

# A comparative study of the effect of gaur gum and gum arabic on snacks products chakli and sev

Nikhil Solanke and Pradip Pawar

Hydrocolloids such as gaur gum and gum arabic are used for reducing the content of oil from the fried food item. The results shows that the fat replaces add into food product show the positive effect on product and body, health risks were no longer challenged. The present study was conducted to develop deep fat fried snacks, which is based on gaur gum and gum arabic which are acts as fat replacer but the addition of the fat replacer have the limitation if there is large amount of addition of the fat replacer may affect the food product textural properties and overall acceptability of the product by consumer. Experimental design with varying the gaur gum (0.2 to 1.0 %) and gum arabic (0.3 to 1.5 %) as independent variables produced 13 different combinations that were studied using response surface methodology to investigate the effect of these variables on product responses. The comparative study evaluated the effect of gaur gum and gum arabic on physical properties of snacks product chakli, as the addition of gaur gum and gum arabic in different ranges in sev and chakli product and prepared the snacks product. The comparative study was done on physical parameters like oil absorption index and oil uptake ratio. Increasing the gaur gum and gum arabic content in sev and chakli sample there is decreases the oil absorption index and oil uptake ratio. Overall data suggested that positive effect of both the hydrocolloids on snacks samples.

**Key Words :** Chakli, Gum arabic, Gaur gum, Oil absorption index, Oil uptake ratio, Sev

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## INTRODUCTION

Impacts of black gram flour cooked untreated and sprouted on the scone properties of wheat flour have been shifted. The acceptable nature of bread rolls could

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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 and Venkateswara, 1995). The impact of pre-treatment to Bengal gram dhal preceding processing on nature of sev. The wet pre processing (WPT) gave lower measure of fine flour than dry pre-treatment (DPT) independent of crushing machine. WPT basen (chickpea flour) made in plate factory (having molecule size scope of 250 to 100 microns) gave great quality product. The base had simple to expel and more water retention capacity (Pratape *et al.*, 2009). In the business of foods guar gum was utilized as a novel added substance for nourishment in various

results of nourishment for nourishment adjustment and as fibre asset (Morris *et al.*, 2010). It was loved by the two makers and purchasers since it was monetarily just as common added substance of nourishment. It was utilized in various assortments of nourishments as an added substance since it modifies the present conduct of water as a typical segment in several foods. An alternate correspondent has been contemplated on creatures to for testing both hurtful and valuable impacts of guar gum crop. Guar was entirely corrupted in an internal organ by *Clostridium butyricum*. The guar gum demonstrated glucose and cholesterol decreasing effects on account of the qualities of framing the gel. This additionally helps in losing of weight and counteractive action of corpulence. Because of limit of gel framing guar gum dissolvable fibre, expanded satiation was achieved due to slow gastric purging. In gaur gum diet supplemented has been diminished the craving hunger and eating want. The component behind cholesterol bringing down by guar gum was because of increment in bile acid excretion in fetus as well as lessens in enterohepatic bile corrosive which may improves the creation of bile acids by cholesterol as well as it results in the decreased concentration of hepatic free cholesterol. Hypotriacylglycerolaemic impacts were expected to lessen in dietary lipids absorption as well as decline exercises of unsaturated fat syntheses in liver (Yamamoto, 2001). The lethality on partially hydrolyzed guar gum has discovered that it was not mutagenic upto portion level of 2500 mg for everyday (Takahashi *et al.*, 1994). The sufficient admission of guar gum in the form of fibre helps in the bowel consistency support huge decreases in total as well as LDL cholesterol, diabetes control improvement of mineral ingestion and avoidance of problems of digestives like clogging, respectively (Yoon *et al.*, 2008).

The aim of the present work were compared the effect of gaur um and gum arabic on physical properties of the snacks product like sev and chakli, physical properties like oil absorption index, oil uptake ratio and hardness.

## METHODOLOGY

Chickpea flour (CF) (Besan) and black gram flour (BGF) was added in different proportions. Two hydrocolloids are used individually namely guar gum and

gum arabic.

### 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 %).

### Oil absorption index:

– Assurance of oil absorption limit the technique for (Sosulski, 1962) has been utilized.

– The food sample has been taken and blended for 1 min using slight brass wire for scattering a chosen sample in oil.

– After holding for some period (30 min) the tubes has been centrifuged for 25 min at 3000 rpm.

– Isolated oil has been evacuated using tubes and pipette is modified for 25 min to deplete the oil before reweight.

– OAI was referenced in gram for oil bound of per 1 gram of sample at dry premise. OAI is determined by given equation:

### Calculations:

$$\text{OAI} = \frac{\text{Weight of centrifuge tube after draining oil} - \text{Weight of centrifuge tube} + \text{Sample}}{\text{Sample weight}}$$

### Oil uptake ratio ( $U_r$ ):

–  $U_r$  is determined using moisture substance as well as mixture and Sev as well as oil substance of Sev utilizing a recipe referenced by Pinthus *et al.* (1993).

Calculations are:

$$U_r = \frac{\text{Oil content of sev}}{\text{Md} - \text{Mp}} \%$$

Here,  $M_p$  as well as  $M_d$  was moisture substance of mixture and the item.

## OBSERVATIONS AND ASSESSMENT

In below interpretation the physical properties are oil absorption index, oil uptake and hardness was study and compares the result with each other by snacks product chakli and sev.

### Compare the effect of gaur gum and gum arabic on oil absorption index in chakli and sev:

*Effect of process variable on oil absorption index of*

*chakli:*

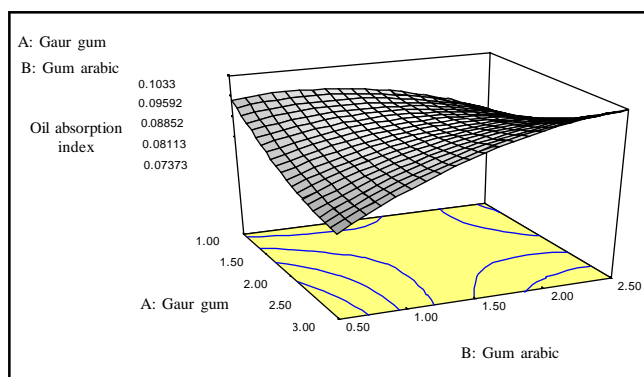
The statistical oil absorption index attributes as well as the used pertained co-efficients of the model are pertained in Table 1. Where A and B are the coded variable for gaur gum and gum arabic, respectively. Above eq. (1) Showed that the co-efficient of A and B was negative. Data from Table 1 indicated that oil absorption index of gaur gum and gum arabic gave significant model (P<0.05).

In linear term, gaur gum (A) and gum arabic (B) were found to be significant (P<0.05). F value for linear terms gaur gum (A) and gum arabic (B) were 7.827E-003 and 19.84 and P-value was found to be 0.9320 and 0.0030 (P<0.05), respectively (Table 1).

The quadratic terms of gaur gum (A) and gum arabic (B) has been shown significant (P<0.05). F value for quadratic terms gaur gum (A<sup>2</sup>) and gum aerobic (B<sup>2</sup>) are 12.21 and 29.24 and P value has been observed to be 0.0101 and 0.0010 (P<0.05) shown significant effect, respectively.

The interaction term form gaur gum and gum arabic (AB) gave significant effect P value was found to be 0.0001 (P<0.05) and it showed the positive effect on the interaction term and F value found to be 58.43.

Fig. 1 showed the effect of gaur gum (A) and gum arabic (B) on oil absorption index of snacks product. As, gaur gum content increases oil absorption index decreases



**Fig. 1 : Response plot for oil absorption index of snacks product chakli**

and gum arabic content increases oil absorption index decreases.

**Effect of process variable on oil absorption index of sev:**

Where A and B are the coded variable for gaur gum and gum arabic, respectively. Above equation (2) showed that the co-efficient of A and B was positive. Data from Table 2 indicated that oil absorption index 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 7.28 and 3.31 and P value are observed to be 0.0308 and 0.1119

<b>Table 1 : ANOVA for oil absorption index of snacks product (Chakli)</b>						
Factor	DF	Sum of squares	Mean square	F value	Prob > F	
Model*	5**	9.424E-004	1.885E-004	25.09	0.0002	
A	1	5.879E-008	5.879E-008	7.827E-003	0.9320	
B	1	1.490E-004	1.490E-004	19.84	0.0030	
A <sup>2</sup>	1	9.173E-005	9.173E-005	12.21	0.0101	
B <sup>2</sup>	1	2.196E-004	2.196E-004	29.24	0.0010	
AB	1	4.389E-004	4.389E-004	58.43	0.0001	
Lack of fit	3	3.738E-005	1.246E-005	3.28	0.1417	
Pure error	4	1.520E-005	3.800E-006			
Residual	7	5.258E-005	7.511E-006			
Total	12	9.950E004				

R<sup>2</sup> 0.9472, Adj. R<sup>2</sup> 0.9094, Adeq. Press. 16.144

O.A.I. (Chakli) = +0.091 -8.572E005\*A +4.316E003\*B +3.63E003\*A<sup>2</sup> -5.619E003\*B<sup>2</sup> +0.010\*A\*B ..... (Eq. 1)

(P<0.05) shown at (Table 2), 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<sup>2</sup>) and gum arabic (B<sup>2</sup>) were 8.59 and 1.50 and P value was found to be 0.0220 and 0.2603 (P<0.05) showed significant and non-significant effect, respectively.

The interaction term form gaur gum and gum arabic (AB) gave significant effect P value was found to be 0.0242 (P<0.05) and it showed the positive effect on the interaction term and F value found to be 8.21.

Fig. 2 showed the effect of gaur gum (A) and gum

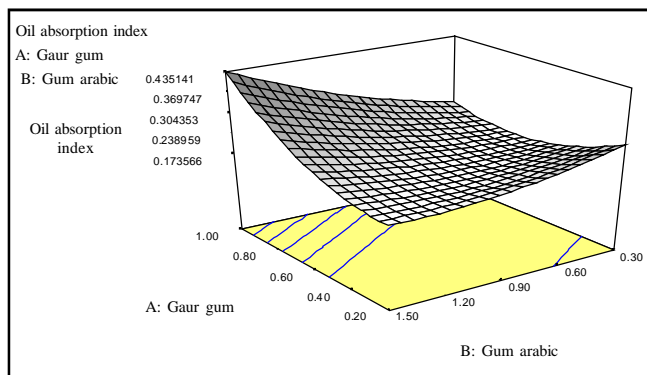


Fig. 2 : Response plot for oil absorption index of snacks product sev

Table 2 : ANOVA for oil absorption index of snacks product (Sev)

Factor	DF	Sum of squares	Mean square	F Value	Prob > F
Model	5	0.082	0.016	5.62	0.0214
A	1	0.021	0.021	7.28	0.0308
B	1	9.680E003	9.680E003	3.31	0.1119
A <sup>2</sup>	1	0.025	0.025	8.59	0.0220
B <sup>2</sup>	1	4.391E003	4.391E003	1.50	0.2603
AB	1	0.024	0.024	8.20	0.0242
Lackoffit	3	0.011	3.526E003	1.42	0.3602
Pureerror	4	9.920E003	2.480E003		
Residual	7	0.020	2.928E003		
Total	12	0.10			

R<sup>2</sup> 0.8005,      Adj. R<sup>2</sup> 0.6581,      Adeq. Press. 7.024

$$\text{O.A.I. (Sev)} = +0.19 + 0.052*A + 0.035*B + 0.060*A^2 + 0.025*B^2 + 0.078*A*B \dots (\text{Eq. 2})$$

Table 3 : ANOVA for OUR of snacks product (Chakli)

Factor	DF	Sum of squares	Mean square	F value	Prob > F
Model	5	9.184E-003	1.837E-003	14.16	0.0015
A	1	4.289E-006	4.289E-006	0.033	0.8609
B	1	5.000E-005	5.000E-005	0.39	0.5544
A <sup>2</sup>	1	4.133E-003	4.133E-003	31.86	0.0008
B <sup>2</sup>	1	3.720E-003	3.720E-003	28.67	0.0011
AB	1	1.000E-004	1.000E-004	0.77	0.4091
Lackoffit	3	5.820E-004	1.694E-004	1.69	0.3049
Pureerror	4	4.000E-004	1.000E-00		
Residual	7	9.082E-004	1.297E-006		
Total	12	0.010			

R<sup>2</sup> 0.9100,      Adj. R<sup>2</sup> 0.8457,      Adeq. Press. 12.867

$$\text{O.U.R. (Chakli)} = +0.080 - 7.322*A + 2.50*B + 0.024*A^2 + 0.023*B^2 + 5.00E003*A*B \dots (\text{Eq. 3})$$

arabic (B) on oil absorption index of snacks product. As, gaur gum content and gum arabic content increases oil absorption index decreases.

**Compare the effect of gaur gum and gum arabic on oil uptake ratio in chakli and sev:**

*Effect of process variable on oil uptake ratio of chakli:*

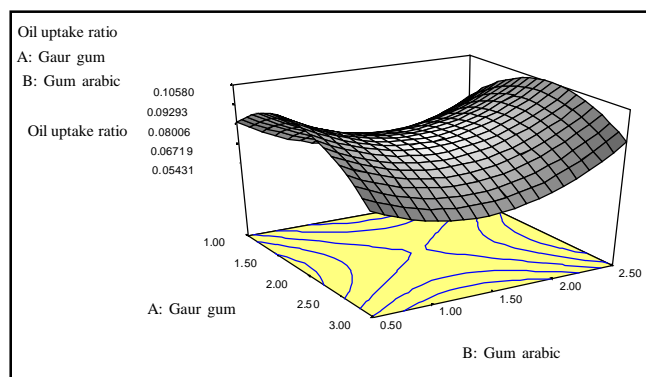
Where A and B are the coded variable for gaur gum and gum arabic, respectively. Above eq. (3) showed that the co-efficient of A and B was negative and positive. Data from Table 3 indicated that OUR of gaur gum and gum arabic gave significant model (P<0.05).

In linear term, gaur gum (A) and gum arabic (B) are observed to be non-significant (P>0.05). F value for linear terms gaur gum (A) and gum arabic (B) are 0.033 and 0.39 and P value was got to be 0.8609 and 0.5544 (P>0.05), respectively (Table 3).

The quadratic terms of gaur gum (A) and gum arabic (B) had shown significant (P<0.05). F value for quadratic terms gaur gum (A<sup>2</sup>) and gum arabic (B<sup>2</sup>) were 31.86 and 28.67 and P value was observed to be 0.0008 and 0.0011 (P<0.05) shown significant effect, respectively.

The interaction term form gaur gum and gum arabic (AB) gave non-significant effect P value was found to be 0.4091 (P>0.05) and it showed the positive effect on the interaction term and F value found to be 0.77.

Fig. 3 showed the effect of gaur gum (A) and gum arabic (B) on OUR of snacks product. As, gaur gum content increases oil uptake ratio decreases and gum arabic content increases oil uptake ratio decreases.



**Fig. 3 :** Response plot for oil uptake ratio of snacks product chakli

*Effect of process variable on oil uptake ratio of sev:*

Where A and B are the coded variable for gaur gum and gum arabic, respectively. Above eq. (4) showed that the co-efficient of A and B was positive and negative. Data from Table 4 indicated that OUR 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 5.28 and 3.74 and P value are observed to be 0.0551 and 0.0942 (P<0.05), respectively (Table 4).

Quadratic terms of gaur gum (A) and gum arabic (B) had shown significant (P<0.05) F value for quadratic terms gaur gum (A<sup>2</sup>) and gum arabic (B<sup>2</sup>) were 3.69 and 8.90 and P value was found to be 0.0962 and 0.0204 (P<0.05) showed non-significant effect, respectively.

The interaction term form gaur gum and gum arabic

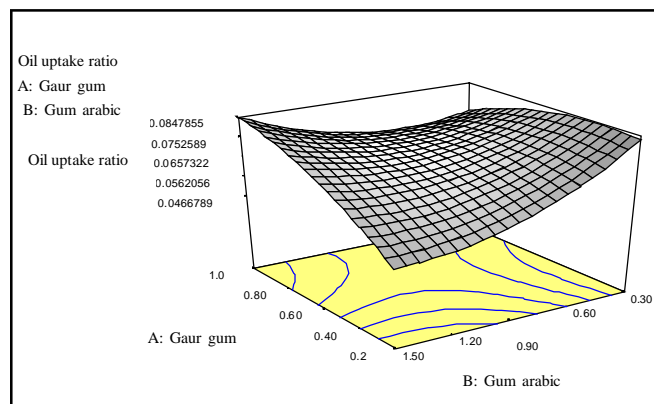
Factor	DF	Sum of squares	Mean square	F value	Prob > F
Model	5	2.145E-003	4.289E-004	6.59	0.0140
A	1	3.436E-004	3.436E-004	5.28	0.0551
B	1	2.436E-004	2.436E-004	3.74	0.0942
A <sup>2</sup>	1	2.401E-004	2.401E-004	3.69	0.0962
B <sup>2</sup>	1	5.792E-004	5.792E-004	8.90	0.0204
AB	1	6.250E-004	6.250E-004	9.61	0.0173
Lackoffit	3	1.754E-004	5.846E-005	0.84	0.5406
Pureerror	4	2.800E-004	7.000E-005		
Residual	7	4.554E-004	6.505E-005		
Total	12	2.600E-003			

R<sup>2</sup> 0.8249

Adj. R<sup>2</sup> 0.6998

Adeq. Press. 8.646

O.U.R.(Sev) = +0.068+6.55\*A -5.518\*B +5.587E003\*A<sup>2</sup>+9.125\*B<sup>2</sup>+0.013\*A\*B .....(Eq. 4)



**Fig. 4 :** Response plot for oil uptake ratio of snacks product sev

(AB) gave significant effect P value was found to be 0.0173 ( $P < 0.05$ ) and it showed the positive effect on the interaction term and F value found to be 9.61.

Fig. 4 showed the effect of gaur gum (A) and gum arabic (B) on OUR of snacks product. As, gaur gum content increases oil uptake ratio increases and gum arabic content increases oil uptake ratio decreases.

### Conclusion:

The above result compared and concluded that as increasing the gaur gum and gum arabic content there are decreases the oil absorption index and oil uptake ratio in both snacks sample sev and chakli shows the positive effect of both hydrocolloids.

## LITERATURE CITED

- Morris, J., Bassier, A., Joniau, M. and Baert, J. (2010).** Effect of heat induced association of whey proteins and casein micelles on yogurt texture. *J. Dairy Sci.*, **72** : 2247–2256.
- Patel, M.M. and Venkateswara, R.V. (1995).** Effect of untreated, roasted and germinated black gram (*Phaseolus mungo*) flours on the physico-chemical and biscuit (Cookie) making characteristics of soft wheat flour. *J. Cr. Sci.*, **22**: 285–291.
- Pinthus, E.J., Weinberg, P. and Saguy, I. S. (1993).** Criterion for oil uptake during deep fat frying. *J. Food Sci.*, **58**: 204–205.
- Pratape, V.M., Yadahally, N., Sreerama, Vadakkoot, B. Sashikala (2009).** Effect of enzyme pre dehulling treatments on dehulling and cooking properties of legumes. *J. Food Engg.*, **92**: 389–395.
- Sosulski, F.W. (1962).** The centrifuge method for determining flour adsorption in hard red spring wheats. *J. Cer. Chem.*, **39** : 344-350.
- Takahashi, H., Yang, S.I., Fujiki, M., Kim, M., Yamamoto, T. and Greenberg, N.A. (1994).** Toxicity studies of partially hydrolyzed guar gum. *Int. J. Toxicol.*, **13**: 273–278.
- Yamamoto, Y. (2001).** Hypolipidemic effects of a guar gum-xanthan gum mixture in rats fed high sucrose diet. *J. Japanese Soc. Nutr. & Food Sci.*, **54** : 139–145.
- Yoon, S.J., Chu, D.C. and Juneja, L.R. (2008).** Chemical and physical properties. Safety and application of partially hydrolyzed guar gum as dietary fibre. *J. Clinical Biochem. Nutr.*, **42** : 1–7.

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