ABSTRACT

Rasogolla is one of the milk based heat acid coagulated product. Production of rasogolla is increasing day by day. However, the production of rasogolla lies in the hands of local sweetmeat makers. The process of conventional atmospheric cooking takes about 25-30 min. High rates of evaporation during cooking alters the cooking sugar syrup concentration and quality of rasogolla. To reduce the cooking time and to save energy, laboratory scale rasogolla cooking machine of 600 g per batch was designed and developed. Quality analysis of the rasogolla was done in terms of volume expansion ratio and hardness. In case of plain water cooking, the effect of time of cooking and pressure of cooking on volume expansion ratio and hardness of rasogolla was found to be greater than that of moisture content of kneaded chhana. The optimum condition for cooking chhana balls in plain water was moisture content of 0.62 kg/kg kneaded chhana, 0.12 MPa pressure and cooking time of 5.51 min and the optimum condition for cooking rasogollas in sugar syrup was moisture content of 0.62 kg/kg kneaded chhana, 0.1 MPa pressure, 5.27 min time of cooking and 52.21 ^{o}Brix sugar syrup for getting good quality rasogolla. With increase in pressure and time of cooking the volume expansion ratio was found to be increasing and the hardness was found decreasing. Low calorie rasogolla was prepared by cooking chhana balls in plain water and soaking in sorbitol solution. In comparison to the conventionally prepared rasogolla, about 13.08% less calories were obtained per g of rasogolla from rasogollas cooked in plain water and soaked in sugar syrup at 75 ^{o}Brix. The cooking sugar syrup concentration had negligible effect on volume expansion ratio and hardness. Microstructure study of the rasogolla samples was carried out in scanning electron microscope. Sensory analysis was performed using Fuzzy sensory analysis and the rasogolla prepared by cooking in sugar syrup was having higher similarity value next to the market rasogolla under category ‘Good’. The shelf-life study of prepared rasogolla samples was conducted at room temperature and refrigerated condition. Numerical modelling of sugar syrup diffusion inside the plain water cooked rasogolla was done using finite element based CFD software COMSOL Multiphysics. Finally, the techno-economic feasibility of the developed machine was studied in comparison to traditional process.

Keywords: Rasogolla, pressure cooking, volume expansion ratio, hardness, microstructure, sensory analysis, storage study, sorbitol