

4. Claret, P. A., In: *Comprehensive organic chemistry*, (eds) D. H. R. Barton and W. D. Ollis, Pergamon Press, New York, 1979, Vol. 4, p. 198.
5. *The Merck Index*, 9th edition, (ed.) M. Windholz, Merck and Co, Inc., New Jersey, 1976, p. 2278.
6. Holla, B. S., Kalluraya, B. and Sridhar, K. R., *Curr. Sci.*, 1987, **56**, 236.
7. Burch, H. A., *J. Med. Chem.*, 1969, **12**, 535.
8. *Organic synthesis coll.*, John Wiley, New York, 1967, Vol. 1, p. 327.
9. Senear, A. E., Sargent, H., Mead, J. R. and Roefli, J. B., *J. Am Chem. Soc.*, 1946, **68**, 2695.

### EFFECT OF FEEDING FENUGREEK (*TRIGONELLA FOENUM GRACECUM*) LEAVES ON FAECAL EXCRETION OF TOTAL LIPIDS AND STEROLS IN THE NORMAL ALBINO RABBITS

VINITA CHATURVEDI and M. C. PANT  
Department of Biochemistry, S. N. Medical College,  
Agra 282 002, India.

SPICES are important in human dietaries to enhance the sensory quality of food. They also exhibit a wide range of beneficial physiological and biochemical effects in the body. Fenugreek (*Trigonella foenum gracecum*), commonly known as 'methi' a leguminous aromatic plant, is described as a medicinally important plant in the Ayurvedic system of medicine<sup>1</sup>. Seeds of Fenugreek have hypocholesterolemic and antidiabetic activities<sup>2-6</sup> and their leaves have hypocholesterolemic activity<sup>7</sup>. The present study was undertaken to determine the effect of incorporating Fenugreek leaves in the diet of normal rabbits, on faecal excretion of total lipids and sterols.

Fresh green leaves of 'methi' lost 90% of its weight (due to moisture) when dried at 20° to 22°.

Sixteen normal adult male albino rabbits were maintained on rabbit's feed (Hindustan Gold Mohr) for a month. Before starting the experiments, faecal matter of animals starved for 12 h was collected for 24 h and analysed for total lipids and sterols, for 2 consecutive weeks to ensure an almost constancy of the above parameters with respect to diet. The rabbits were divided into two groups, experimental and control groups, each consisting of eight rabbits.

Thereafter, feeding of experimental diet (containing 1 g of dried green leaves which were boiled in water along with basal diet) was started and continued for 8 weeks. The rabbits of control group

were kept only on control diet without the leaf addition. The animals had free access to food and water. Their daily food consumption was from 95 to 100 g. The food intake was essentially similar in both groups. Faecal matter of animals starved for 12 h was collected at the end of 1st, 2nd, 4th and 8th weeks, each time, and analysed for total lipids<sup>8</sup> and sterols<sup>8,9</sup> in the 24 h faecal excretion. Body weight was recorded at the beginning and end of the 1st, 2nd, 4th and 8th weeks. The difference between the groups was evaluated by Student's *t* test.

Analysis of the faeces after ingestion of cooked, dried leaves of Fenugreek 1 g/day for total lipids and sterols in 24 h faecal excretion, revealed increase in the faecal total lipids as well as sterols excretion, in the duration of eight-week feeding. Maximum increase in the levels of lipids and sterols was observed after the 8th week (table 1).

Biochemical studies have been reported regarding the hypocholesterolemic<sup>2-5</sup>, hydrocholagogic<sup>10</sup> and hypoglycemic<sup>5,6</sup> activities of the Fenugreek seeds. We have reported<sup>7</sup> that fresh green leaves of *Trigonella foenum gracecum*, when incorporated in the diet of normal rabbits, caused lowering in serum

**Table 1** Effect of ad libitum feeding fenugreek (*Trigonella foenum gracecum*) green leaves (1 g/day) on dry weight basis on faecal total lipids and sterols excretion per 24 h in normal rabbits (values are mean  $\pm$  SD, expressed in mg/24 h faecal excretion)

Diet	Control+ group (no. leaf addition)	Experimental' Group addition of leaf			
		1st week	2nd week	4th week	8th week
Cooked leaves					
Body weight (kg)	1.4820 $\pm 0.131$	1.5000 $\pm 0.128$ (1.21)	1.5240 $\pm 0.133$ (2.83)	1.5570 $\pm 0.142$ (5.06)	1.5950 $\pm 0.137$ (7.62)
Faecal lipids	168.35 $\pm 23.30$	204.45 $\pm 24.41$ (21.44)	233.45 $\pm 43.24$ (38.67)	287.04 $\pm 38.47$ (70.50)	345.90 $\pm 42.16$ (105.45)
Faecal sterols	64.59 $\pm 6.72$	72.84 $\pm 7.30$ (12.77)	78.62 $\pm 8.17$ (21.72)	83.38 $\pm 7.93$ (29.09)	105.40 4.37 (63.18)

'Sample size in each case was 8, Figures in parentheses indicate per cent change.  $P < 0.001$ ;  $P < 0.01$ ;  $P < 0.05$ .

total cholesterol and triglyceride. This indicates that ingestion of green leafy vegetables of Fenugreek stimulates the 'hepatoenteric excretion' of triglycerides and cholesterol thereby lowering their circulatory levels. The findings are supported by the work of Bhat *et al*<sup>10</sup> and Sharma *et al*<sup>2</sup> who experimented with the Fenugreek seeds. The leaves of this legume are also rich in protein<sup>11,12</sup> and like soybean, have low lysine/arginine ratio<sup>2</sup> which is considered to be important in the development of atherosclerosis<sup>13</sup>. Moreover, Fenugreek seeds and leaves contain a large amount of essential fatty acids<sup>14,15</sup>, fiber<sup>16-18</sup> and saponins<sup>19</sup> which increase faecal excretion of bile acids and cholesterol<sup>10,20,21</sup>. It was also observed that ingestion of Fenugreek increased faecal weight, simultaneously with increase in bile acid excretion<sup>22,23</sup>.

On the basis of these studies, we conclude that lowering of total cholesterol, rise in HDL-cholesterol (obviously lowering in LDL-cholesterol) and lowering of triglyceride levels in the blood with simultaneous increase in faecal excretion of total lipids and sterols, after ingestion of *Trigonella foenum graecum*, is a significant finding especially from the view point of cardiovascular system<sup>23-25</sup> with lesser possibility of development of carcinoma in gut.

Financial assistance from ICMR, New Delhi is gratefully acknowledged.

29 June 1987; Revised 28 September 1987

1. Kirtikar, K. R. and Basu, B. D., *Indian medicinal plants*, L. M. Basu, Allahabad, 1933, 2nd edn, p. 700.
2. Sharma, R. D., *Nutr. Rep. Int.*, 1986, **33**, 669.
3. Sharma, R. D., *Nutr. Rep. Int.*, 1984, **30**, 221.
4. Singhal, P. C., Gupta, R. K. and Joshi, L. D., *Curr. Sci.*, 1982, **51**, 36.
5. Valette, G., Sauvaire, Y., Baccon, J. C. and Ribes, G., *Atherosclerosis*, 1984, **50**, 105.
6. Bever, B. O. and Zahnd, G. R., *J. Crude Drug Res.*, 1979, **17**, 139.
7. Chaturvedi, Vinita and Pant, M. C., *Curr. Sci.*, 1987, **56**, 600.
8. King, E. J. and Wootton, I. D. P., *Microanalysis in medical biochemistry*, J&A Churchill Ltd., London, 1964, 4th edn, p. 89.
9. Zlatkis, A., Zak, B. and Boyle, G. J., *J. Lab. Clin. Med.*, 1953, **41**, 486.
10. Bhat, G. B., Sambaiah, K. and Chandrashekhar, N., *Nutr. Rep. Int.*, 1985, **32**, 1145.
11. Kamath, S. H. and Sohoni, K., *Indian J. Med. Res.*, 1959, **41**, 93.

12. Sauvaire, Y., Baccon, J. C. and Besanco, P., *Nutr. Rep. Int.*, 1976, **14**, 527.
13. Kritchevsky, D., Tepper, S. A., Czarnecki, S. K., Klurfield and Story, J. A., *Atherosclerosis*, 1981, **39**, 169.
14. Hilditch, T. P., *Chemical constitution of natural fats*, Chapman and Hall, London, 1956, 3rd edn, p. 230.
15. El-Sebaihy, L. A. and El-Mahdy, A. R., *Food Chem.*, 1983, **10**, 309.
16. Tipson, R. S. and Horton, D., *Adv. Carbohydr. Chem. Biochem.*, 1975, **31**, 251.
17. *The wealth of India, raw materials*, Publication and Information Directorate, CSIR, New Delhi, 1976, p. 302.
18. Jaya, K. N. and Kurup, P. A., *Atherosclerosis*, 1979, **33**, 41.
19. Varshney, I. P. and Jain, D. C., *Natl. Acad. Sci. Lett.*, 1979, **2**, 331.
20. Oakenful, D. G., Fenwick, D. E., Hood, R. L., Topping, D. L., Illman, R. L. and Storer, G. B., *Br. J. Nutr.*, 1976, **42**, 209.
21. Kritchevsky, D., Tepper, S. A. and Story, J. A., *Proc. Soc. Exp. Biol. Med.*, 1979, **160**, 126.
22. Nigro, M. D., Bull, A. W., Clopper, B. A., Pak, M. S. and Campell, R. L., *J. Natl. Cancer Inst.*, 1979, **62**, 1097.
23. Hill, M. J., Draser, B. S., William, R. E. O., Meede, T. W., Cox, A. G., Simpson, J. E. P. and Morson, B. E., *Lancet*, 1978, **2**, 1278.
24. Mishra, K. P., Suresh, S. G., Balchandran, K. N., Reddy, P., Mohan, R., Radhakrishnan, T. and Radhe, K., *J. Assoc. Physicians India*, 1980, **28**, 399.
25. Brady, G. H. V., Valen, A. J. and Walton, K. W., *Lancet*, 1978, **2**, 1271.

#### EFFECT OF EXOGENOUS AMINO ACID APPLICATION ON RHIZOGENESIS IN HYPOCOTYL CUTTINGS OF *PHASEOLUS VULGARIS* L.

R. K. KAKKAR and V. K. RAI  
Department of Biosciences, Himachal Pradesh University,  
Shimla 171 005, India.

STIMULATORY effect of inorganic and organic nitrogenous compounds on rooting has been reported<sup>1,2</sup>. Various low molecular weight nitrogenous compounds have strong but often variable influences on rooting<sup>3</sup>. Polypeptides containing specific amino acids have been proposed as initiators of organogenesis<sup>4</sup>.