Optimization and Study the Effect of Hydrocolloids on Overall Acceptability of Low Fat Sev and Chakli as Snacks Products

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A B S T R A C T

The present study was conducted to develop deep fat fried snacks products sev and chakli, which is based on gaur gum and gum Arabic they varying in range gaur gum (0.2 to 1.0%) and gum Arabic (0.3 to 1.5%) for sev and gaur gum (1.0 to 3.0%) and gum Arabic (0.5 to 2.5%) for chakli as independent variables produced 13 different combinations that were studied using response surface methodology. In this study the use of hydrocolloids in snacks food product and seen their effect on overall acceptability of product by sensory parameter. In this study used of different levels of black gram flour and chickpea flour for development of snacks product. They are prepared by 50:50% of flours used in snacks preparation. Sev gives better sensory result and accept by all panelists as compare to chakli and sev is more acceptable by their overall sensory property.

Key words: Chakli, Gaur Gum, Gum Arabic, Sev

In this research response surface methodology is used to study the experimental design of snacks product (RSM). It is a statistical technique working according to the nonlinear multivariate model. This can also be used for studying interactions among different process parameters. RSM comes with a benefit of using it to decrease the number of experimental runs required for providing enough statistical acceptance information of the outcomes. There are two variants which are sometimes are known as variables (for each variable there are five levels) Central Composite Rotatable Experimental Design (CCRD) has been used (Montgomery 2001).

An independently variables has been considered were gaur gum and gum Arabic percentage for sev (A, B) where for chakli, gaur gum and gum Arabic (A, B) respectively. The process of research with 5-levels has been coded as the negative to positive ways coded -1.414, -1, 0, +1 and 1.414. The mean values for protein, starches, lipid and fiery debris substance of 22.5%, 69.5%, 5.01% and 2.98%, individually for chickpea flour has been like those recorded before

reports (Milan Carrillo *et al*. 2000). The acceptable nature of baked and fried products could be readied in any case by replacing wheat flour at different stages for black gram flours high protein which were prepared in a different way (Patel *et al*. 1995). Chickpea flour made in plate factory (having molecule size scope of 250 to 100 microns gave great quality Sev. The base had simple to expel and more water retention capacity (Pratape *et al*. 2005). The purpose of this study to evaluate the overall acceptability of the snack's product, the sensory analysis of the product by their taste and hardness of product.

MATERIALS AND METHODS

Chickpea flour (CF) (Besan) and polished and unpolished black gram flour (BGF) was added in different proportions. Two hydrocolloids are used individually namely guar gum and gum Arabic. The research is carried based on rotatable experimental response of design of Response Surface Methodology.

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Raw materials: Raw material used for Sev: Chickpea flour, Polished black gram flour, Guar gum (0.2, 0.4, 0.6, 0.8, 1%), Gum Arabic (0.3, 0.6, 0.9, 1.2, 1.5%), Raw material used for chakli: Chickpea flour, Unpolished black gram, Gaur gum (1, 1.5, 2.0, 2.5, 3.0%), Gum Arabic (0.5, 1.0, 1.5, 2.0, 2.5%).

Sensory evaluation: The overall acceptance of the food product is evaluated by the sensory methods. Quality is important for the acceptance of the food. When the quality of this product is determined by the human being and by the equipment's methods. The best method is by human beings' sensory method by the organs of human beings, according to the human beings there is evaluation of the food product by sensory method like organoleptic evaluation, subjective evaluation and psychometric evaluation.

Hedonic rating test: This test is used for the determination of the satisfaction and unsatisfying of the food product acceptance according the scale by nine-point scale.

Hedonic rating is measured the consumer acceptance of the food production and gives the evaluation and result of the human sense. Sensory parameter is judge by given:

Like Extremely	:	9
Like Very Much	:	8
Like Moderately	:	7
Like Slightly	:	6
Neither Like nor Dislike	:	5
Dislike Slightly	:	4
Dislike Moderately	:	3
Dislike Very Much	:	2
Dislike Extremely	:	1

RESULTS AND DISCUSSION

Following table show the value of the independent variable for the snack's product sev and chakli. By the application of the composite central rotatable design on the hydrocolloids.

Table 1 Values of independent variables at five levels of the CCRD with hydrocolloid for Sev

Independent variables	Code	Levels in coded form				
		-1.414	-1	0	1	1.414
Gaur Gum	A	0.03	0.4	0.6	0.8	1.17
Gum Arabic	B	0.05	0.6	0.9	1.2	1.75

Table 2 Values of independent variables at five levels of the CCRD with hydrocolloid for chakli

Independent variables	Code	Levels in coded form				
		-1.414	-1	0	1	1.414
Gaur Gum	A	0.59	1.5	2.0	2.5	3.41
Gum Arabic	B	0.09	1.0	1.5	2.0	2.91

Table 3 Optimized sample for Chakli and Sev

Optimized composition	Chakli	Sev
Gaur gum	1.45	0.29
Gum Arabic	1.82	0.46
Chickpea: Unpolished black gram	1:1	1:1

The independent variables gaur gum and gum Arabic were denoted by code (A) and (B) levels of coded form are

five they vary from coded variable from –α to +α and ranges from -1.414, -1, 0, 1 and 1.414 by applying CCRD (central composite rotatable design) to get 13 different experiments or data to manufacture product.

In below (Table 3) it is show that the final optimized sample for the sev and chakli after the interpretation of the all 13 results in CCRD and got final optimized samples foe save and chakli.

Table 4 Sensory panelist result at sensory evaluation of snacks product sev and chakli

	Sr. No.	1	2	3	4	5	6	7	8	9	10	11	12	13
O.A.	Sev	9	9	9	9	9	9	9	7	8	8	8	8	7
	Chakli	9	5	6	9	9	9	9	7	9	9	5	8	8

The above all results from sensory panelist are put into central composite rotatable design and below the overall acceptance of the sev and chakli was studied and below result are interpreted.

Effect of variable on overall acceptability of chakli (O.A.)

The design summary of overall acceptability, minimum and maximum ranged from 5 to 9 respectively. The statistical OA attributes as well as the used pertained coefficients of the model are pertained in (Table 5). The experimental outcomes were calculated using the regression

model depicting that the significance of the Model F value was at 17.77. The Lack of Fit F value 2.28 was not significant (P>0.05) relative to pure error. This absence of a nonsignificant value was good for the model to fit. This model to fit has been also stated by the determination coefficient R^2 which was observed to be 0.9270 the Adj. R2 were 0.8748 where the Adequate Precision is 11.561 shown an adequate signal. The making an allowance for every mentioned criterion, a model shown in Equation 1 has been chosen for representing a variation of OA respectively.

Table 5 ANOVA for O.A. of snacks product (Chakli)

Factor	DF	Sum of Squares	Mean Square	F Value	Prob > F
Model,	5	27.52	5.50	17.77	0.0004
A	1	14.20	14.20	45.83	0.0003
B	1	3.44	3.44	11.09	0.0126
A²	1	5.63	5.63	18.19	0.0037
B²	1	2.94	2.94	9.49	0.0178
AB	1	2.25	2.25	7.26	0.0309
Lackoffit	3	2.17	0.46	2.28	0.2213
Pureerror	4	0.80	0.20		
Residual	7	2.17	0.31		
Total	12	29.69			

R^2 0.9270, Adj. R^2 0.8748, Adeq. Press. 11.561,

O.A. (Chakli) = $+8.80 +1.33*A +0.66*B -0.90*A^2 +0.65*B^2 +0.75*A*B$ ……. (Eq. 1)

Where A and B are the coded variable for gaur gum and gum arabic respectively. Above Equation (1) showed that the coefficient of A and B was positive. Data from (Table 5) indicated that O.A. of gaur gum and gum arabic gave significant model ($P<0.05$). In linear term, gaur gum (A) and gum Arabic (B) are observed to be significant ($P<0.05$). F value for linear terms gaur gum (A) and gum Arabic (B) are 45.83 and 11.09 and P value was observed to be 0.0003 and 0.0126 ($P<0.05$) respectively (Table 5).

Quadratic terms of gaur gum (A) and gum Arabic (B) had shown significant ($P<0.05$). F value for quadratic terms gaur gum (A^2) and gum Arabic (B^2) were 18.19 and 9.49 and P value was found to be 0.0037 and 0.0178 ($P<0.05$) showed significant effect respectively. The interaction term form gaur gum and gum Arabic (AB) gave nonsignificant effect P value was found to be 0.0309 ($P>0.05$) and it showed the positive effect on the interaction term and F value found to be 7.26.

The (Fig 1) showed the effect of gaur gum (A) and gum Arabic (B) on O.A. of snacks product. As, gaur gum content increases overall acceptability increases and gum Arabic content increases overall acceptability decreases. So, according to the above result its show that positive and negative effect on chakli product and due to sensory and hedonic scale also chakli is not accepted by taste and hardness.

Effect of variable on overall acceptability of sev (O.A.)
Design summary of overall acceptability, minimum and maximum ranged from 7.00 to 9.00. The (Table 6) shown the model coefficients and other statistical features of O.A. the regression model suited to experimental outcomes are shown model depicting that the significance of the Model F value was at 6.77. The Lack of Fit F value 0.73 was not significant ($P>0.05$) relative to pure error. This absence of a nonsignificant value was good for the model to fit. This model to fit has been also stated by the determination coefficient R^2 which was observed to be 0.8286 the Adj. R^2 were 0.7062 where the Adequate Precision is 8.596 shown an adequate signal. The making an allowance for every mentioned criterion, a model shown in Equation 2 has been chosen for representing a variation of OA respectively.
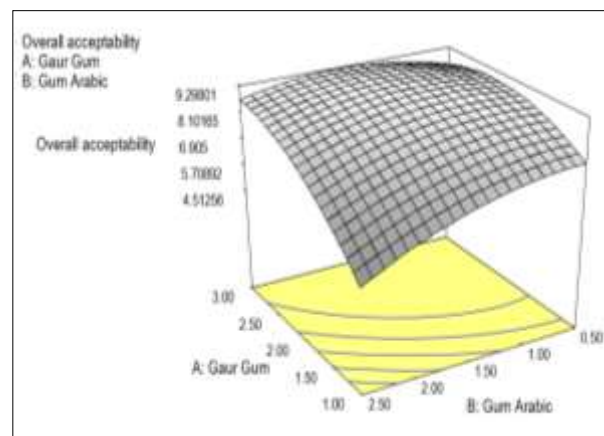

Fig 1 Response plot for overall acceptability of snacks product chakli

Table 6 ANOVA for O.A. of snacks product (Sev)

Factor	DF	Sum of Squares	Mean Square	F Value	Prob > F
Model	5	5.99	1.20	6.77	0.0131
A	1	1.83	1.83	10.35	0.0147
B	1	0.73	0.73	4.11	0.0821
A²	1	1.11	1.11	6.29	0.0406
B²	1	0.16	0.16	0.88	0.3784
AB	1	2.25	2.25	12.71	0.0092
Lackoffit	3	0.44	0.15	0.73	0.5846
Pureerror	4	0.80	0.20		
Residual	7	1.24	0.18		
Total	12	7.23			

R^2 0.8286 Adj. R^2 0.7062 Adeq. Press. 8.596

O.A. (Sev) = +8.80 +0.48*A +0.30*B -0.40*A^2 -0.15*B^2 +0.75*A*B …...… (Eq. 2)

Where A and B are the coded variable for gaur gum and gum Arabic respectively. Above equation (2) Showed that the coefficient of A and B was positive. Data from Table 6 indicated that OA of gaur gum and gum arabic gave significant model (P<0.05).
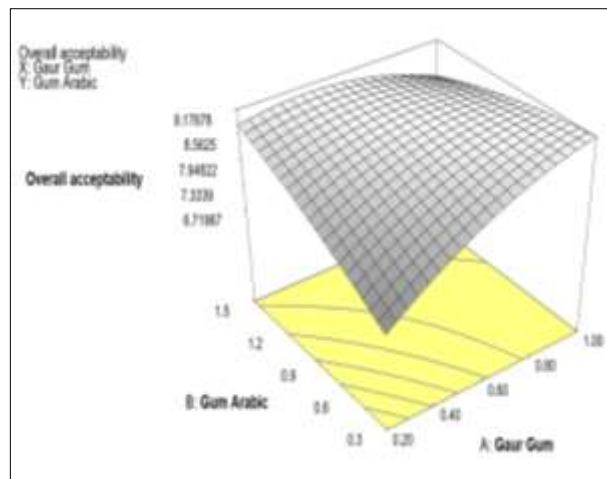

Fig 2 Response plot for overall acceptability of snacks product sev

In linear term, gaur gum (A) and gum Arabic (B) are observed to be significance (P<0.05). F value for linear terms gaur gum (A) and gum Arabic (B) are 10.35 and 4.11

and P value are observed to be 0.0.147 and 0.0821 (P<0.05) (Table 6) respectively.

Quadratic terms of gaur gum (A) and gum Arabic (B) had shown significant (P<0.05). F value for quadratic terms gaur gum (A^2) and gum Arabic (B^2) were 6.29 and 0.88 and P value was found to be 0.0406 and 0.3784 (P<0.05) showed nonsignificant effect respectively.

The interaction term form gaur gum and gum Arabic (AB) gave significant effect P-value was found to be 0.0092 (P<0.05) and it showed the positive effect on the interaction term and F value found to be 12.71.

The (Fig 2) shown the effect of gaur gum (A) and gum Arabic (B) on O.A. of snacks products of food. As, gaur gum content and gum Arabic content improve overall acceptability improves simultaneously.

In the light scientific data collection it is concluded that the composite flour is unpolished and polished black gram flour and chickpea is added in 1:1 proportion, and gaur gum and gum Arabic added as per the final experiments show after application of the CCRD where, the effect of gaur gum (A) and gum Arabic (B) on O.A. of snacks product. As, gaur gum content increases overall acceptability increases and gum Arabic content increases overall acceptability decreases. So, according to the above result its show that positive and negative effect on chakli product and due to sensory and hedonic scale also chakli is not accepted by taste and hardness. As, gaur gum content and gum Arabic content improve overall acceptability improves simultaneously. Sev is more acceptable by sensory property as compare to chakli.

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