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Effect of utilization of (Galactomannan) guar gum blended with acacia gum in yoghurt

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The effect of guar and acacia gum blend at different concentrations *viz.,* 0.1, 0.2, 0.4 and 0.6 per cent on the physico-chemical, sensory properties and rheology of yogurt were studied. It was observed that the setting time of the yoghurt reduced with increased concentration of blend gum. The viscosity of samples containing blend gum increased compared to the control sample. As increase in levels of blend gum, the per cent synersis was noticed in decreased trend. No marked change in pH and acidity of yoghurt was recorded irrespective added of blend gum and their concentration. As level of blend gum concentration increased the total solid content was found increased. Sensory evaluation showed that the use of blend gum upto 0.2 per cent concentration improved body and texture of the product. Being hydrocolloid nature the blend gum improved the consistency and reduced whey separation in yoghurt.

Key Words : Acacia, Blend, Guar, Viscosity, Yoghurt

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INTRODUCTION

Yoghurt is fermented and coagulated milk product with a smooth texture having mildly sour taste and pleasant flavour. It is obtained from pasteurized or boiled milk by souring natural or otherwise using lactic acid fermented bacteria (Soomro *et al.,* 2003).

Stabilizers such as pectin or gelatin are often added to the milk base to enhance or maintain the appropriate yogurt properties including texture, mouth feel and appearance viscosity/ consistency and to prevent whey separation but foresaid difficulties can be solved by using hydrocolloids as an economical.

The growing awareness of the relationship between diet and health has led to an increased demand for food products that support health above and beyond providing basic nutrition.Yoghurt has been attributed nutraceuticals, therapeutic (Sloan, 2001) and probiotic effects such as digestion enhancement, immune system boosting, anticarcinogenic activity and reduction in serum cholesterol (Bertolami, 1999 and Milo-Ohr, 2002). Yogurts are increasingly popular due to their nutritional and potentially therapeutic characteristics (Aguirre Mandujano *et al.,* 2009). Yoghurt may have two primary defects variation in viscosity and/or expulsion of serum (syneresis). Processing, incubation and storage conditions have an effect on these changes. Dairy ingredients and hydrocolloids have sometimes been added to combat such defects (Klupsch, 1989). Combination of more than one type of hydrocolloids is commonly used in food product, modify rheological characteristic and satisfy processing requirement in the industry (Norziah *et al.,* 2006).

METHODOLOGY

The investigation was undertaken at the College of

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Food Technology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra. Cow milk was obtained from Cattle Cow Breeding Programme. Microbial starter culture Lactobacillus bulgaricus and Sreptococcus thermophillus was obtained from National Chemical Laboratory (NCL), Pune. Guar gum was collected from AICRP, College of Food Technology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani and arabic gum from local market. Blend was used in concentration of 0.1, 0.2, 0.4 and 0.6 per cent.

Standardization of milk :

The cow milk was standardized to 3.0 per cent fat and 8.5 per cent SNF according to Pearson's square method described by De (1980 and 2008).

Preparation of yoghurt :

After addition of blended gum milk was pasteurized at 63^0 C for 30 min, cooled to 42^0 C and starter culture was added at the rate of 2 per cent and transferred to glass beaker, inoculated at 42^0 C till the desired coagulum was formed (De, 1980 and 2008).

Table A : Formulation of yoghurt

Sr. No.	Samples	Blend of gum (%)	Milk(lit)
1.	A (Control)	Nil	1
2.	B	0.1	1
3.	C	0.2	1
4.	D	0.4	1
5.	E	0.6	1

A= 0.0 % blend of gum, B= 0.1 % blend of gum, C= 0.2 % blend of gum, D= 0.4 % blend of gum, E= 0.6 % blend of gum.

Physical qualities of yoghurt :

Setting time :

Setting time of sample was recorded from the time of inoculation to just coagulum was formed and it was recorded in hours.

Determination of viscosity :

Viscosity was measured by using Brookfield viscometer-LV model and Spindal No.S-62 at 60 rpm; at 4^o C readings were recorded after 20 s (Mitschka, 1982).

Determination of synersis :

The synersis in yoghurt samples was measured as; 5 ml of yoghurt was centrifuged at 5000 rpm for 20 minutes at 4^o C and separated whey was measured after 1 minute. Whey separation amount was expressed as volume of separated whey per 100 ml of yoghurt (Hasan *et al.*, 2014).

Chemical qualities of yoghurt :

Determination of pH :

The pH of yoghurt was measured by using digital pH meter (Model LT-11).

Determination of acidity :

The acidity was determined as per the method described by "Indian standards Institution Hand Book of Food Analysis", part xi (1981).

Determination of total solids :

The total solids content of yoghurt was determined according to method described in A.O.A.C. (2003).

Sensory evaluation :

Sensory quality of yoghurt products was evaluated by 9 point hedonic scale and involved the following parameters; colour and appearance, body and texture, flavour and taste. Subjects tasted the samples and were asked to keep the yoghurt in mouth for 12 seconds before scoring (Yanes *et al.*, 2002).

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Setting time :

The data regarding setting time of yoghurt presented in Table 1. It reveals that the use of blend of gum at different concentrations affected positively on setting time of yoghurt. It is observed from the Table 1 that the setting time of the yoghurt reduced with increase in the concentrations of the gum. The time required for setting of yoghurt was minimum (4.22 h) in case of 0.6 per cent

Table 1 : Effect of gum on setting time of yoghurt

Sr. No.	Sample	Added gum (%)	Setting time(h)
1.	Control	0.0	5.02
2.	A	0.1	4.54
3.	B	0.2	4.48
4.	C	0.4	4.35
5.	D	0.6	4.22

*Each value represents the average of three determinations

gum concentration.

Viscosity :

The data given in Table 2 indicates that the use of blend of gum had significant effect on synersis of yoghurt. It is seen from the Table 2, that the minimum per cent synersis (11.90) was recorded in case of yoghurt prepared from the 0.6 per cent gum concentration. Further it was

Table 2 : Effect of gum on viscosity (cp) of yoghurt

Sr. No.	Sample	Added gum (%)	Viscosity (cp)
1.	Control	0.0	502
2.	A	0.1	520
3.	B	0.2	540
4.	C	0.4	550
5.	D	0.6	560

*Each value represents the average of three determinations

Table 3 : Effect of gum on synersis (%) of yoghurt

Sr. No.	Sample	Added gum (%)	Synersis (%)
1.	Control	0.0	13.58
2.	A	0.1	12.20
3.	B	0.2	12.12
4.	C	0.4	12.02
5.	D	0.6	11.90

*Each value represents the average of three determinations

Table 4 : Effect of gum on pH and acidity of yoghurt

Sr. No.	Sample	Added gum (%)	pH	Acidity
1.	Control	0.0	3.92	1.08
2.	A	0.1	4.11	1.06
3.	B	0.2	4.13	1.05
4.	C	0.4	4.21	1.03
5.	D	0.6	4.27	0.99

*Each value represents the average of three determinations

Table 5 : Effect of gum on total solids of yoghurt

Sr. No.	Sample	Added gum (%)	Total solids (%)
1.	Control	0.0	12.1
2.	A	0.1	12.6
3.	B	0.2	13.5
4.	C	0.4	13.9
5.	D	0.6	14.1

*Each value represents the average of three determinations

Table 6 : Sensory evaluation of yoghurt

Sample	Colour	Body and texture	Flavour	Overall acceptability
A	8.0	7.5	8.0	7.8
B	7.8	7.8	8.0	7.9
C	7.8	8.0	8.0	8.0
D	7.5	7.5	7.1	7.5
E	6.9	7.0	6.7	6.9
S.E. $\pm$	0.037	0.034	0.020	0.025
C.D. (P=0.05)	0.116	0.106	0.061	0.079

*Each value represents the average of three determinations

observed that the increase in levels of gum, the per cent synersis was found to be decreased. The decrease in the per cent synersis was due to the water binding capacity of hydrocolloid used. Keogh and O'Kennedy (1998) used locust bean gum in combination with xanthan gum (50:50) in stirred yogurt and observed an increase in the consistency co-efficient and a reduction in the serum separation.

Synersis :

The data given in Table 3 indicates that the use of blend of gum had significant effect on synersis of yoghurt. It is seen from the Table 3, that the minimum per cent synersis (11.90) was recorded in case of yoghurt prepared from the 0.6 per cent gum concentration. Further it was observed that the increase in levels of gum, the per cent synersis was found to be decreased. The decrease in the per cent synersis was due to the water binding capacity of hydrocolloid used. The results are in agreement with Keogh and O'Kennedy (1998).

pH and acidity :

The data depicted in Table 4 shows that the incorporation of gum had significant effect on pH and acidity of yoghurt. It is observed from the Table 4 that no marked change in pH and acidity of yoghurt was recorded irrespective added of blend of gum and their concentration. But there was a marginal increase in the pH and decrease in the per cent acidity as the level of gum increased.

Total solids :

The data stated in Table 5 indicates that the incorporation of gum had significant effect on total solids content of yoghurt. It is observed from the Table 5 that the as level of gum concentration increased the total solid content was found to be increased. The total solids observed were in the range of 12.1 to 14.1 per cent. Minimum total solids of 12.1 per cent were recorded in case of control.

Sensory evaluation :

The data pertaining to sensory evaluation is presented in Table 6, shows that the use of blend of gum does not affected significantly on colour of yoghurt compared to that of control. The addition of gum did not affect the flavour upto 0.2 per cent concentration, but further increase in the levels reduced the sensory score for flavour. In case of body and texture the maximum score recorded for the levels at 0.2 per cent gum concentration, but further increase in the levels of blend of gum reduced the score of the body and texture. It may be further concluded that use of blend of gum upto 0.2 per cent concentration improved body and texture of the product. Being hydrocolloid nature of the additives, the blends of gum are very useful for improving the consistency and reducing whey separation in yoghurt.

Conclusion :

It is concluded that the incorporation of 0.2 per cent of blend gum found to be overall acceptable and improved the texture of yoghurt without wheying –off.

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