Physico-chemical, nutritional and sensory quality of soy fortified gluten free pearl millet *(Pennisetum glaucum)* vermicelli

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Pearl millet *(Pennisetum glaucum)*, besides supplying calories and proteins in the diet, is a good source of essential minerals (Abdalla *et al.*, 1998). Production of commercially important products such as vermicelli (ready to cook cold extruded product) is expected to attract the food industry as well as consumers due to the increasing demand for convenience foods, naturally healthy and gluten free foods. Different types of pearl millet vermicelli fortified with defatted soya flour were prepared with and without the addition of Gum Karaya (GK), Guar gum (GG) and carboxymethyl cellulose (CMC).They were used either alone or in combination at 2% level and tested against control vermicelli made from refined wheat flour. Cooking and sensory quality, nutritional composition including dietary fibre and in vitro digestibility were studied. Though wheat based vermicelli had a higher overall sensory score (8.2) than all the pearl millet formulations, there was no significant difference ($P < 0.05$) between vermicelli with GG and CMC and with refined wheat flour. Addition of GG and CMC at 2% to the soy fortified pearl millet vermicelli could improve the overall acceptability on par with that of refined wheat flour. When individual sensory parameters were considered, all the scores were less than those of the gum-fee control. However, there was no significant difference between the scores of texture and flavour. The addition of GG and KG when used individually did not improve the texture, but when they are used in combination with CMC there was a significant improvement from 7.2 and 7.1 to 8.4 and 7.4. This can be attributed to the synergetic effect of hydrocolloids. Compared to the GK and CMC combination, GG and CMC combination was found to be better suited for the product. Edwards *et al.* (1995) reported that non-starch polysaccharides help to improve the network structure in whole wheat pasta. Raina *et al.* (2005) reported that when 1.5% GG was added to pre-gelatinized rice flour, the texture of rice pasta was improved. In the present study though the pearl millet is free from gluten, which is essential for structure development, the binding nature of the GG might have helped to improve texture by developing firmness. It has been reported that the introduction of GG resulted in crumb structure with a more even cell size distribution in gluten-free breads (Schwarzlaff *et al.*, 1996). The nutritional quality of the present vermicelli was good in terms of protein, minerals, soluble and insoluble fibre. The dietary fibre content of hydrocolloids added pearl millet vermicelli was significantly ($P \leq 0.05$) higher than that of refined wheat flour. The addition of hydrocolloids also reduced the in vitro digestibility of the protein and starch. However, the amount of protein (10.2 to 12.7g/100 g) present in the soy fortified vermicelli can counteract the lower protein digestibility. The reduction in starch digestibility is advantageous in the light of lifestyle diseases. The study demonstrated that the vermicelli formulation is gluten-free yet contains a good amount of protein, minerals, soluble and insoluble fibre. The product can thus be promoted as functional vermicelli with multi advantages.

Keywords
Gluten free; pearl millet; hydrocolloids; vermicelli; in vitro digestibility. dietary fibre

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