

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

This study consisted of three parts; first part was on proximate analysis and water activity of the formulations to know the nutritive values of the *Sunnah* cereal bars. The second part was sensory evaluation where panelists were used to assess the acceptability of the product formulated and mineral analysis determined by the microwave – assisted digestion. Thirdly, textural analysis, the shelf life and packaging suitable for the *Sunnah* cereal bars were studied. The textural analysis was done with the aid of Texture analyzer, the shelf life was observed after being stored in four different packaging materials (nylon, aluminium foil, polyethylene terephthalate and metallised polyester) for 120 days.

It has been observed there is feasibility to formulate cereal bar with different *Sunnah* foods. *Sunnah* foods are quite rich in especially carbohydrate as compared to other fruits. The *Sunnah* foods include dates, figs, raisins, honey, black cumin and saffron. All of these aforementioned foods have health benefits which have been verified by numerous researchers. The results of the current study showed that the cereal bars can be formulated with different *Sunnah* foods to provide nutritive value to the final product. These products were also acceptable by the consumers as shown in sensory analysis findings. Formulations with lower fruit contents in the mixture increased the energy and carbohydrate contents of the final product significantly. The proximate analysis showed that the *Sunnah* foods could be used effectively for formulation of cereal bars, depending on the overall acceptability of final product, formulation C

(*Sunnah* foods – 300g, honey – 100g, glucose syrup – 70g) was highly accepted by the panelists which could be traced to its good texture.

Sunnah foods increased the nutritive values of the bars. Therefore, the superiority of *Sunnah* foods in the formulations regarding the high sensory score could be attributed to the considerable nutritive and good texture of formulation C (*Sunnah* foods – 300g, honey – 100g, glucose syrup – 70g). The right mixture of the binding agents increased the palatability of the sample. This study showed that the mixtures of *Sunnah* foods and the binding agents should be optimized to provide better acceptability for the *Sunnah* cereal bars. Feasibility of incorporating *Sunnah* foods in the formulation of cereal bars and preserving consumer preference has been shown in this study. The *Sunnah* foods had marked effects on the physical attributes, chemical composition and fibre content of the bars placing them as a higher fibre content snack.

Puffed glutinous rice, with its combination with the fruits, is a promising cereal that contribute to the increase in fibre, fat, energy contents and mineral contents in the samples. Formulation C presented the best fibre and texture results. All the formulated samples are sources of magnesium, calcium, iron, manganese and copper. The samples presented good acceptance for all the characteristics evaluated.

Fruit pieces (*Sunnah* foods in this study) are frequently used as essential or as additional ingredients in many composite foods and food formulations. The water activity of the ingredients must be controlled in such a system to avoid moisture migration. The water activity of the bars in this study was < 0.620 which possibly would assist in microbial proliferation of the product.

The metallised polyester was found as the best packaging material, though aluminum foil also can be employed in packaging this cereal bars. The changes in water activity and moisture contents in different packaging materials significantly ($P < 0.05$) varied, though they did not affect the shelf stability of the bars for the 120-day storage.

The Sunnah cereal bars displayed shelf stability for 120 days when packed PET, AF, MP and nylon (polyamide) under ambient conditions.

6.2 RECOMMENDATIONS

The results of this study showed that *Sunnah* foods offer an excellent nutritive value to the cereal bars and that the best formulation among the six formulations based on consumer acceptance was the cereal bar formulated with binding agents that contained 100g each of the *Sunnah* foods; 100g and 70g of honey and glucose syrup respectively. However further studies are needed, they are stated below:

- Sensory evaluation of the bars to determine if the bars will still be acceptable by the consumers after the shelf life study;
- The packaging of the bars should be automated carried out under vacuum to verify if the process will ultimately deal with moisture migration in the packaging materials during the storage period.
- Furthermore, the microbial evaluation of freshly produced cereal bars and after storage for the determination of shelf life.