessing estrogenicity of a compound[25]. The phytoestrogens and diosgenin content of fenugreek appear to account for the increase in milk flow[26]. But the exact mechanism of action is at undefined. Phytoestrogens are alike in chemical structure to endogenous estrogen and can bind to both α and β estrogen receptors. Thus they have the potential to act as estrogen agonist or antagonist, which could alter the structure or functioning of the endocrine system[27,28].

Limitations of Fenugreek as lactational aid

None of the included studies reported any side effects associated with the use of fenugreek or other galactogogues.However, there were evidences from some of the observational studies reporting nausea, vomiting and decreased glucose levels in the mother and diarrhoea, GI bleeding in the child associated with the use of fenugreek[29]. The increased heart rate and breast mobbing were also observed in one mother in the study reporting the use of galactogogues among the south african mothers[30]. In addition ,a maple like smell of milk and body secretion with worsening asthma symptoms were some other red flags underlining on the need to use fenugreek with caution during lactation[31].

Table 1: Physical properties of lipoproteins

S. No	Parameters	VLDL	LDL	HDL
1	Density	0.94-1.006	1.006-1.063	1.063-1.210
2	Diameter	600	250	70-120
3	Total lipid (weight %)	91	80	44
4	Triacylglycerols	55	10	6
5	Cholesterol esters	18	50	40
6	Cholesterol	7	11	7
7	Phospholipids	20	29	46

REFERENCES

1. Lee CH, Olson P and Evans RM. Mini-review: lipid metabolism, metabolic diseases, and peroxisome proliferator: activated receptors. Endocrinology. 2003;144:2201-7.
2. Garg A and Simha V. Update on dyslipidemia. J Clin Endocrinol Metab. 2007;92:1581-9.
3. Sharma RD. Effects of fenugreek seeds and leaves on blood glucose and serum insulin responses in human subjects. Nutr Res. 1986;6:1353-64.
4. Emmet PM and Rogers IS. Early Human Development. 1997;49:7-28.
5. Harding J. International Journal Epidemiology. 2001;30:15-23.
6. Jackson R and Beagle HR. Evidence based management of dyslipidemia Lancet. 1995;346:1440-1444.
7. Brunton L, Parker K, Blumenthal D and Buxton I. Goodman and Gilman's Manual of Pharmacology and Therapeutics. 1st Edn., McGraw Hill, USA., ISBN-13: 978-0071443432. 2008; 603-615.
8. Aminoff MJ. Nervous System: Current medical diagnosis and Treatment: The Mcgraw- Hill Company. 2004;43:956-963
9. Soutar AK and Naoumova RP. Mechanisms of disease: genetic causes of familial hypercholesterolemia. Nature Clinical Practice Cardiovascular Medicine. 2007;4:214-225.
10. Sharma RD. Effects of fenugreek seeds and leaves on blood glucose and serum insulin responses in human subjects. Nutr Res. 1986;6:1353-64.
11. Jasim Naeem Al-Asadi. Therapeutic Uses of Fenugreek (Trigonella foenum-graecum L.), American journal of social issues and humanities. ISSN: 2276 – 6928, 21-26.
12. Hudson T. Fenugreek seed tea improves breast milk sufficiency in infants. Townsend Letter. 2017;109.
13. Kent JC, Prime DK and Garbin CP. Principles for maintaining or increasing breast milk production. J Obstet Gynecol Neonatal Nurs. 2012;41(1):114–121.
14. Harding J. International Journal Epidemiology. 2001;30:15-23.
15. Mora JO and Nestel PS. American Journal of Clinical Nutrition. 2000;71:1353-63.
16. Agunbiade OM and Ogunleye OV. Constraints to exclusive breastfeeding practice among breastfeeding mothers in Southwest Nigeria: implications for scaling up. Int Breastfeed J. 2012.7(5):1–22.
17. Madden JD. American Journal Obstetrics & Gynecology. 1997;132:436-441.
18. Kent JC, Prime DK and Garbin CP. Principles for maintaining or increasing breast milk production. J Obstet Gynecol Neonatal Nurs. 2012;41(1):114–121.
19. Bazzano AN, Hofer R, Thibeau S, Gillispie V, Jacobs M and Theall KP. A review of herbal and pharmaceutical galactagogues for breast-feeding. Ochsner J. 2016;16(4):511–524.
20. Madden JD. American Journal Obstetrics & Gynecology. 1997;132:436-441.
21. Betzold CM. Galactagogues. Journal of Midwifery & Women's Health. 2004;49(2):151–154.
22. Gupta M and Shaw B. A double-blind randomized clinical trial for evaluation of galactagogue activity of Asparagus racemosus wild. Iran J Pharm Res.
23. Turkyılmaz C, Onal E and Hirfanoglu IM. The effect of galactagogue herbal tea on breast-milk production and short-term catch-up of birth weight in the first week of life. J Altern Complement Med. 2011;17(2):139–142.
24. Gabay MP. Galactogogues: medications that induce lactation. J Hum Lact. 2002;18(3):274–279.
25. Sreeja S, Anju VS and Sreeja. Indian Journal of Medical Research. 2010;131:814-819.
26. Turkyilmaz C, Onal E and Hirfanoglu IM. Journal of Alternative and Complementary Medicine. 2011;17(2):139-142.
27. Patisaul HB and Jefferson W. Frontiers Neuro-endocrinology. 2010;31(4):400-419.
28. Cassidy A. International Journal of Vitamin and Nutrition Research. 2003;73(2):120-126.
29. Betzold. Nice. 2011; Orief Farghaly and Ibrahim, 2014.

30. Steyn N, Zunza M and Decloedt E. A cross-sectional descriptive study of breastfeeding behaviour and galactogogue use among pri- vate-sector patients in Cape Town, South Africa. South African Journal of Obstetrics and Gynaecology. 2017;23(1):20–23.
31. Forinash AB, Yancey AM, Barnes KN and Myles TD. The use of galactogogues in the breastfeeding mother. Annals of Pharmacother- apy. 2012;46(10):1392–1404. https://doi.org/10.1345/aph.1R167.