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Ready to Reconstitute and Instant Mix of Indian Traditional Food Products

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ABSTRACT: One of the basic needs of human beings is food. It is necessary for both healthy growth and the regular operation of the body's organs. Due to their convenience, affordability, appealing look, flavour, and texture, instant mixes and ready-to-reconstitute (RTR) foods are becoming more and more popular. Indians frequently believe that packaged, RTR, and instant-mix foods include a lot of salt, sugar, and fat. They avoid consuming such things due to these beliefs. So, the present study aimed to illustrate the variation of factors affecting traditional instant mixes and RTR food preferences and to provide a broad review of the variables influencing instant mixes and RTR food selection as well as the actual decision-making process involved in food preference and selection. Fermented and non-fermented dessert instant mixes and ready-to-reconstitute food products based on different fortification of cereals, pulses, and vegetables are discussed in this literature.

Keywords: Traditional food, Ready-to-Reconstitute, Instant Mix, Physical-chemical Properties.

INTRODUCTION

As a close substitute for our everyday food, ready-to-eat/serve, ready-to-cook, instant mix, and ready-to-reconstitute foods are now widely available. Younger generations are more likely to spend money on these kinds of goods. Young customers, who are easily targeted by manufacturing corporations because to the level of convenience, texture, and pleasant flavour over the entire shelf life of the items, are driving up demand for these foods. Because of this, customers in India and throughout the world are gradually moving away from conventional cooking methods and toward ready-to-eat/serve, ready-to-cook, instant mix, and ready-to-reconstitute food products. Cereals, pulses, and millets are used to make a variety of prepared foods, such as puffed and flaked millets, pasta, baked goods, extruded goods, and fermented foods. These foods are useful for providing nutrients and quick energy. Due to its convenient size and small packing, it is simple to handle and transformation.

According to the "India Ready-To-Cook Market Outlook, 2021," the market for the RTE category has developed over the past five years at a CAGR of 15-20 %. Research & Markets estimates that the Indian RTE market was worth $261 million in 2017 and would increase to $647 million by 2023 at a CAGR of about 16 %. (Source: The Hindu Business Line).

A greater number of Indian companies have entered the market with a variety of instant food products as a result of the introduction of new, high-quality instant food products that have altered peoples' lifestyles. In India, well-known brands of ready-to-eat meals include TTC (The taste company), MTR, GITS, TATA Q, Priya foods and Haldiram. These companies offer ready to eat dishes like dal makhani, palak paneer, poha, biryani, pulao etc. (Source: Indian local foods). Many variants are easily accessible in every organized retail store because these companies have a strong distribution network across the country. Among the three sales channels traditional store, modern retail stores, online sales; the traditional stores contribute the highest revenue in the market. Companies are working with online food stores and even launching their own websites in response to the rapidly expanding e-commerce market and the rising movement of grocery shopping to the e-platform.

Instant mixes and ready-to-reconstitute foods normally in dry form need to be mixed with water before consumption. These food products are the most convenient foods because they only need to be reconstituted in boiling water and simmered for 2 to 10 minutes, depending on the processing method and the food's content. Foods that are ready to eat offer a number of advantages, including convenience, usability, and time savings. The ability to save time is one of the most obvious benefits of meals that are ready to eat. The best alternatives to traditional cooking, especially when time is a major concern, are food products that can be heated and eaten.

Dried food can be characterized as (i) Ready-to-eat food (foods that will not be cooked or reheated before serving, ready for consumption without any preparation). (ii) Instant mix foods (dehydrated foods with multiple components that only require the addition of water to prepare). These foods need very little preparation prior to consumption. (iii) Ready to cook foods (foods that are processed or prepared to be ready to cook with very little additional effort) (iv) Ready-to-reconstitute foods (foods that can be reconstituted by simply adding boiling water to dehydrated food for 5-7 minutes to restore their original consistency).

The development and optimization of processing parameters for several instant mixes and ready-to-reconstitute products has been successfully performed using response surface methodology (RSM). Attempts have been made earlier to optimize the soy-fortified instant *upma* mix and pearl millet-based *upma* mix to obtain a product with acceptable quality (Yadav and Sharma, 2008; Balasubramanian *et al*., 2014). Sushmitha *et al*. (2017) developed a foxtail millet instant *dosa* mix by varying the level of foxtail millet and rice flour. Roopa *et al*. (2017) developed a lentil-millet-based *dosa* mix. Dhiman *et al*. (2017) developed a dehydrated pumpkin *halwa* mix by varying the amount of dehydrated pumpkin and the level of sugar. Kamble *et al*. (2017) developed a sweet potato *halwa* mix. Nayi and Kumar (2021) used RSM for optimization of levels of ingredients like milk, sugar, and cooking time for the development of ready-to-reconstitute sweet corn *halwa*. Vaghela *et al*. (2016) used RSM for optimization of levels of ingredients like *khoa*, *ghee*, and sugar for the development of ready-to-constitute carrot *halwa.*

Scope of the study

The study mainly focuses on consumer awareness of instant and ready to reconstitute food products and analysing the factors that influence the buying behaviour of these food products. Hence, this study would help in understanding the market for instant and ready-to-reconstitute food products in India. The study is focused on several kinds of instant products, namely, *upma* mix, *dosa* mix, and *halwa* mix, and ready-to-constitute products, namely, *carrot halwa* and *sweet corn halwa*. This research will assist manufacturing companies in developing future marketing strategies, making changes to existing Indian traditional food products and developing new ones, as well as making pricing and packaging decisions.

Nonfermented instant mix food products. Nonfermented foods are those foods which are instantly prepared without the need for any fermentation process. These foods are easy to digest, contain healthy carbohydrates, help to regulate blood sugar levels, and are high in probiotics.

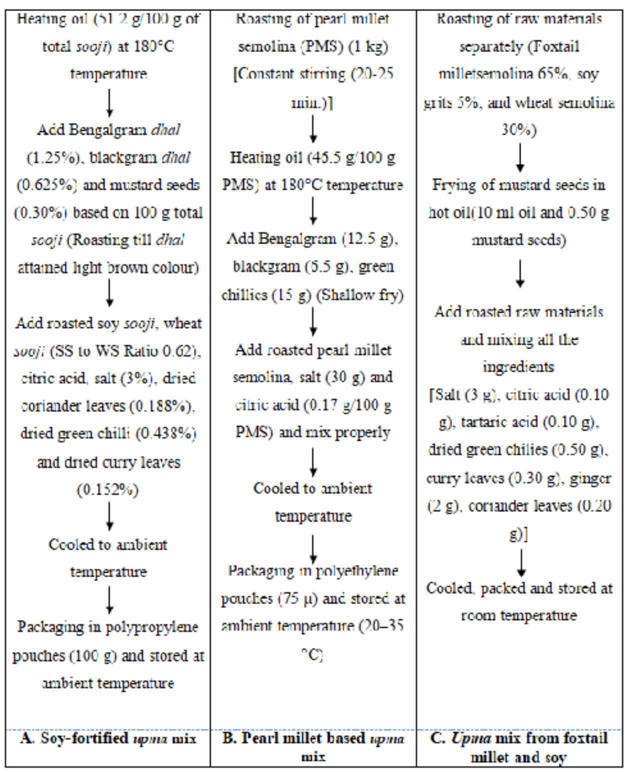

Fig. 1. Flow chart for non fermented instant mix.

Physical parameters. The developed final product e.g. nonfermented and fermented ready mixes, ready to reconstitute products needs to be evaluated for physical parameters as these parameters characterize the final product and affect the sensory characteristics of the product. Some of the parameters, which are reported in literature for characterizing various products are discussed as under:

Rehydration ratio. It is defined as the ratio of dried rehydrated product mass to the original mass of the dried food samples. Rehydration ratio (RR) of the dehydrated product can be calculated by using following equation (Yadav and Sharma, 2008; Balasubramanian *et al*., 2014; Dhumketi *et al*., 2018).

$$R = \frac{\text{Mass of the dried rehydrated product, g } (w_r)}{\text{Mass of the dried food sample, g } (w_d)}$$

The rehydration ratio is dependent absorption capacity of various constituents of the food materials, which remains main reason for the variation in rehydration ratio. The rehydrating water temperature and beating process also affects the rehydration due to more absorption and air incorporation while rehydrating ready mixes. The rehydration ratios of soy-fortified *upma* mix (SFUM), pearl millet based *upma* mix (PMUM), and foxtail millet and soy *upma* mix (FMSM) range between 2.59-3.11, 2.20-3.40 and 2.80-3.50 respectively (Yadav and Sharma 2008; Balasubramanian *et al*., 2014; Dhumketi *et al*., 2018). The maximum rehydration ratio was more in foxtail millet and soy *upma* mix is obvious due to incorporation of soy in the *upma* mix (Fig. 2).

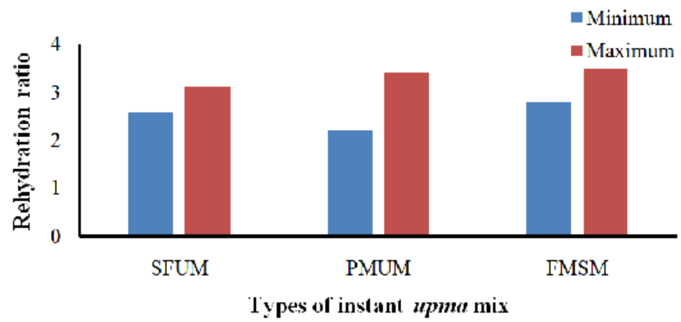

Fig. 2. Variation in rehydration ratio of different instant *upma* mix.

Chemical parameters. The developed final product e.g. nonfermented and fermented ready mixes, ready to reconstitute products needs to be evaluated for chemical parameters as these parameters characterize the final product and affect the sensory characteristics of the product. Some of the parameters, which are reported in literature for characterizing various products are discussed as under:

Protein. Pearl millet has well-balanced protein, with high concentration of threonine and tryptophan. Foxtail millet and soy are also a good source of protein in daily diet and provide all the essential amino acids. A combination of these millet and soy with cereal proteins can improve the quality of protein and positively impact on growth and maintenance of body. Protein content of the sample can be determined by using methods described in AOAC 1995, AACC 2000 (method 46-12) and AOAC (1992) respectively (Yadav and Sharma 2008; Balasubramanian *et al*., 2014; Dhumketi *et al*., 2018).

The protein content of optimized soy-fortified *upma* mix (SFUM), pearl millet based *upma* mix (PMUM) and foxtail millet and soy *upma* mix (FMSM) were 16.2 %, 6.7 % and 12.47 % respectively. (Yadav and Sharma, 2008; Balasubramanian *et al*., 2014; Dhumketi *et al*., 2018). The maximum protein content in soy-fortified *upma* mix due to soybean is rich source of protein and ratio of soybean fortification is more in SFUM as compared to FMSM (Fig. 3).

Fat. Fat content of the sample can be determined by using methods described in AOAC 1995, AACC 2000 (method 30-25) and AOAC (1992) respectively (Yadav and Sharma 2008; Balasubramanian *et al*., 2014; Dhumketi *et al*., 2018). The fat content of optimized soy-fortified *upma* mix (SFUM), pearl millet based *upma* mix (PMUM) and foxtail millet and soy *upma* mix (FMSM) were 34 %, 29.5 % and 7.76 % respectively. (Yadav and Sharma 2008; Balasubramanian *et al*., 2014; Dhumketi *et al*., 2018). Fat content of soy-fortified *upma* mix (SFUM) was high as compared to other two *upma* mixes (Fig. 3).

Ash

Ash content of the sample can be determined by using methods described in AOAC 1995, AACC 2000 (method 8-01) and AOAC (1992) respectively (Yadav and Sharma 2008; Balasubramanian *et al*., 2014; Dhumketi *et al*., 2018). The ash content of optimized soy-fortified *upma* mix (SFUM), pearl millet based *upma* mix (PMUM) and foxtail millet and soy *upma* mix (FMSM) were 2.1 %, 0.91 % and 3.55 % respectively (Yadav and Sharma 2008; Balasubramanian *et al*., 2014; Dhumketi *et al*., 2018). Maximum ash content was observed in foxtail millet and soy *upma* mix (FMSM) (Fig. 3).

Carbohydrate. The body receives glucose from carbohydrates, which is then transformed into energy for maintaining bodily processes and carrying out physical activities. Foods high in carbohydrates like unprocessed or minimally processed whole grains and beans are an important part of a healthy diet. Carbohydrate of the sample can be determined by using methods described in AOAC 1995 and also calculated by subtracting the sum of moisture, protein, fat and ash from 100 (Yadav and Sharma 2008; Balasubramanian *et al*., 2014; Dhumketi *et al*., 2018).

Carbohydrate of optimized soy-fortified *upma* mix (SFUM), pearl millet based *upma* mix (PMUM) and foxtail millet and soy *upma* mix (FMSM) were 45.43 %, 62.9 % and 32.73 % respectively (Yadav and Sharma 2008; Balasubramanian *et al*., 2014; Dhumketi *et al*., 2018). The maximum carbohydrate in pearl millet based *upma* mix due to pearl millet contain more carbohydrate as compared to other millets (Fig. 3).

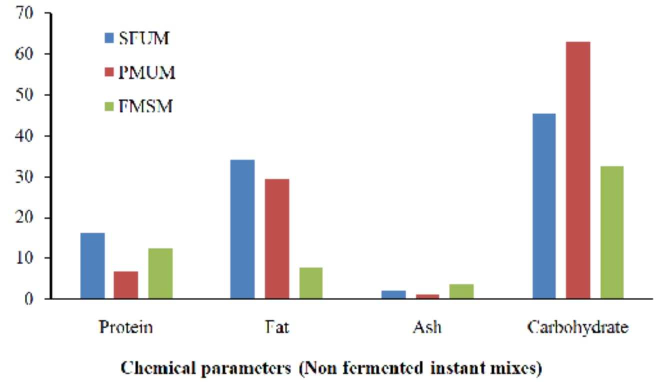

Fig. 3. Variation in chemical parameters of non fermented mixes.

Fermented instant mix food products. Fermented foods are defined as "foods or beverages generated through properly controlled microbial growth and the enzymatic conversion of food components". Food fermentation's primary goal is to generate a wide range of fermentation products with distinct tastes, flavours, aromas, and textures. Food nutrients that have undergone fermentation are easier to digest. A number of health benefits are associated with fermentation like improves digestive health, boosts immune system, weight loss, heart health and mental health.

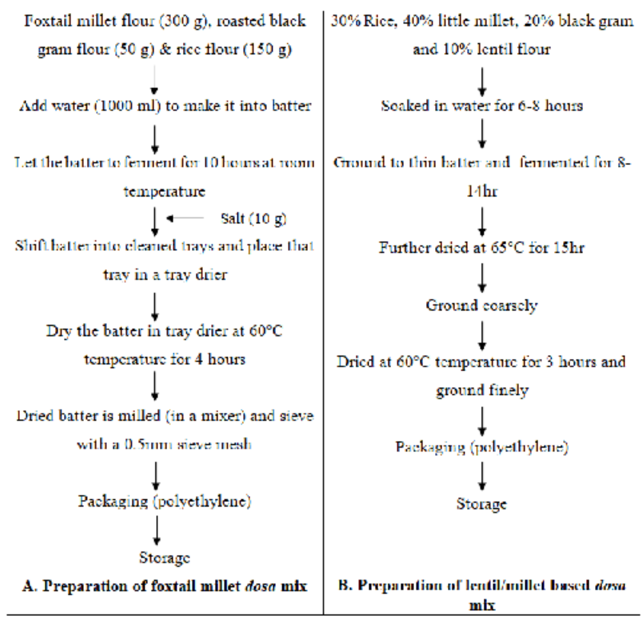

Fig. 4. Flow chart for fermented instant mix.

Physical parameters

Moisture content. Moisture content of instant mixes can be determined according to AOAC 1990 (Roopa *et al*., 2017). Moisture content of foxtail millet *dosa* mix (FMDM) and lentil/millet based *dosa* mix (LMDM) were 6.36 % and 7.95 % (Fig. 5) (Sushmitha *et al*., 2017; Roopa *et al*., 2017).

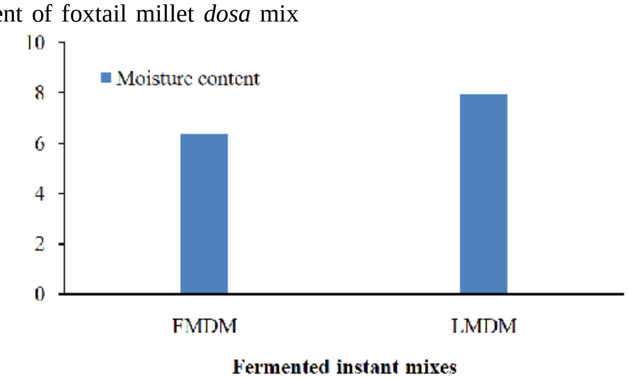

Fig. 5. Variation in moisture content of fermented mixes.

Chemical parameters

Protein. Protein content of the instant mixes can be determined by using standard method AOAC 1990 (Roopa *et al*., 2017). Protein content of foxtail millet *dosa* mix (FMDM) and lentil/millet based *dosa* mix (LMDM) were 12.26 % and 12.69 % (Sushmitha *et al*., 2017; Roopa *et al*., 2017). Lentil/millet based *dosa* mix (LMDM) contain more protein as compared to foxtail millet *dosa* mix (FMDM) due to lentils are excellent source of protein (Fig. 6).

Carbohydrate. The total carbohydrate of the instant mixes can be estimated by hydrolysis method according to AOAC 1995 (Roopa *et al*., 2017). Carbohydrates were calculated by using following equation (Sushmitha *et al*., 2017).

Total carbohydrates (g/100g dry weight) = 100 - [protein (g) + crude fat (g) + ash (g) + crude fiber (g) + moisture (g)]

Carbohydrate of foxtail millet *dosa* mix (FMDM) and lentil/millet based *dosa* mix (LMDM) were 71.99 % and 70.80 %. (Sushmitha *et al*., 2017; Roopa *et al*., 2017). Maximum carbohydrate was observed in foxtail millet *dosa* mix (FMDM) (Fig. 6).

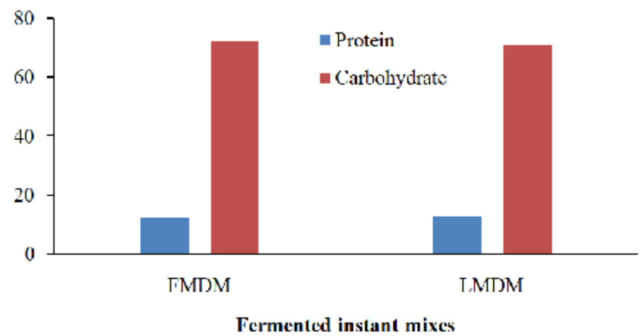

Fig. 6. Variation in protein and carbohydrate of fermented instant mixes.

Fat. The fat content of the instant mixes can be determined by Soxhlet, using diethyl ether as a solvent according to AOAC 1990. Fat content of foxtail millet *dosa* mix (FMDM) and lentil/millet based *dosa* mix (LMDM) were 2.97 % and 1.12 % (Sushmitha *et al*., 2017; Roopa *et al*., 2017). Maximum fat content was observed in foxtail millet *dosa* mix (FMDM) (Fig. 7).

Crude fiber. Pulses are good sources of soluble fibres, several vitamins and minerals. The fibre content can be determined by fibra plus-operational procedure for crude fibre (Roopa *et al*., 2017). Crude fiber of foxtail millet *dosa* mix (FMDM) and lentil/millet based *dosa* mix (LMDM) were 5.03 % and 3.65 % (Sushmitha *et al*., 2017; Roopa *et al*., 2017). Maximum crude fiber was observed in foxtail millet *dosa* mix (FMDM) (Fig. 7).

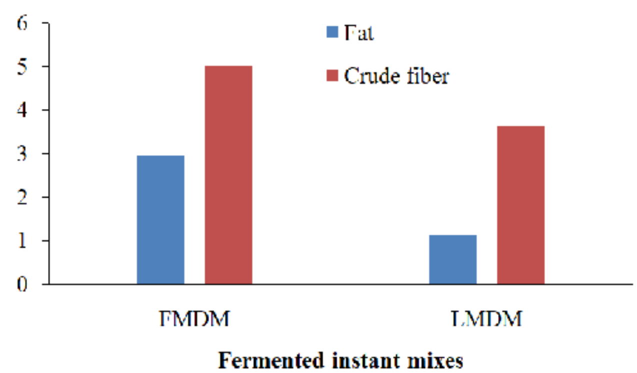

Fig. 7. Variation in Fat and crude fiber of fermented instant mixes.

Energy. Total energy was calculated according to the following equation (Sushmitha *et al*., 2017; Roopa *et al*., 2017).

Total energy (kcal/100g) = [(carbohydrates % × 4) + (protein % x 4) + (fat % x 9)].

Energy value of foxtail millet *dosa* mix (FMDM) and lentil/millet based *dosa* mix (LMDM) were 363.73 kcal/100g and 344.06 kcal/100g (Sushmitha *et al*., 2017; Roopa *et al*., 2017).

Instant mix dessert products. Desserts are usually sweet and warm tasting course or dishes often described with a word such as 'creamy' or 'sweet'. Brain releases endorphins like serotonin as a result of the sugar in desserts. These hormones are in responsible of helping to feel joyful, cheerful, and relaxed. A great stress reliever is sugar. These foods have health benefits like rich in nutrition, mood booster, weight control, protect from strokes and Lowers risk of heart disease.

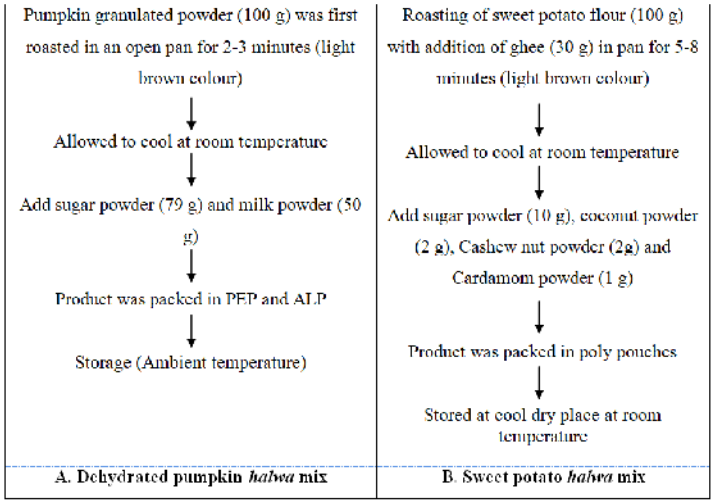

Fig. 8. Flow chart for instant mix dessert products.

Physical parameters

Moisture content. Moisture content can be estimated by drying the weighed sample (10 g) to a constant weight in a hot air oven (AOAC 2004) and also estimated by method described in Ranganna, 1977. The percent moisture content was calculated by using following formula (Dhiman *et al*., 2017; Kamble *et al*., 2017).

$$\text{Moisture content (\%)} = \frac{\text{(Weight of Petri dish with sample after drying,W2} - \text{Weight of empty Petri dish ,W)}}{\text{(Weight of Petri dish with sample before drying,W1} - \text{Weight of empty Petri dish,W)}} \times 100$$

Moisture content of dehydrated pumpkin *halwa* mix (DPHM) and Sweet potato *halwa* mix (SPHM) were 4.99 % and 6.94 % (Dhiman *et al*., 2017; Kamble *et al*., 2017).

Chemical parameters

Protein. Protein content can be estimated by lowery's method with using of folin-ciocalteau reagent. Bovine serum albumin as a standard and read the intensity of blue colour at 660 nm in spectrophotometer. Protein content of dehydrated pumpkin *halwa* mix (DPHM) and Sweet potato *halwa* mix (SPHM) were 6.21 % and 6.15 % (Dhiman *et al*., 2017; Kamble *et al*., 2017). Maximum protein was observed in dehydrated pumpkin *halwa* mix (DPHM) (Fig. 9).

Fat. Fat content can be estimated by using soxhlet extraction apparatus and Computer digital water activity meter and also estimated according to AOAC 1995. The percent fat content was calculated by using following formula (Dhiman *et al*., 2017; Kamble *et al*., 2017).

$$\text{Fat (\%)} = \frac{\text{Weight of flask with oil,g (W2)} - \text{Weight of empty flask,g (W1)}}{\text{Initial weight of sample,g (W)}} \times 100$$

Fat content of dehydrated pumpkin *halwa* mix (DPHM) and sweet potato *halwa* mix (SPHM) were 5.84 % and 27.3 % (Dhiman *et al*., 2017; Kamble *et al*., 2017). Maximum fat was observed in sweet potato *halwa* mix (SPHM) (Fig. 9).

Reducing sugar. Reducing sugar can be determined as per the method described by Ranganna 2009 and also estimated by dinitrosalicylic acid method by using glucose as a standard. Read the intensity of dark red colour at 510 nm. Reducing sugar of dehydrated pumpkin *halwa* mix (DPHM) and sweet potato *halwa* mix (SPHM) were 13.47 % and 3.6 % (Dhiman *et al*., 2017; Kamble *et al*., 2017). Maximum reducing sugar was observed in dehydrated pumpkin *halwa* mix (DPHM) (Fig. 9).

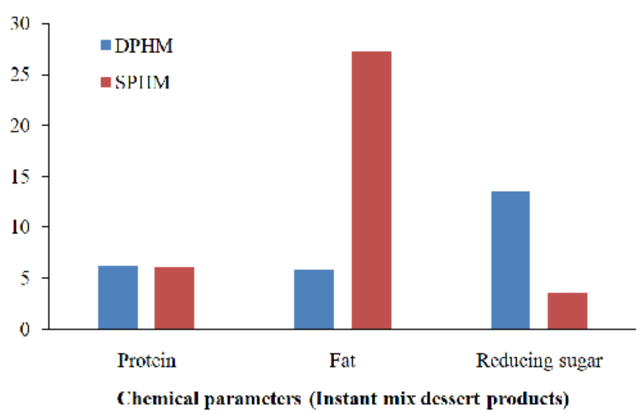

Fig. 9. Variation in chemical parameters of instant mix dessert products.

Ready-to-reconstitute food products. Ready to reconstitute foods just need to add boiling water to dehydrated food for 5-7 minutes to regain their original consistency. Reconstitution in boiling water with simmering for 2–10 min, depending again on the type of processing and the composition of the food.

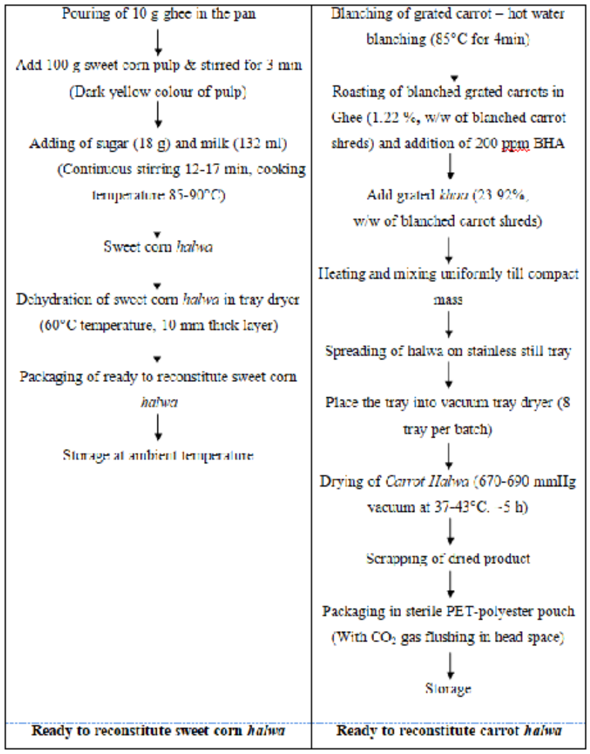

Fig. 10. Flow chart for ready-to-reconstitute food products.

Chemical parameters

Titratable acidity. Heat stability and keeping quality of the product are determined by the titratable acidity. Titratable acidity can be determined by using standard method described in Ranganna 2000 and also determined by procedure described as per BIS: Part XI (1981). Titratable acidity of ready to reconstitute sweet corn *halwa* (SCH) and carrot *halwa* mix (CH) were 0.34 % and 0.43 % (Nayi and Kumar, 2021; Vaghela *et al*., 2016). Acidity of carrot *halwa* mix (CH) is more as compared to sweet corn *halwa* (SCH) is obvious due to incorporation of carrot.

CONCLUSION

With so many fast food options accessible in the market, modern people have adjusted their lifestyles and behaviors toward instant mixes and RTR food products. They react to foods that are both fresh and simple to prepare. This study concluded that cereals, pulses and vegetables are major category of food which used for making instant mixes and RTR foods. To produce wholesome and high-quality ready meals, different innovations and technologies are used. These types of food are healthy, convenient and also considered as therapeutic food for health conscious peoples.

FUTURE SCOPE

Further research could focus on different types of traditional ready-to-reconstitute foods because there are very limited varieties available in the market and RTR foods will not only remain popular in India but also expand significantly.

Conflict of Interest. Nil.

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