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Yoghurt (dahi): a probiotic and therapeutic view

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YOGHURT (DM1!): A PROBIOTIC AND THERAPEUTIC VIEW

Pages with reference to book, From 221 To 224

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Yoghurt is one of the staple dairy products of Indo-Pakistan subcontinent. This is the name given to the traditional yoghurt which is prepared and sold commercially in the earthenware pans. The simmering milk is cooled down in these pans and is inoculated with the starter substance from the previous day's dahi. Lassi, prepared from dahi is a popular beverage. Yoghurt is taken with meals as bland or with added salt or sugar and with salads. It is also recommended as a source of nutrition and household remedy for ill health, pOor appetite and digestive disturbances. Dahi oryoghurt is produced by the fermentation of milk. The bacteria involved are the lactobacillus bulgaricus and streptococcus thermophilous. In a study by Naeem and Rizvi[1], organisms cultured from dahi were streptococcus lactic, streptococcus thermophilous, lactobacillus acidophilus, lactobacillus casei, lactobacillus bulgaricus and leuconostoc citrovorum. The pH varied between 3.4 to 6.0. Many claims have been made concerning prophylactic and therapeutic effects of yoghurt. Yoghurt is rich in nutrients and probiotics. Probiotics are live microbial feed supplements which beneficially affect the host animal by improving microbial balance[2]. Our intestinal microflora provide protection against various diseases. Yoghurt starter bacteria, lactobacillus bulgaricus and streptococcus thermophilous are the part of probiotic preparations currently on the market. They may be operating by production of antimicrobial substances, competition for adhesion to receptors and stimulation of immunity[3]. Although there are many claims of yoghurt and its probiotic effects, the amelioration of symptoms of lactose intolerance has been worked in details.

Lactose intolerance

Kolars et al[4] showed that lactose was better absorbed in lactase deficient subjects after ingestion of yoghurt than after consumption of milk or powdered lactose in water despite nearly equal lactose loads. Ingestion of 18 grams of lactose in yoghurt resulted only about one third as much hydrogen excretion in breath as a similar load of lactose in milk or water. This enhanced absorption is believed to be due to B galactosidase (B gal) activity of its endogenous bacteria. Lactobacillus bulgaricus and streptococcus thermophilous produce higher amount of lactase or B gal than other microorganisms with lactase potentials[5,6] . 40-50% of the lactose is hydrolyzed during fermentation[5], the residual level of lactose and high lactase activity make yoghurt very suitable product for lactase deficient persons who can absorb roughly 50% of a lactose load; a finding supported by direct measurement of lactose absorption through aspiration of the terminal ileum[7]. The buffering capacity of yoghurt protects the bacteria and their enzymes from gastric degradation by slowing the decrease of gastric pH[8]. It has been shown that three times more acid is required to acidify yoghurt than to acidify milk[8]. Yoghurt B gal was stable at pH 4.0 but inactivated at lower pH. However, this buffering capacity also prevents microbial B gal from hydrolysing lactose in the duodenum[9]. Moreover, as pH is still low in duodenum, so B gal is not active and process of hydrolysis and absorption occurs lower down in the small intestine where the pH is progressively increased. Intracellular location of the enzyme and integrity of the bacterial cell membrane is an additional protective factor from acidic pH[8]. When yoghurt was sonicated to disrupt microbial cell structure, only 20% of the activity remained after incubation at pFI 4.0 for 60 minutes. Acidified milk alone or with disrupted yoghurt microorganisms caused twice as much lactose malabsorption as did the acidified milk containing intact organisms[8]. Some experimental studies suggest that yoghurt may increase the lactase activity in mucosal cells either by adherence of lactase of

bacterial origin[10] or by stimulation of brush border of the enterocytes[11]. A recent study did not demonstrate any increase in the lactase or B gal activity in the intestinal mucosa after a long term (8 day) ingestion of yoghurt[12]. Biopsies in this study were taken from the 3rd part of duodenum, 10-12 hours after the last yoghurt ingestion, so this study does not show what happens to the enzyme activity lower down in intestine. The results are contrary to a previous experimental study in rats which showed increase in enzyme activity after prolonged yoghurt intake[13]. The orofaecal transit time for yoghurt is significantly longer than the milk. This allows greater time for any residual intestinal lactase activity to act. This also explains the better absorption even from heated yoghurt as compared to milk in some studies[14], while other workers have shown that the beneficial effect of yoghurt is destroyed by pasteurization[12]. It has been shown that microbial endogenous lactase is superior to exogenous commercial lactase in alleviating lactose maldigestion[15]. Though the commercially available preparations do their job[16], they are expensive. Moreover, to get the best results one has to incubate the milk with them before consumption to achieve lactose hydrolysis[17]. All yoghurts are not created equal. Lactose malabsorbing subject may absorb lactose better from different brands of yoghurt. This variation could be due to whether products were pasteurized which had destroyed the B gal activity, way of storage and transport and intrinsic differences in the B gal activity of cultures[18]. This would not be a great problem in case of yoghurt which is produced by the shopkeepers on daily basis and no heat treatment is given to the formed product. Lactose malabsorption frequently occurs in patients with symptomatic giardiasis[19] because of the non-specific damage to the mucosa of the infection site by various mechanisms[20-22]. Such children may benefit from the administration of yoghurt whose lactose appears to be well absorbed[23]. Yogliurt may be an appropriate food for the renutrition of malnourished children with chronic diarrhoea and lactase deficiency[24].

Cancer

Antitumour activity of yoghurt has been studied in experimental animals. Feeding of fermented milk products decreased the DNA synthesis of intraperitoneally transplanted ehrlich ascitic tumours[25]. Lactobacilli used in the fermentation of milk products, may survive in the digestive tract[26] and interfere with other gut bacteria. Alternation in the intestinal bacterial enzyme activity was observed during feeding milk supplements with lactobacillus acidophilus[27,28]. Oral administration of such strains decreased the concentration of three faecal enzymes (B glucuronidase, azoreductase, nitroreductase) [28] that had the capacity to convert procarcinogens to carcinogens in the colon. Another study confirmed decrease in nitroreductase activity but B glucuronidase and azoreductase activity remained un-changed[29]. Difference in the strains of lactobacilli are likely to be responsible for these differences but this study confirmed that the lactobacillus acidophilus and bilIdobacterium bifidum in the daily products lead to metabolic changes in the colonic flora. Such changes may influence estrogen, steroid and bile acid metabolism and interfere enterohepatic circulation[30-33]. Moreover, glycopeptides from the cell wall of lactobacillus bulgaricus have shown to have antitumour action[34]. Furthermore, micro-organisms provided by yoghurt may stimulate immunological activity in the host and increase interferon production by the lymphocytes[35]. Lactobacillus casei given per os to the mice has shown to increase the phagocytic activity of macrophages[36]. The immune stimulation could be relevant to the dietary yoghurt's effect on inhibition of tumour cell proliferation. In a case control study from Netherlands a significantly lower consumption of fermented milk products was observed among breast cancer cases as compared to the population controls[37].

Intestinal infections

Oral antibiotics often alter the intestinal flora and this may end up in pseudo-membranous colitis[38]. This disease caused by clostridium difficile can be cured by administration of faecal enema from

healthy adults[39]. A particular strains of lactobacillus is effective in preventing relapses of pseudo membranous colitis[40]. Bifidobacterium longum is a part of normal intestinal microflora. Yoghurt containing this species may decrease the frequency of gastrointestinal disorders by reducing antibiotic induced alternations in the intestinal microflora[41]. In addition to the restoration of intestinal microflora, yoghurt also has some antimicrobial effect. Antibiotic production have been shown by lactic streptococci and lactic bacilli[42]. Low pH due to lactic acid has also shown to kill pathogens but acidity may not always be enough to be bacteriocidal. Various pathogens may survive in yoghurt or dahi. Contamination may occur during handling of milk, inoculation and storage. Staphylococcus aureus, streptococcus faecalis, escherichia coli, enterobacter aerogenosa, bacillus cereus, yeasts and mould have been recovered from some of the specimens of dahi from Lahore1. It is important to observe all hygienic measures while dealing with dahi. Fermented milk consumption decreases the incidence of salmonella carrier state[43] and reduces the risk of travellers diarrhoea caused by enterotoxigenic escherichia coli[44]. Volatile fatty acids produced by lactic acid bacteria may be responsible for controlling the colonization of the gut by shigella sonnei and E. coli[45].

Osteoporosis

Calcium supplementation in the form of dairy products decreases the rate of vertebral bone loss in premenopausal women[46]. In another study women with postmenopausal idiopathic osteoporosis were found to have significantly greater chance of lactase deficiency[47] which could predispose to osteoporosis either through reduced intake of milk secondary to intolerance or impaired calcium absorption. Though the presence of lactose enhances absorption of calcium from the milk; in lactase deficiency it might inhibit its absorption[48-50]. The yoghurt would certainly be a better choice in terms of tolerance to overcome the problem of decrease dietary intake of calcium. The relation of lactase, lactose and calcium appears to be a complex one as one of the studies showed that calcium was absorbed equally well from milk and yoghurt in hypolactasic subjects[51]. Further work is needed to resolve the issue.

Miscellaneous

Yoghurt, like milk is a good source of protein, riboflavin, folic acid and calcium. Its folic acid content is higher than the milk[52]. Digestibility of the milk protein is increased due to its partial predigestion during the fermentation process[53]. Yoghurt may be used by the geriatric population as a mild laxative[54] because of its lactose and lactic acid content. It also has hypocholesterolemic effect[55] but such activity is also present in the milk. It is hoped that in the years to come much more detailed and important scientific knowledge would be available for this ancient natural food.

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