Effect of incorporation of oil on sensory and textural properties of millet based *Dhokla* prepared from instant mix

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***Abstract*- The idea of healthy and nutritionally rich snack is fulfilled by incorporating barnyard millet and amaranth. In western India, *Dhokla* is typical part of staple diet and popular all over the Indian subcontinent. The present study was planned to evaluate Texture profile analysis (TPA) of *Dhokla* made from instant mix without oil and with oil. The *Dhokla* was organoleptically evaluated by using 9-points hedonic scale by trained sensory panel. The body & texture, flavour and after taste & overall acceptability of *Dhokla* score were significant increased by 10.59, 8.34 and 6.67% respectively, made with oil from instant mix. The results of TPA were significant change in texture properties like hardness, adhesiveness, resilience, gumminess, and chewiness of *Dhokla* were decreased by 20.81, 86.93, 14.81, 20.39 and 28.62%, respectively, prepared with oil rather than without oil. And springiness showed a significant increase of 16.57%. However, there was no significant change observed in the cohesiveness of the *Dhokla* made with oil from the instant mix. The organoleptic evaluation of the *Dhokla* was more acceptable with addition of oil.**

***Keywords*: Barnyard millet, Amaranth, Texture profile analysis (TPA), *Dhokla*, organoleptic characteristics, significant (S), non-significant (NS).**

I. INTRODUCTION

The 'instant food mix' is a product composed of all the ingredients, premixed in standardized form providing with (homemade food option) benefits like, convenience, ease of use and rapid preparation aiming to save time and energy for today's busy generation [1]. There are many different types of instant foods in the market nowadays, depending on the consumer's needs. Introduction of instant food products had revolutionized the lifestyle and eating habits of the people along with paving way for number of companies to enter into market [2].

Dhokla, a lactic acid fermented/ non fermented (acidified) spiced cake, is one such traditional food Gujarat, and now, popular all over india and some part of world due to its delicate spongy texture and its digestibility. Traditionally *Dhokla* is prepared from high protein legumes like bengal gram dhal (*Cicer arietinum Linn.*) or black gram dhal (*Phaseolus mungo Roxb.*) and cereal grains like rice (*Oryza sativa Linn.*) or semolina, which are staples of Indian vegetarian diets [3]. The textural properties of *Dhokla* play a major role in consumer acceptance of the product. Desirable textural characteristics of a *Dhokla* include soft, spongy, fluffy body, and non-sticky texture.

Barnyard millet (Echinochloa species), an ancient millet crop of Asian countries. Barnyard millet grain is a rich source of dietary fibre, iron, zinc, calcium, protein, magnesium, fat, vitamins, and some essential amino acids [4][5][6]. Which is superior to many major and minor millets. Amaranth, a dicotyledonous pseudo cereal, belongs to the family *Amaranthaceae* is a promising underutilized food crop. [7]. Due to the nutritional significance of millets, many new products are being developed by incorporation of millets and other suitable ingredients [8][9][10]. In terms of nutritive value, it provides good amount of E.A.A rich protein, PUFA and squalene rich lipid, antioxidant and dietary fibre [11].

II. METHODOLOGY

The required raw materials i.e. Barnyard millet, Amaranth, Sago, Refined oil, Salt and Leavening mix etc.

The instant millet *Dhokla* mix was prepared using barnyard millet (60%), amaranth grain (35%), and sago (5%). The blend was added with leavening mix (7.25%) and rock salt (3%).

For the preparation of *Dhokla* 130mL of water, 5g oil (optional) were added to 100g of instant mix and mixed well to made batter. The batter was hold for 10min, followed by pouring it in *Dhokla* steaming plate, and steamed for about 15min. The *Dhokla* prepared with & without addition of oil were analysed for texture characteristics & sensory.

The textural characteristics of *Dhokla* were analysed using p/75 mm compression platen in texture analyser (TA-HDi Texture Analyser, Stable Micro System) using 3.5 cm cubic mold.

The sensory evaluation of *Dhokla* prepared from instant mix with & without oil were done by trained sensory panel using 9-point heonic scale [12].

All the data obtained were statistically analysed using paired t-test [13].

III RESULT & DISCUSSION

The results obtained from texture and sensory analysis of *Dhokla* are tabulated and discussed in this chapter.

1) Texture profile analysis

The texture profile analyzer applies a controlled force to a food sample and measures the responds of sample, creating a diagram showing properties like hardness, adhesiveness, springiness and more. Table (1) displays the value of these properties for the *Dhokla* prepared with and without addition of oil.

As reported in table (1); there was significant ($p<0.05$) decrease in the hardness of *Dhokla* (from 412.16 to 326.41g) when it made with addition of oil. There was around 20% reduction in the hardness of product, yielding a softer product when oil was added to the batter. Adhesiveness was significantly ($p<0.05$) decreased from 3.29 to 0.43g.sec for *Dhokla* made with oil, and the reduction around 87%, The addition of oil to the batter to prepare *Dhokla* resulted in a decrease in hardness and adhesiveness, resulting a softer and less sticky product. The incorporation of oil in the *Dhokla* batter significantly reduced (about 15%) the resilience of the prepared *Dhokla*, while it didn't significantly affect the cohesiveness of *Dhokla*.

Table: (1) Texture profile analysis data of *Dhokla* without oil and with oil
n = 7, t – critical = 2.447 (p < 0.05)

TPA Properties	*Dhokla* Without oil	*Dhokla* With oil	Cal. t-value	Statistical difference	% Change after addition of oil
Hardness, g	412.16 ± 40.43	326.41 ± 58.91	3.157	S	↓ 20.81%
Adhesiveness, g.sec	3.29 ± 2.81	0.43 ± 0.28	2.709	S	↓ 86.93%
Resilience, %	13.17 ± 2.21	11.22 ± 0.84	2.670	S	↓ 14.81%
Cohesiveness	0.31 ± 0.04	0.31 ± 0.03	0.510	NS	-
Springiness, %	25.33 ± 3.57	30.36 ± 2.88	4.134	S	↑ 16.57%
Gumminess	130.89 ± 19.21	104.83 ± 20.21	4.008	S	↓ 20.39%
Chewiness	36.90 ± 10.46	26.34 ± 4.69	2.579	S	↓ 28.62%

It was observed that, the springiness of product was improved by around 17%. While the gumminess and chewiness were significantly reduced from 130.89 to 104.83 (around 20%), and 36.90 to 26.34 (around 29%), respectively. These improvements in the texture characteristics can be correlated with the presence of oil while formulation of texture.

As in [14]. *Idli* made with the incorporation of finger millet was prepared and reported hardness, adhesiveness, resilience, cohesiveness, springiness, and chewiness was found 222 g, 0.5 mJ, 0.11, 0.89, 0.83 cm, and 16.3 mJ, respectively. Similarly, the hardness of *Idli* made by Momin and Prasad (2019) [15] was found 240.5 g. The reported effect of LAB-fermented batter for 12 h on hardness and springiness was 305 g and 68.70%, respectively for prepared *Idli* [16].

2) Sensory Evaluation

Sensory evaluation of the *Dhokla* was performed by trained sensory penal on 9-hedonic scale, and scores of different sample are tabulated in table (2).

Table: (2) Sensory attribute data of *Dhokla* without oil and with oil

Sensory Attribute (score out of 9.0)	*Dhokla* Without oil	*Dhokla* With oil	Cal. t-value	Statistical difference
Colour & Appearance	7.67 ± 0.41	7.67 ± 0.41	0.231	NS
Body & Texture	7.09 ± 0.12	7.93 ± 0.19	8.035	S
Flavour & After Taste	7.14 ± 0.20	7.79 ± 0.27	6.000	S
Overall acceptability	7.28 ± .037	7.80 ± 0.24	3.928	S

n = 7, t – critical = 2.447 (p < 0.05)

As presented in table (2); the colour & appearance scores of *Dhokla* made with and without oil were significantly at par with each other while the other sensory parameters differed significantly. The body & texture, flavour and aftertaste as well as overall acceptability scores for the *Dhokla* prepared with oil (7.93, 7.79 and 7.80) were higher than such scores for *Dhokla* prepared without addition of oil (7.09, 7.14 and 7.28).

The improvement in flavour score id attributed to the presence of fat, which yield rich flavour and better after taste without perception of bitterness or any objectionable flavour in *Dhokla* [16], while the increased score of body& texture are the result of change in texture characteristics (Table-1) of the *Dhokla* when prepared with oil.

Shobha *et al.* (2020) [18] mentioned in their study, the sensory evaluation of *Dhokla* made by maize semolina and Bengal gram (3:1), was a control variant. Sensory score of colour (8.75), appearance (8.80), taste (8.10), texture (8.35), flavour (8.52) and overall acceptability (8.65). Rani and Sundaravalli (2016) [19] developed spirulina millet mix flour (SMMF) added *Dhokla*, 75% addition

of SMMF was most acceptable variant of *Dhokla*. Sensory score of 75% SMMF added *Dhokla*, colour (7.95), appearance (7.52), texture (7.00), taste (7.23), aroma (7.19) and overall acceptability (7.04).

IV. CONCLUSION

The instant food mixes are becoming popular nowadays due to several advantages they offered. The biggest challenges against the food technolo.gists is the development a instant mix which is comparable in all aspects with the freshly prepared one.

The texture of *Dhokla* is an important factor in its consumer acceptance. *Dhokla* should have a fluffy and spongy texture, and if they are too dry or too dense, it will be less appealing to the consumers. Thus, the efforts were made to improvise the acceptability of the millet *Dhokla* made from instant mix. The results of the sensory evaluation showed that the *Dhokla* made with oil were rated more favourable than the *Dhokla* made without oil. The results of the TPA analysis also showed that the *Dhokla* made with oil were significantly softer and less adhesive (sticky), better in volume (springiness) and had lesser gumminess and chewiness than the *Dhokla* made without oil. The results of this study suggest that the addition of oil can be a useful technique for improving the sensory and textural properties of *Dhokla* prepared from instant mix.

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