Physico-Chemical Properties of Low Fat Pork Sausages

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Abstract: Low fat meat product is a panacea against cardiovascular diseases and obesity related ailments. But, simulated fat reduction affects the sensory qualities and shelf stability of the meat product due to microbial growth. Low fat pork sausages were prepared with minced pork, spices, salt and Sodium alginate. Milk co-precipitates (MCP) obtained from skim milk were added at 0-2% levels as fat replaces and a suitable formulation was arrived at by evaluating physico-chemical and sensory parameters. The formulation with 1% MCP had recorded higher flavor, juiciness and overall acceptability scores when compared to others. The sausage with 1% MCP also had better emulsion stability, lower fat content, better cooking yield and lower cholesterol content compared to control.

Key words: Pork sausages • Low fat • Milk-co-precipitates

INTRODUCTION

There is growing demand for low fat meat products among the health conscious consumers, because of its relation with cardiac diseases and obesity related ailments. Fat contributes to nutritional, textural and sensory attributes of meat products. Thus, there is need of developing appropriate technologies that would enhance the palatability of the low fat products.

Processed meats are considered to be high fat foods. Fresh pork sausages and patties may have fat as high as 50% although industry average is 36%. Therefore, currently focus has been given to employ various approaches for the reduction of fat in the formulation of meat products with acceptable flavors and texture. Reduction of fat in comminuted meat products results in rubbery dry textured products with high shear force due to changes in hardness [1]. Thus, it is necessary to select appropriate fat replaces and optimize their concentrations to produce low fat meat products having better consumer acceptability and market value. Several researchers have used fat replaces to produce meat products with lower fat content. Inclusion of carrageen an produced acceptable low fat mutton kofta [2, 3] reported the use of defatted melon kernel flour in beef sausages. [4] reported that incorporation of modified starches in a meat batter improved the emulsion stability and reduced the jelly and fat separation. Hence the present study was carried out to assess the quality of low fat pork sausages containing tetra sodium pyrophosphate (TSPP) and milk co precipitates (MCP).

MATERIALS AND METHODS

Market age large white Yorkshire pigs of 7-8 months age weighing 70-90 kg were humanely slaughtered and lean trimmings of fresh ham portion were used to prepare the sausages. The MCP was prepared by heat and salt coagulation of milk proteins from fresh skim milk by the method of [5]. The MCP has 65.2% moisture and 32.6% protein. The lean meat and back fat were minced separately through a 4 mm plate in a meat mincer (Sirman TC12E, Italy supplied by Agaram industries, Chennai). Low fat sausage (T1, control) was prepared with 77.65% minced pork, 1.7% salt, 1.5% spice mix, 0.5% condiments, 0.04% Sodium alginate, 10% water and 2.5% pork back fat. The other sausages were developed by incorporating 0.5% (T2), 1% (T3), 1.5% (T4) and 2% (T5) MCP and 77.16, 76.76, 76.26 and 75.76% minced meat where as the other constituents were same as control in all the formulations. The amount of fat to be added to the recipe was determined by simple back calculation based on the fat content in the fresh ham in all formulations. The amounts of other ingredients used in the formulation were based on the results of preliminary experiments conducted. The emulsion was prepared by adding minced meat and other ingredients of recipe in a sequential order at one minute time intervals of chopping. Salt, sodium alginate were premixed and added to the meat mix. During chopping, the temperature of the emulsion was maintained at 10-12°C by addition of crushed ice. The emulsion was then stuffed into sheep casing using a manual sausage stuffer and sausages were linked and weighed.
Cooking yield was determined by calculating weight differences for sausages before and after cooking. Emulsion stability was determined by the method of [6]. Moisture, fat (ether extractable) and protein content of raw and cooked patties were determined according to [7] procedures and the pH of the suspension was measured using digital pH meter (EI Deluxe PH Meter Model 101 E, MS Electronics INDIA Pvt.Ltd.). The shear force value of cooked sausages cut in to 1 cm size pieces was recorded using Warner–Bratzler shear press (Emerson electric S44EXTJ-988,C42, Stype,USA) and expressed as kg/cm². Cholesterol was estimated by the method of [8]. Sausages were evaluated for their appearance and color, flavour, juiciness, texture and overall acceptability by a 5 member panel of judges using a 9 - point hedonic scale. Water activity was estimated by the method of [9]. Microbial counts were estimated as per the technique of [9]. The data were statistically analyzed by using the method of [10] (n=4).

**RESULTS AND DISCUSSION**

Low fat pork sausages were standardized with reduced addition of fat level and incorporation of sodium alginate at 0.04 % level to optimize sensory parameters to similar levels as that of control and serving as treatment. The formulation with 2 % MCP had higher pH value than others. Higher pH values are desirable for better water holding capacity, juiciness and other sensory parameters. The results were in agreement with those of [11]. The cooking yield increased with increasing levels of MCP incorporation. The increased cooking yield might be due to the building up of strong flexible membranes by caseinates, which will hardly be influenced by heat, thus reducing cooking losses. The emulsion became more stable with increasing levels of MCP incorporation. This might be due to the emulsification of free fat in meat emulsion by milk proteins and saving of salt soluble proteins for water binding [12]. Milk proteins are preferentially absorbed over both salt soluble and water-soluble proteins in fat-water interface. The lower number of small fat globules created in the presence of milk proteins reduce the expulsion of water during heating. As the level of incorporation of MCP increased, the moisture content also increased (p<0.05). The increase in the moisture content in MCP sausages might be due to larger water holding capacity of the gel and also due to the water content of MCP gel. The fat content of all MCP sausages was lower (p<0.05) than the low fat control (T). The reduction in fat content with incorporation of fat replaces was also reported by [13] in pork nuggets (gums and modified starches), [14] in salame milano (skimmed milk and dextrins) and [15] in bologna (Soya protein isolate). The cholesterol level did not differ (p>0.05) with increasing levels of MCP but 2% MCP sausages had lower (p<0.05) cholesterol content than others. The water activity values decreased (p<0.05) with increasing levels of MCP. This finding was in accordance with the reports of [17]. The reduction in water activity values might be due to a relative decrease in the active water content of meat block due to the incorporation of MCP.

The shear force values increased with increasing levels of MCP and MCP sausages had lower (p<0.05) shear force values compared to control (T).
might be due to the gelling ability of MCP resulting in increased tenderness of sausages. A progressive decline in sausage color was observed with increased MCP incorporation and this might be ascribed to the simultaneous increase in whiteness of the product. The flavor and juiciness scores increased up to 1% MCP level and thereafter decreased. This trend might be due to the fact that added MCP up to 1% was able to emulsify free fat that set free during mincing and bind water during heating thus causing increased water binding and providing the texture and juiciness to the final product [12]. The MCP get hydrolyzed when heated and the presence of lactose as a flavor enhancer contributed towards the flavor in the product. Overall acceptability of low fat pork sausages was highest for MCP sausages and MCP Sausages scored better than control (Tc).

REFERENCES