FOOD AND NUTRITION NEWS

Acharya N.G. Ranga Agricultural University

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Dietary Fiber In Human Nutrition

Dietary fibre (DF) enjoys a very positive connotation as a food component ingredient with consumers, food and cereal scientists, and nutrition and health professionals. Total dietary fibre (TDF) includes all ingested polymers in foods not broken by digestive enzymes in the small intestine. Individual sugars and sugar acids are the major building blocks of TDF.

Source of fibre can be natural and unprocessed (e.g. brans), isolated (e.g. Cellulose and various gums), modified (e.g. carboxy methyl cellulose) or non-plant (e.g. Xylans and Poly dextrose). Dietary fibre exist in insoluble and soluble forms and in many foods they are intimately mixed and ingested. Water insoluble fibre which produces necessary dietary roughage includes, cellulose and some of insoluble hemicelluloses, lignin, and are realtively resistant to breakdown so do not yield energy (wheat, most grain products and vegetables).

Soluble fibre includes pectic substances, gums, mucilages, certain hemicelluloses and storage polysaccharides (fruits, barley, legumes, oat bran and dried beans).

Some of the physico chemical, physiologic and clinical aspect of fibre are shown in table 1.

In addition, other preventive implications of high fibre diets include constipation, chronic bowel diseases such as appendicitis, diverticular disease, colon cancer and obesity, hypertension and cardio vascular diseases.

Although short term consumption of TDF may produce acute changes in body functioning, it is long term consumption that will produce physiological changes providing beneficial results in regards to human health. However, persons in good health consuming normal fibre (20-40 g/day) would not expect to benefit from high fibre supplements.

Table 1 : Physicochemical, Physiologic and Clinical Aspects of Fiber

Physicochemical property	Type of Fiber	Physiologic Effect	Clinical Implication
Viscosity	Gums, mucilages, pectins	↓ Gastric emptying ↑ mouth to cecum transit ↓ rate of small intestinal absorption (e.g., of glucose, bile acids)	Dumping syndrome Diabetes. Hypercholesterolemia.
Particle formation and water-holding capacity	e.g., Wheat bran, pentosan content, polysaccharide-legnin mixtures.	↑ Gastric emptying ↓ mouth to cecum transit ↓ total GI transit time ↓ Colonic intraluminal pressure. ↑ Fecal bulk	Peptic ulcer Constipation Diverticular disease Dilute potential carcinogens
Adsoption and non-specific effects	Lignin, pectin mixed fibres	↑ Fecal steriods output ↑ Fecal fat N losses (small)	Hypercholesterolemia Cholelithiasis
Cation exchange	Acidic polysaccharides (e.g. pectins)	↑ Small intestinal losses of minerals (-) trace elements (+) heavy metals.	Negative mineral balance, probably compensated for by colonic salvage antitoxic effect.
Antioxidant	Lignin (reducing phenolic groups)	↓ Free radicals in digestive tract	Anticarcinogenesis
Degradability (colonic bacteria)	Polysacchaarides (free of lignin)	↑ Gas and SCFAs production. ↓ cecal pH	Flatus, energy production

Research Highlights

High Fibre Supplements for Therapeutic Use :

The most important criterion for incorporating an ingredient into a formulated food is that it must contribute to an acceptable final product. TDF in foods has taken on the added concept that it can help reduce calorie density.

A high fibre extruded product - Vermacelli developed, using wheat and rice bran at 10 and 20 per cent levels, was quite acceptable and did not mar the sensory qualities of the produce even after 4-6 weeks of storage period whereas addition at 30% level was not acceptable. The dietary fibre content of the wheat bran and rice bran products at 10% level incorporation was 13.1 g and 10.6 g percent respectively.

N. Janaki
Kanwaljit Kaur

High fibre bakery product - biscuits developed by incorporating wheat bran at 20, 30 and 40 per cent levels were found to be well accepted upto 30 percent levels. The keeping quality and also sensory attributes of the biscuits stored in high density polyethelene (HDPE) bags was shown to be high compared to those of stored in paper carton boxes. Nutrient composition of the products was also analysed (Table 2).

N. Laxmi Devi
V. Vimala

Table 2 : Nutrient and fibre (proximate and dietary fibre) content of high fibe biscuits per 100g.

Nutrients	Control	Level of bran incorporation		
		20%	30%	40%
Moisture (g)	4.7	5.5	5.1	4.9
Fat (g)	37.4	37.4	38.0	38.6
Protein (g)	4.5	7.3	8.1	8.2
Calories (computed) Kcal	517	482	465	448
Dietary fibre *(g)	1.3	10.0	14.4	18.7

Effect of Processing on Fibre and it's Components :

Results of a study on processing effect of fenugreek seeds showed that boiling and germination reduced the soluble fibre by 84 and 47 per cent respectively due to leaching of soluble fibre in boiling water and breakdown and utilization by the growing sprouts (Table 3).

A. Neeraja
P. Rajyalakshmi

Table 3 : Fibre content of raw and processed fenugreek seeds.

Process	Fibre contetn (g%) of fenugreek seeds		
	Total fibre	Soluble fibre	Insoluble fibre
Raw seeds	47.8	18.8	29.0
Boiling	30.0	3.0	27.0
Germination	33.8	10.0	23.8

Effect of homescale processing on dietary fibre and its components in certain cereal and millets were studied. Total dietary fibre (TDF), neutral detergent fibre (NDF), Acid detergent fibre (ADF) and crude fibre (CF) content of unprocessed and processed flour samples of ragi, bajra and wheat/sorghum found to be high, low and intermediate respectively. However the loss of TDF and it's components on processing was found to be significnat ($P<0.01$) with all the flour samples.

G. Navitha
S. Sumathi

Decreased Nutrient Availability of High Fibre Diets :

High fibre diets may constitute a risk of leading to a decreased utilisation of protein and minerals. A study with humans fed with fibre levels of 19.6g and 28.4 g from Bengalgram (Cicer arietanium) for two days showed that the percent retention of nitrogen and calcium was 22.9 and 14.4% and 11.2 and 7.37% respectively, *in vitro* binding of iron, calcium and zinc with cereal-millet based diets was also reported.

V. Radha
P. Geervani
P. Mahalaxmi
Geetha Rani
S. Sumathi

Hypolipidemic Action of *Volvariella Volviacea* in Albino Rats

Inclusion of sun dried Volvariella volviacea (paddy straw mushroom) at 5% or 10% level in hypercholesterolemic diet resulted in an insignificant effect on gain in body weight, inspite of higher food intake. This also resulted in an increase in food efficiency ratio of diets. Feeding of Volvariella volviacea also caused a number of lipid changes in plasma, liver and heart. Lipid, cholesterol, and glyceride levels in plasma were significantly decreased without any effect on free fatty acids and phospholipids. Hepatic lipid profile was not much affected by feeding Volvariella volvacea whereas total lipid levels of heart significantly decreased but effect was significant only in the case of phospholipids and glycerides.

Vijaya Khadar

Reduced Glycemic Response to a Meal :

The beneficial effects of fibre in diabetics could be attributed to its effect on the increased efficiency of

endogenous insulin to metabolise glucose or fibre diminishes or translocates the absorption of carbohydrates to a point lower in the gut where, after colonic conversion, it would be absorbed as volatile fatty acids and not as carbohydrate per se.

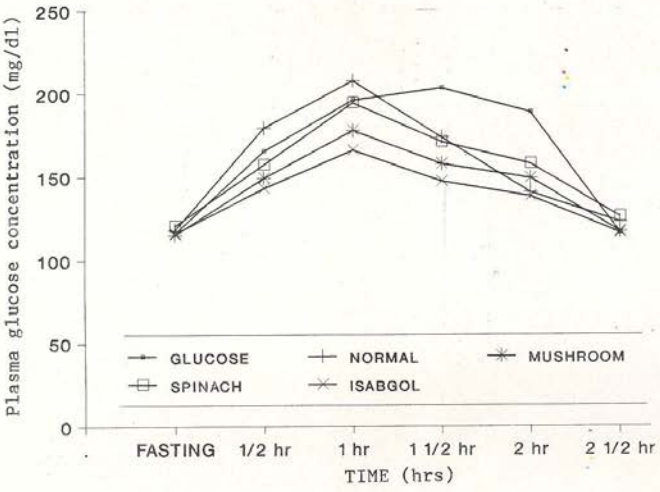

Fig I : SOURCES OF FIBRE AND POST-PRANDIAL GLYCEMIC INDEX IN NIDDM SUBJECTS

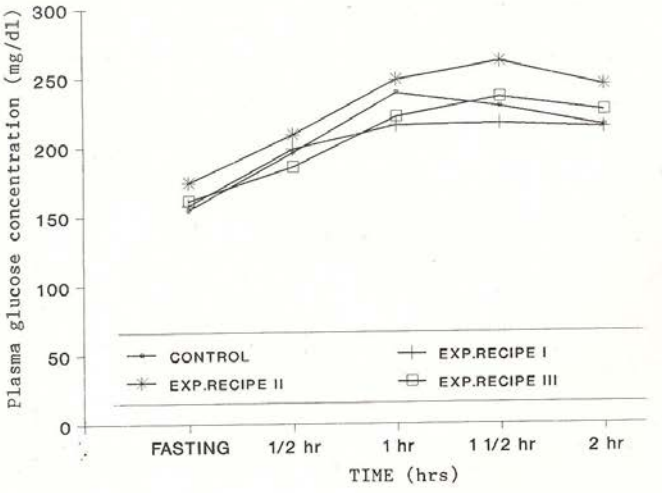

FIG II : FENUGREEK SEEDS AND POST PRANDIAL GLYCEMIA IN NIDDM SUBJECTS

The glycemic response to fibre from different sources was studied. Oyster mushrooms, spinach and isabogal were incorporated in powdered form into a recipe Pulka at different levels. Mushrooms at levels of 15 g and spinach and isabagol at 10 g each effectively controlled blood glucose levels (Fig I).

Another study with greengram husk, amaranth and isabagol at levels of 15g per cent each as part of normal diet for 4 days showed to reduce rise in blood glucose levels.

J. Alakananda
J. Bramaramba
Vijaya Khadar

Experimental recipes where in powdered seeds of raw, boiled and germinated fenugreek (Trigonella foenum graecum) seeds incorporated into a traditional receipe 'Pongal' at the levels of 12.5 g each when fed to normal and non-insulin dependent diabetics (NIDDM) showed that raw and germinated fenugreek seeds significantly ($P<0.05$) reduced post prandial glycemia in all the subjects (Fig II).

A. Neeraja
P. Rajyalakshmi

AWARDS

Dr. (Mrs.) K. Aruna, Scientist II in AICRP (F & N) of Post Graduate and Research Centre is awarded **Jawaharlal Nehru Award** for Post Graduate Agricultural Research - 1996, for the Ph.D work on "Propagation, Processing and Storage Studies of Papaya (*Carica papaya* L.) and its products.

Meetings on Campus

A one day symposium on Horticultural products in nutrition and dietitics was jointly organised by National Institute of Nutrition (ICMR) and Centre of Advanced Studies, Postgraduate and Research Centre, Acharya N.G. Ranga Agricultural University Hyderabad on 21-6-97 in connection with IX Annual meeting of Indian Dietitic Association (AP Chapter), Hyderabad.

Dr. Vijaya Rao, Head, Food & Technology Division, DFRL, Mysore delivering lecture at the symposiam of IDA (AP. Chapter).

Dr. Sugunakar Reddy, Dean of Agriculture and Dean of Home Science (I/c), in his inaugural speech stressed the need for extensive research in developing newer varieties of nutritional importance and introduction of topics related to fruits and vegetables in school curriculum. He also cautioned the health hazards due to indiscriminates use of insecticides, pesticides, sprays and horticultural crops and need for research in this direction.

Dr. Kamala Krishna Swamy, Director NIN (ICMR) Hyderabad chaired the technical session. Dr. Vijaya Rao, Head, DFRL, Mysore; Dr. Vijaya Raghavan, Deputy Director and Dr. Bhaskarachary, Technical Assistant, NIN, Hyderabad and Dr. Vijaya Khader, Director, CAS, PG&RC, ANGRAU, spoke on different aspects of processing, storage, preservation, nutritive value and production of horticultural produce and products.

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