ISSN 2250-3153

Studies on Quality Parameters of Set Yoghurt Prepared By the Addition of Honey

Allia Rashid, Er.S.N.Thakur

[*]M.Tech student, Dairy technology, Sam Higginbottom Institute of Agricultural Technology and Sciences, Deemed-to-be-University, Allahabad (U.P)
[**] Assistant Professor at SHIATS Allahabad

***Abstract*-** With the current upward trend in nutritional and health awareness, the consumers demands for high quality probiotic product with acceptable sensory characteristics. The main purpose of this research was to observe the influence of different levels of honey (5%, 10% and 15% and 20%) to yoghurt and its effect on viability of microbial flora of yoghurt, chemical and sensory characteristics. Honey set yoghurt mix was standardized to 3.5% fat, 12 % solid not fat and inoculated with 2% culture. A different level (5%, 10%, 15%, and 20%) of honey was added to yoghurt milk. The samples of different treatments was analyzed for fat, protein, pH, acidity, total solid , moisture percent, viability on selective media (MRS& ST) and sensory characteristics (flavor and taste, colour and appearance, body and texture and overall acceptability).The data obtained on various parameters were statistically analyzed.

Honey yoghurt was fermented with traditional yoghurt culture, containing the strains of ***Streptococcus salivarius ssp. thermophilus*** **NCDC074**, ***Lactobacillus delbrueckii ssp. Bulgaricus*** **NCDC009**. Supplementation of yoghurt with levels of honey affected the viability of probiotic bacteria. Thus it can be concluded that *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus thermophilus* viable counts increased with 10% honey addition as compared to 5 %, 10%, 15%, and 20% honey. On the basis of chemical analysis treatment T_4 showed maximum value for acidity, total solids and moisture but lower value for fat and protein. Amongst all the samples, T_1 prepared from 5% honey was rated best on sensory evaluation.

***Index Terms*-** Yoghurt, Honey, Streptococcus thermophillus, Lactobacillus bulgaricus

I. INTRODUCTION

Honey is a natural, sweet, syrupy fluid collected by bees from nectar of flowers. The pleasant aroma and taste of this viscous liquid ranging in color from pale yellow to dark amber varies according to geographical and seasonal conditions. Its use as a sweetener is well known in different parts of the world. In early history, honey occupied a very important place on religious occasions. The high content of sugars, small amounts of amino acids, lipids, along with some vitamins and minerals imparts its high nutritional value. Honey has good medicinal and antimicrobial properties and is used in different cuisines. Proper processing is essential for a product of good sensory qualities. ISI/Agmark specifications for honey, its adulteration and detection of adulteration are well recorded. The application potential in bakery, confectionery, snack foods, fruit and vegetable products and beverages is ever increasing (Aparna et al 1970)

Plain yoghurt is predominantly sour; therefore fruit, flavorings and sweeteners have been added either to improve the flavor balance or to mask partially the acetaldehyde characteristic (Bills et al 1972). Honey may serve as a natural food preservative due to its antimicrobial properties (Chen et al 2000). Honey in combination with milk provides an excellent nutritional value and it is recommended for use for children's as a main source of nutrition (Klain et al 1969). Honey is considered as an intermediate moisture food, generally contains a low microbial load and has a long shelf life. The water activity of honey reserves the food stuff. (Scott et al 1957). Consumption of yoghurt, live or pasteurised, inhibited the growth of certain types of tumor, and it has been suggested that some factor in the cell walls of the bacteria could be responsible for the effect (Gilliland 1979). It has been observed that molds, yeasts and bacterial spores can be present in honey at low levels, but vegetative bacteria generally are not found (Snowdon et al 1996). Honey is considered as an intermediate-moisture food, generally contains a low microbial load and has a long shelf-life. The water activity (Aw) of honey reserves this foodstuff against microbial spoilage (Scott 1957; Scott and Bernard 1983). In recent years, there has been increasing interest in the use of natural and healthy food additives and incorporating health-promoting substances into the diet. Due to its healthy and natural image (LaGrange et al. 1991), honey has been gaining interest as a substitute sweetener in various foods (Chick et al. 2001). Yogurt was introduced to the American diet during the 1940s. By the 1980s, it had become the product for dieters, and the lunch of choice for young women. The use of yogurt as a calcium source has made it one of the most rapidly growing dairy products, but presently it is more than just a calcium source. Yogurt, Kefir, and similar fermented milk products are on the way to becoming major nutraceuticals aimed at treating a variety of disease conditions.(Katz 2001) Honey acts as a prebiotic because it contains fructose and oligosaccharides which might be the primary components contributing to enhance the growth and promoting of lactic and acetic acids production by *Bifidobacterium ssp*. and yoghurt starter (Kajiwara et al 2002)

II. MATERIALS AND METHODS

Starter preparation

Yoghurt starter culture, a combination of S. thermophilus and L. delbrueckii subsp. Bulgargaricus obtained in freeze-dried form from NDRI Karnal. The freeze dried culture was propagated by inoculating in skim milk which was heated at 90^0C for 30 min before the inoculation. The inoculated milk was incubated at 45^oC until pH 4.6 was reached, then stored overnight at 4^0C in refrigerator.

Yoghurt production

Solid not fat milk was standardized using skim milk powder to 3.5% fat and 12% SNF. The milk was pasteurized, cooled, and fortified with honey at different levels. Next the milk with honey was inoculated with yoghurt culture and incubated. After precooling at ambient temperature the yoghurt samples are refrigerated and analyzed.

Treatments.

T_1 Set yoghurt mix was standardized to 3.5% fat, milk solids not fat 12 %, 5% honey by addition of skim milk and inoculated at 2% with yoghurt culture.

T_2 Set yoghurt mix was standardized to 3.5% fat, milk solids not fat 12 %, 10% honey, by addition of skim milk and inoculated at 2% with yoghurt culture.

T_3 Set yoghurt mix was standardized to 3. 5% fat, milk solids not fat 12 %, honey 15%, by addition of skim milk and inoculated at 2 % with yoghurt culture.

T_4 Plain frozen yoghurt mix was standardized to 3. 5% fat, milk solids not fat 12 %, honey 20%, and inoculated at 2 % with yoghurt

Chemical analysis of honey set Yoghurt

Fat content:

Fat percentage of honey set yoghurt was determined by Gerber method as per adopting the procedure as per ISI (1981 b).

Protein Content:

The protein content of honey set yoghurt was determined by kjeldahl method described in AOAC (1980).

Total solid content:

Determination of total solid of sample was done gravimetrically as per the procedure for milk laid down in IS-1475. Part-I.

Moisture percent:

The moisture content of yoghurt was determined as per ISI (1981 b).

Percentage of Acidity:

Titrable acidity of honey set yoghurt samples (expressed as lactic acid) was determined as per the procedure laid down in IS: 1479,

Determination of pH:

pH was determined using digital pH meter

Organoleptic evaluation:

Judging panel

Five experienced staff members of the Dairy Technology Department served as a judging team and evaluated the samples of honey set yoghurt. Numerical scores were allocated for color and appearance, flavor and taste, body and texture and overall acceptability of the honey set yoghurt.

Viability of micro organisms:

Microbiological analyses were conducted on experimental honey set yoghurt by using MRS agar and ST agar. 1 gram of yoghurt sample was mixed with 9 ml of distilled water and serial dilution was made up to 10^5 to 10^6. One ml from the dilution of 10^5 to 10^6 was spread on MRS agar and ST agar. The plates were then incubated at 37°C for 48 hours.

1) *Streptococcus salivariaus ssp. thermonilus*
2) *Lactobacillus delbrueckii ssp. Bulgaricus*

III. Statistical analysis

The data were analyzed using, analysis of variance technique. (S.R.S Chandel (1972).

IV. Results and Discussion

Chemical Evaluation

Fat content

The fat content goes on decreasing as we increase the percentage of honey, because honey contains 0% fat. The highest mean fat percentage score was recorded in the honey set yoghurt sample of T_1 (95:5)

Protein content

The protein content goes on decreasing as we increase the percentage of honey, because honey contains negligible amount of protein. The highest mean protein percentage score was recorded in the honey set yoghurt sample of T_1 (95:5)

Total solid content

The total solid goes on increasing as we increase the percentage of honey. This is because honey contains fewer amounts of water and more total solids. The highest mean Total solid percentage score was recorded in the honey set yoghurt sample of T_4 (32.46)

Moisture content

The moisture content goes on de creasing as we increase the percentage of honey. This might be due to increase in total solids, as moisture and total solids are inversely proportional to each other. The highest mean Moisture percentage score was recorded in the honey set yoghurt sample of T_1 (79.82)

Acidity

The acidity (lactic acid content) goes on increasing as we increase the percentage of honey. This is because honey contains organic acids which increases the acidity, also the lactose gets converted into lactic acid The highest mean Lactic acid percentage score was recorded in the honey set yoghurt sample of T_4 (0.92.

pH

The pH value goes on decreasing as we increase the percentage of honey. This might be due to increase in acidity, as acidity and pH are inversely proportional to each other. The highest mean pH score was recorded in the honey set yoghurt sample of T_1 (4.23).

Sensory evaluation

On the basis of chemical analysis treatment T_4 showed maximum value for acidity, total solids and moisture but lower

value for fat and protein. Amongst all the samples, T1 prepared from 5% honey was rated as best on the sensory evaluation

Viability of micro-organisms

The highest mean viability of Lactobacillus bulgaricus score was recorded in the honey set yoghurt sample of T_2 (230.20), T_3 (203.00), T_4 (181.40), followed by T_1 (148.40). There was significant difference between all the treatments which may be ascribed by the addition of different levels of honey.

The highest mean viability of Streptococcus thermophillus score was recorded in the honey set yoghurt sample of T_2 (395.00), T_3 (178.60), T_4 (171.00), followed by T_1 (33.20). There was significant difference between all the treatments which may be ascribed by the addition of different levels of honey.

Summary Table

Parameters	**Treatments**			
	T_1	**T_2**	**T_3**	**T_4**
1. Chemical Analysis				
Fat	3.36	3.24	3.10	2.90
Protein	3.00	2.96	2.90	2.87
Acidity	0.78	0.87	0.90	0.92
pH	4.23	4.17	4.12	4.12
Total solids	20.18	24.27	28.35	32.46
Moisture	79.82	75.73	73.08	71.74
2. Organoleptic Analysis				
Colour and Appearance	7.64	7.72	7.64	7.34
Flavour and Taste	7.76	7.64	7.46	7.36
Body Texture	7.78	8.02	7.92	7.30
Overall Acceptability	7.80	7.78	71.65	67.54
3. Microbiological Analysis (cfu/g.)				
Yeast	3.00	3.40	3.40	4.00
Coliform Count (10^{-2})	Nil	Nil	Nil	Nil
Lactobacillus bulgaricus	148.40	230.00	203.00	181.40
Sreptococcus thermophillus	33.20	395.00	178.60	171.00

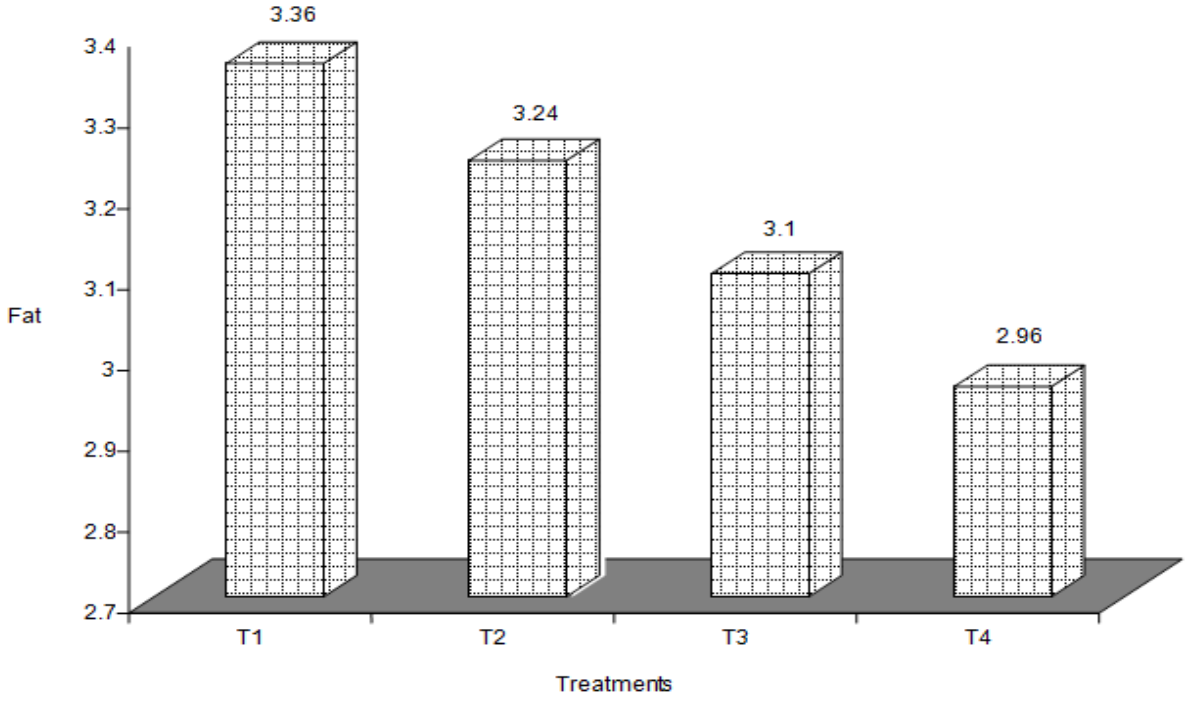

Fig 1: Average fat percentage in samples of honey set yoghurt of different treatments

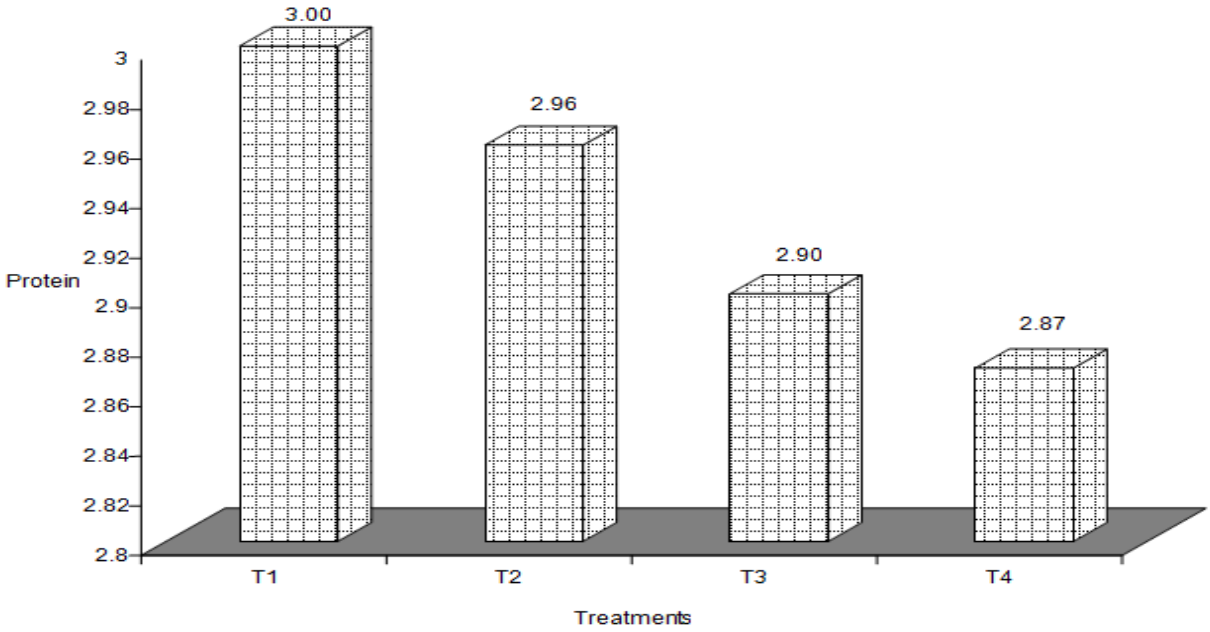

Fig 2: Average protein percentage in samples of honey set yoghurt of different treatments

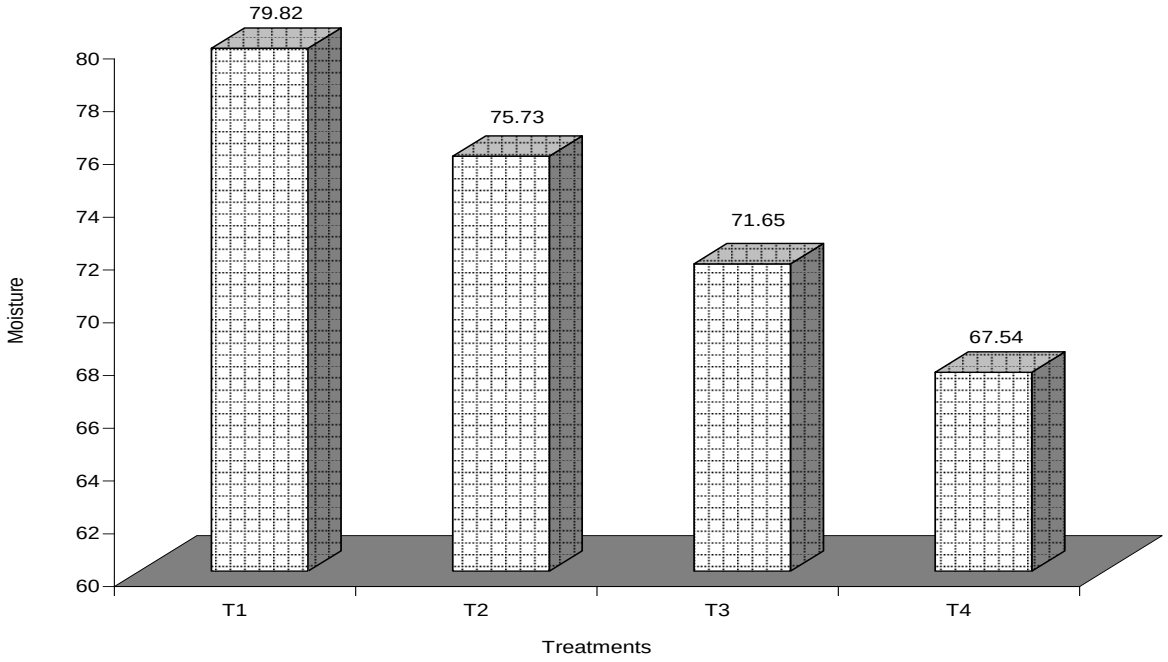

Fig 3: Average moisture percentage in samples of honey set yoghurt of different treatments

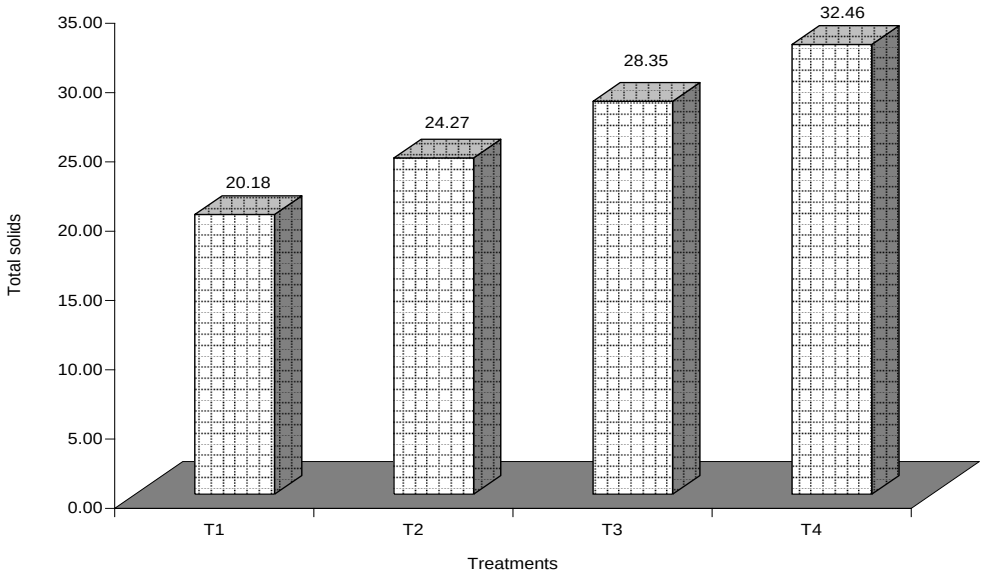

Fig4: Average total solids percentage in samples of honey set yoghurt

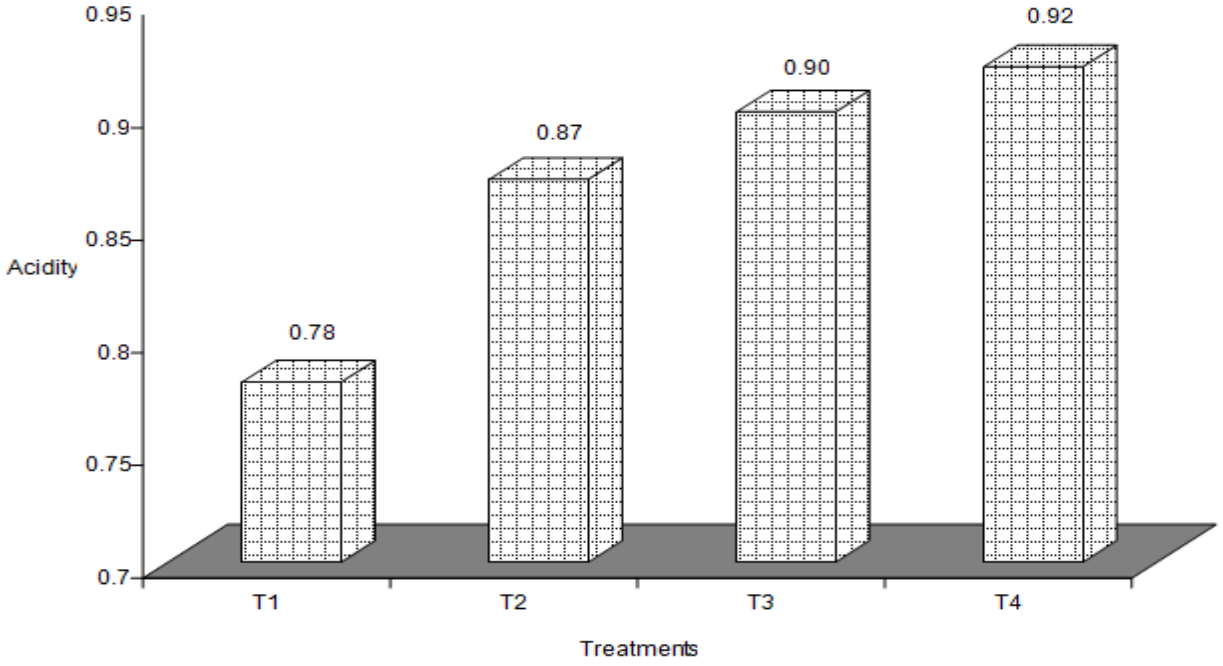

Fig 5: Average acidity percentage in samples of honey set yoghurt

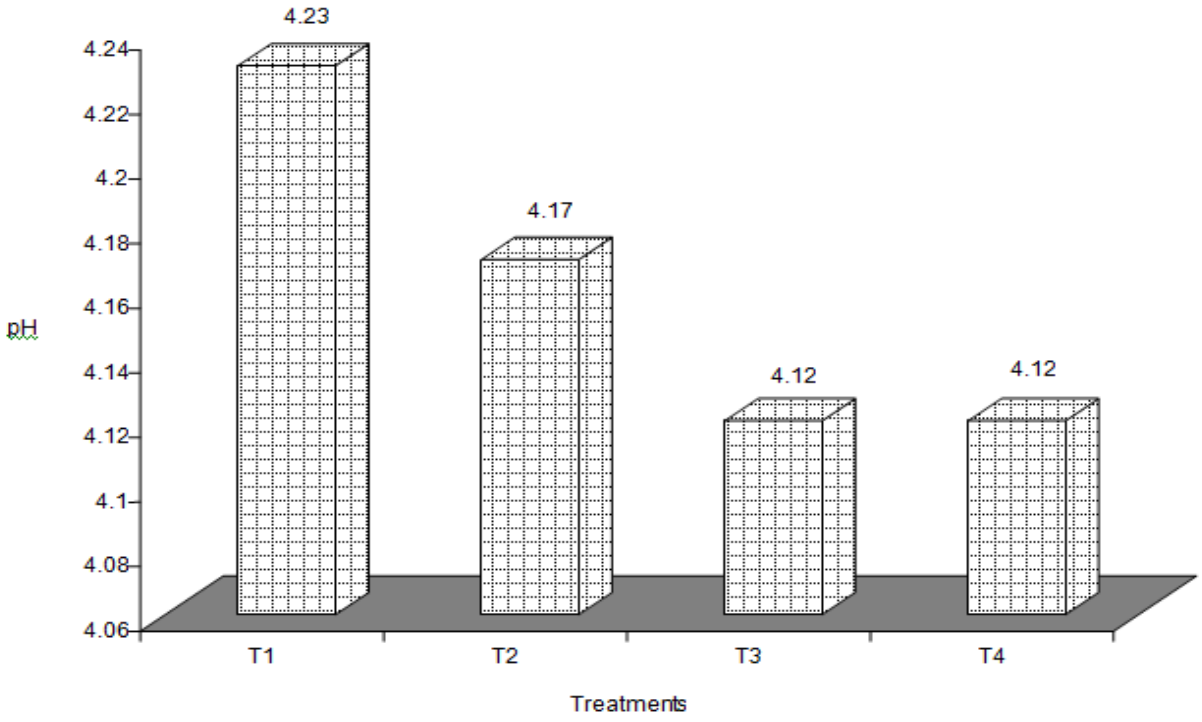

Fig 6: Average pH value in samples of honey set yoghurt

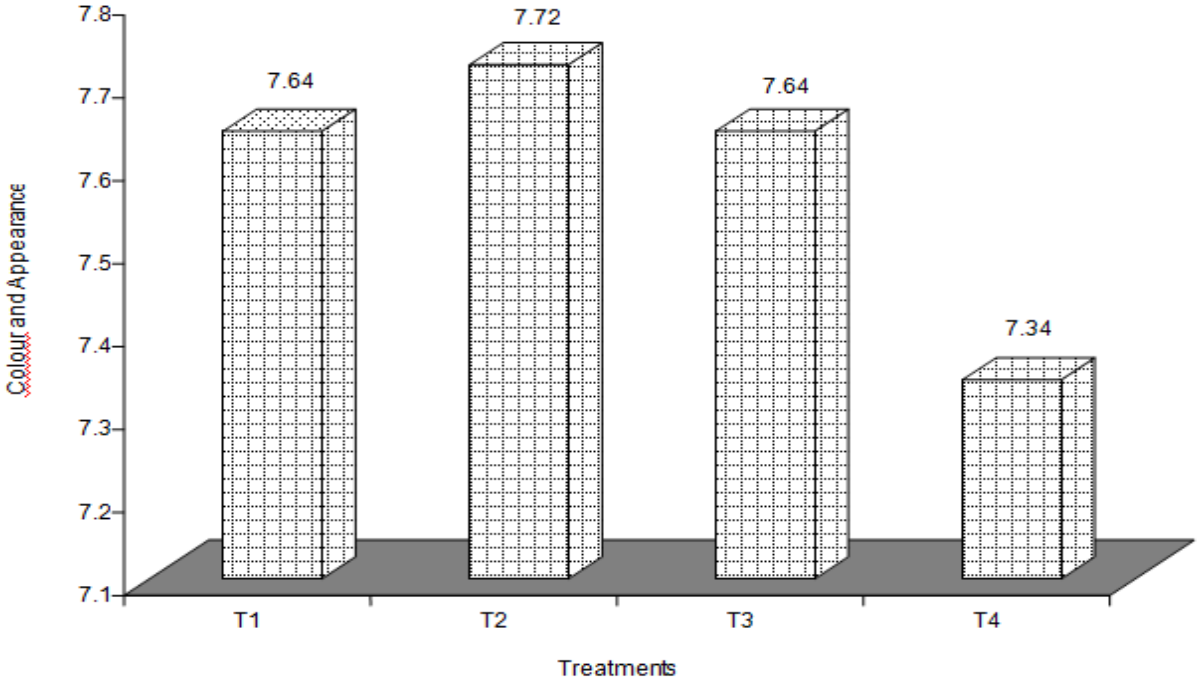

Fig.7: Average color and appearance in samples of honey set yoghurt

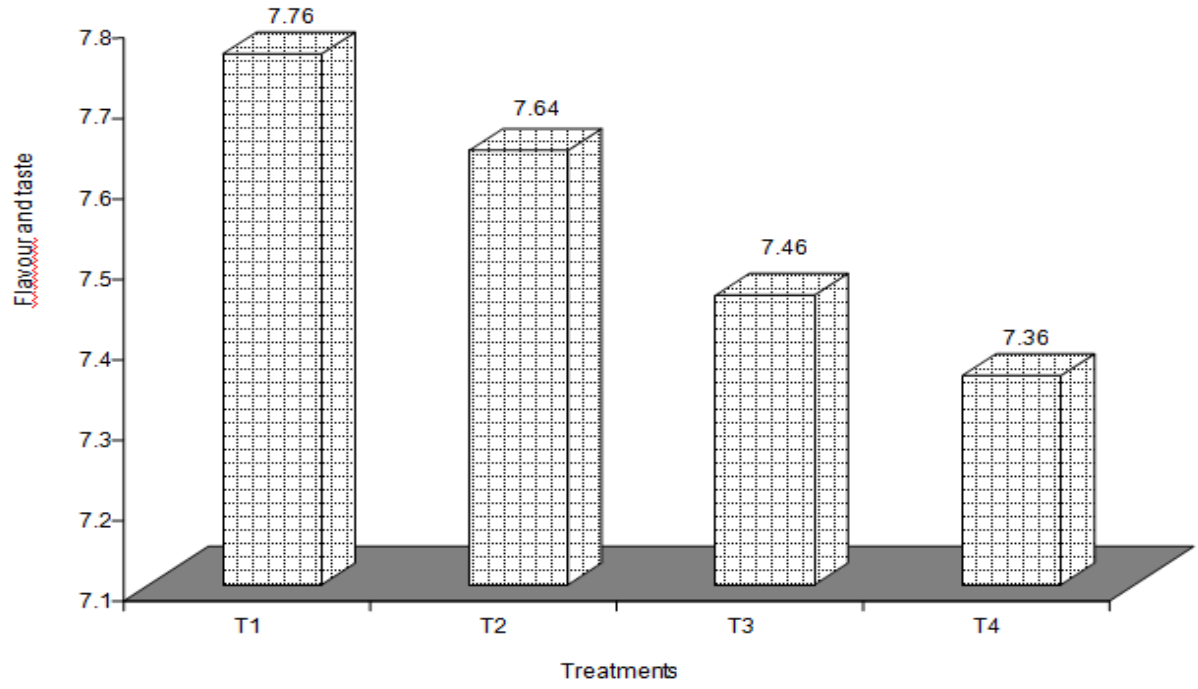

Fig.8: Average flavour and taste in samples of honey set yoghurt

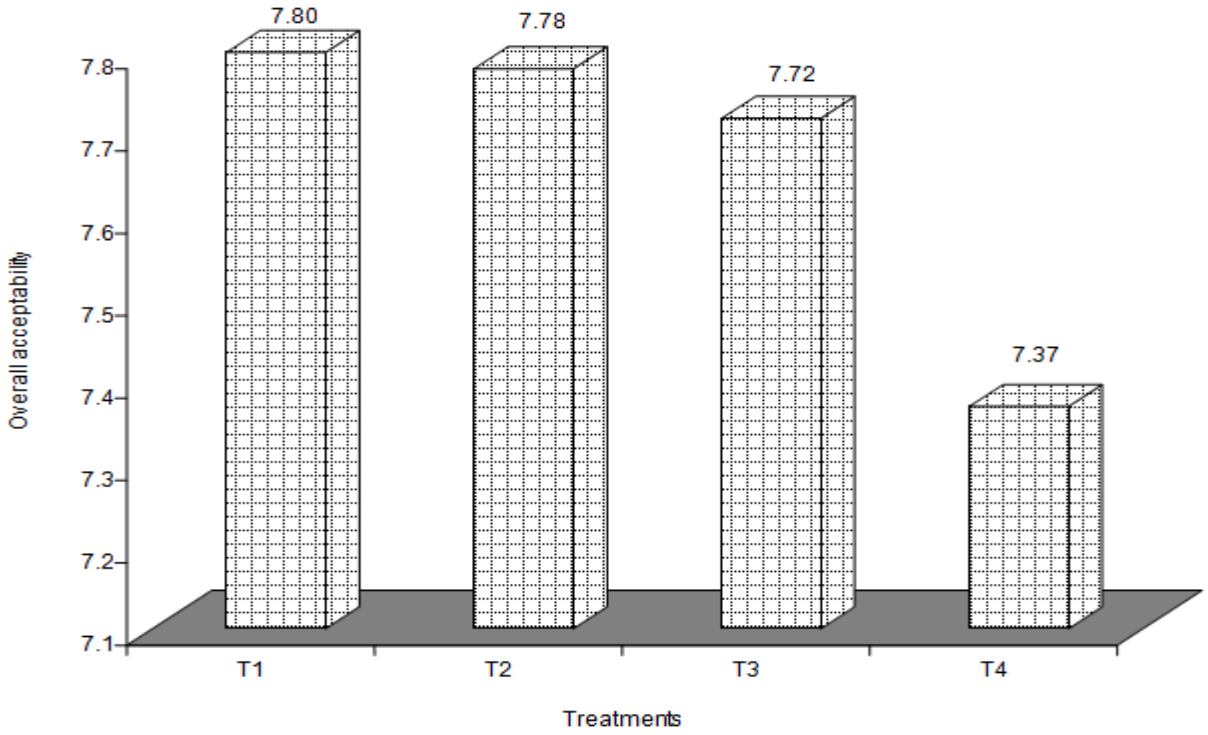

Fig.9: Average overallacceptibility in samples of honey set yoghurt

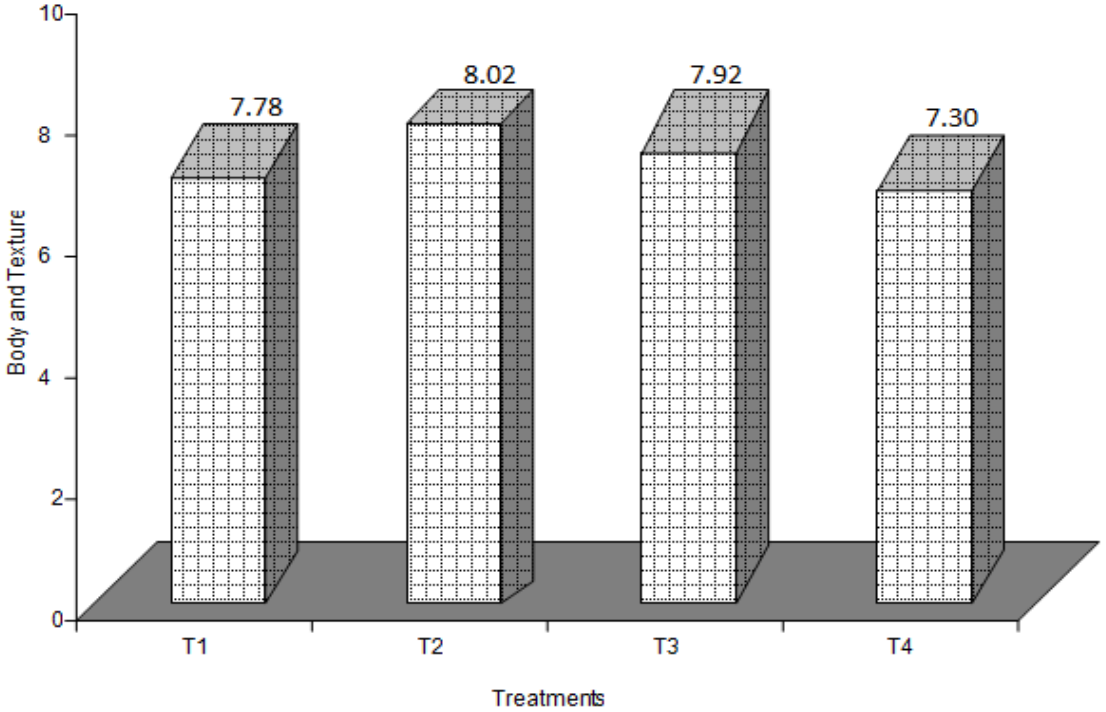

Fig10: Average body and texture in samples of honey set yoghurt

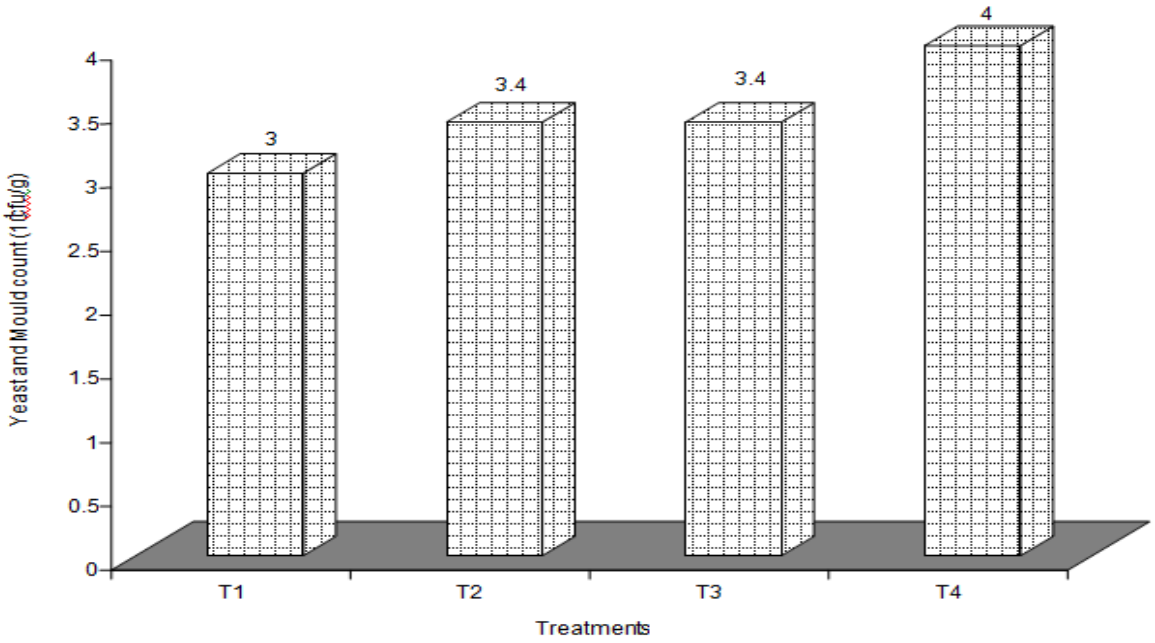

Fig:.11 Yeast and mould count of honey set yoghurt (10^1cfu/g)

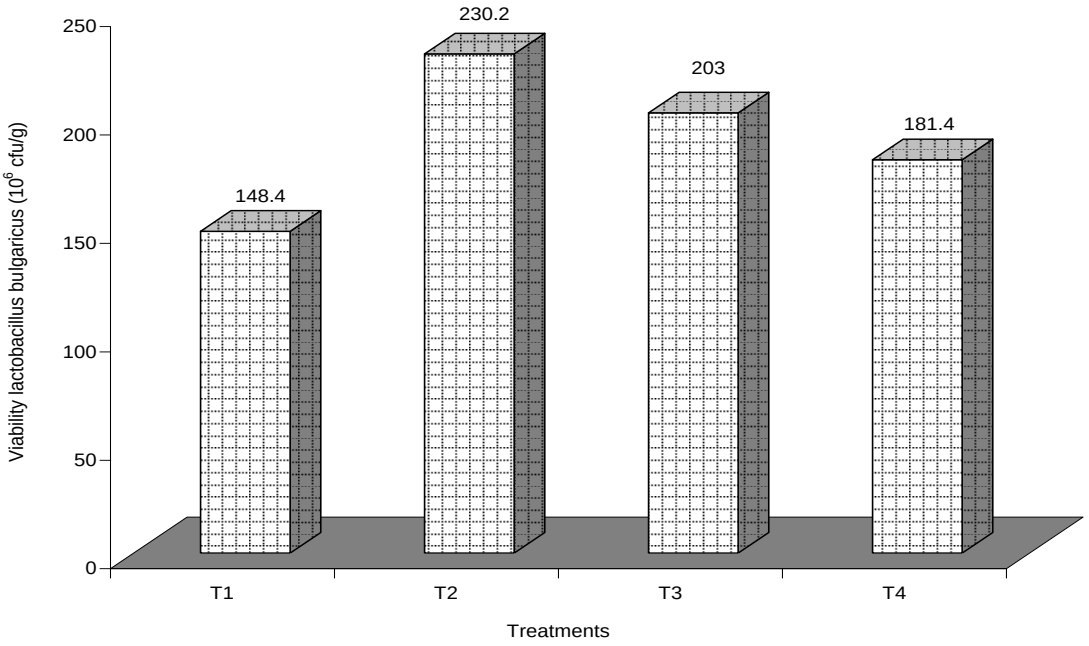

Fig: 12 *Lactobacillus bulgaricus* count of honey set yoghurt (10^6 cfu/g).

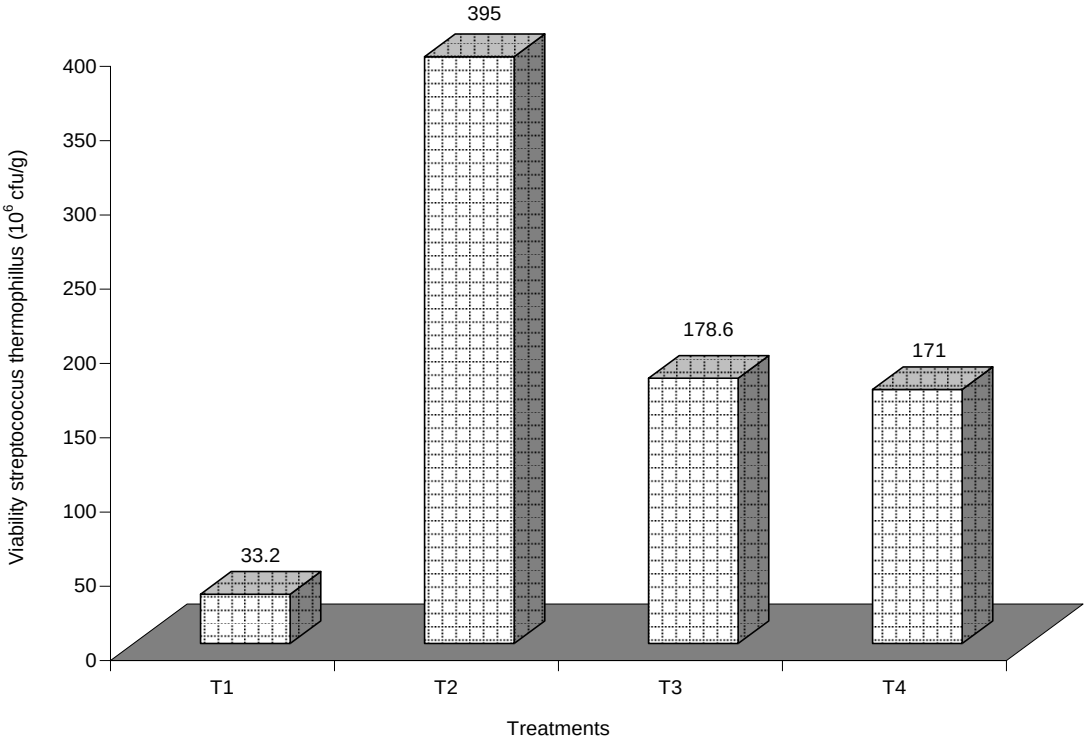

Fig: .13 *Streptococcus thermophillus* count of honey set yoghurt (106 cfu/g)

V. CONCLUSION

From the studies it was concluded that *Lactobacillus delbrueckii* subsp. *bulgaricus* and *S. thermophilus* viable counts increased with 10% addition of honey as compared to 5 %, 15%, and 20% honey. On the basis of chemical analysis treatment T_4 showed maximum value for acidity, total solids and moisture but lower value for fat and protein. Amongst all the samples, T1 prepared from 5% honey was rated as best on the sensory evaluation.

REFERENCES

[1] **Aparna A.R and D.Rajalakshmi 1970** ; Honey—its characteristics, sensory aspects, and applications

[2] **Bills D, Yang C S, Morgan M E and Bodyfelt F W (1972)** Effect of sucrose on the production of acetaldehyde and acids by yogurt culture bacteria. Journal of Dairy Science 55 1570–1573.

[3] **Chen L, Mehta A, Berenbaum M, Zangerl A R and Engeseth N J (2000)** Honeys from different floral sources as inhibitors of enzymatic browning in fruit and vegetable homogenates. Journal of Agricultural and Food Chemistry 48 4997–5000

[4] **CHICK, H.S. Shin, Z. Ustunol 2011**;Growth and Acid Production byLactic Acid Bacteria and Bifidobacteria Grown in Skim Milk Containing Honey JOURNAL OF FOOD SCIENCE—Vol. 66, No. 3,

[5] **Gilliland *S.* E., 1979,** beneficial interrelationships between certain microorganisms and humans: candidate microorganisms for use as dietary adjuncts. Journal of Food Protection, 42:164. Guthrie D., A history of medicine. Thomas Nelson 1958:57-8

[6] **Klain U and Massimo L (1969)** Clinical findings on the importance of milk and honey in infant nutrition. Minerva Pediatrica 21 1821–1825.

[7] **Kajiwara, S., Gandhi, H., Ustunol, Z. (2002**) Effect of honey on the growth of and acid production by human intestinal Bifidobacterium spp.: An *in vitro* comparison with commercial oligosaccharides and inulin. *J. Food Prot*. **65**, 214-218.

[8] **Katz, F., 2001,** Active Cultures Add function to Yogurt and Other Foods. Food Technology, 55 (3): 46-49.

[9] **Labuza T P, Acott K, Tatini R and Lee R Y (1976)** Water activity determination: a collaborative study of different methods. Journal of Food Science 41 910–917

[10] **ScottW J (1957)** Water relations of food spoilage microorganisms. Advances in Food Research 7 83–127.

[11] **Snowdon J A and Cliver D O (1996)** Microorganisms in honey. International Journal of Food Microbiology 31 1–26.)

AUTHORS

First Author –Allia Rashid, M.tech student, Dairy technology, Sam Higginbottom Institute of Agricultural Technology and Sciences, Deemed-to-be-University, Allahabad (U.P), Email:rashidallia@yahoo.com

Second Author – Er.S.N.Thakur, Assistant Professor at SHIATS Allahabad,, Dairy technology, Sam Higginbottom Institute of Agricultural Technology and Sciences, Deemed-to-be-University, Allahabad (U.P)