5. Organoleptic Evaluation of Probiotic Yogurts

Probiotic Yogurt containing single stain *Lactobacillus acidophilus*(Table.1): -The mean score of the acceptability trials of the formulated yogurt by the expert panel of 10 judges using nine hedonic scale. Three samples of yogurt were prepared using different inoculum concentration of the stain (*L.acidophilus*) and normal commercially available curd was used as standard. The mean score of colour was highest for A3 (1.5% v/v) was 7.87 which was liked very much. The mean scores for appearance and flavor was 8.00 and 7.60 which was highest when compared to others samples. The mean score of texture and taste was also highest with in case of A3 i.e. 7.97 and 8.13 respectively in comparison to other samples (A1 and A2) as well as control. The overall acceptability was also highest 8.37, and was liked extremely. In case of samples with lower inoculum concentration decreased the mean score than A3 and the overall acceptability also less than sample A3. Therefore the male subjects at risk CHD were supplemented with A3, containing 1.5% v/v inoculums concentration of *Lactobacillus acidophilus.*

Table1: Organoleptic Scores of Probiotic Yogurt (Mean ± SE)

Sample	*Color*	*Appearance Acceptability*	*Flavor*	*Texture*	*Taste*	*Overall*
Control	7.50±0.17	7.60±0.13	6.77±0.14	7.73±0.13	6.30±0.19	6.87±0.12
A1	7.63±0.14	7.30±0.13	6.97±0.11	7.07±0.14	7.16±0.11	7.33±0.11
A2	7.60±0.12	7.57±0.12	7.30±0.09	7.60±0.14	7.60±0.12	7.63±0.08
A3	7.87±0.14	8.00±0.16	7.60±0.11	7.97±0.13	8.13±0.12	8.37±0.12
B1	7.87±0.12	7.67±0.12	7.16±0.11	7.80±0.13	7.30±0.10	7.37±0.09
B2	8.17±0.14	7.90±0.13	7.73±0.12	8.07±0.10	8.10±0.11	8.30±
B3	8.50±0.12	8.23±0.13	7.83±0.10	8.53±0.11	7.97±0.13	0.11
F-Ratio	6.44**	5.69**	11.66**	11.85**	24.00**	8.00±0.11
CD at 5%	.39	.38	.33	.36	.38	24.77**
						.31

* Significant at 5% level of significance
Control - Normal Curd
A1 = 0.5% *Lactobacillus acidophilus*
A2 = 1.0% *Lactobacillus acidophilus*
A3 = 1.5% *Lactobacillus acidophilus*
B1 = 0.5% *Lactobacillus acidophilus* + 0.5% *Streptococcus thermophilus*
B2 = 1.0% *Lactobacillus acidophilus* + 1.0% *Streptococcus thermophilus*
B3 = 1.5% *Lactobacillus acidophilus* + 1.5% *Streptococcus thermophilus*

Probiotic Yogurt containing two stains *Lactobacillus acidophilus* and *Streptococcus thermophiles* (Table.2): -The mean score of the acceptability trials of the formulated yogurt by the expert panel of 10 judges using nine hedonic scale. Three samples of yogurt were prepared using different inoculum concentration of the stains (*L.acidophilus* and *S. thermophilus*) and normal commercially available curd was used as standard. The mean score of colour was highest for B2 (1.0% v/v each) was 8.57 which was extremely liked. The mean scores for appearance and flavor was 8.23 and 7.83 which was highest when compared to others samples. The mean score of texture and taste was also highest in case of B2 i.e. 8.57 and 8.10 respectively in comparison to other samples (B1 and B3) as well as control. The overall acceptability was also highest 8.30, and was liked extremely. In case of samples with inoculum concentration 0.5 % v/v i.e. B1 and 1.5% v/v i.e. B3 decreased the mean score when compared to B2 and the overall acceptability also less than sample B2. Therefore the male subjects at risk CHD were supplemented with B2, containing 1.0% v/v inoculums concentration of both of stains viz. *Lactobacillus acidophilus* and

5.1 Streptococcus Thermophilus.

Blood Lipid Profile of the Subjects before and After the Supplementation

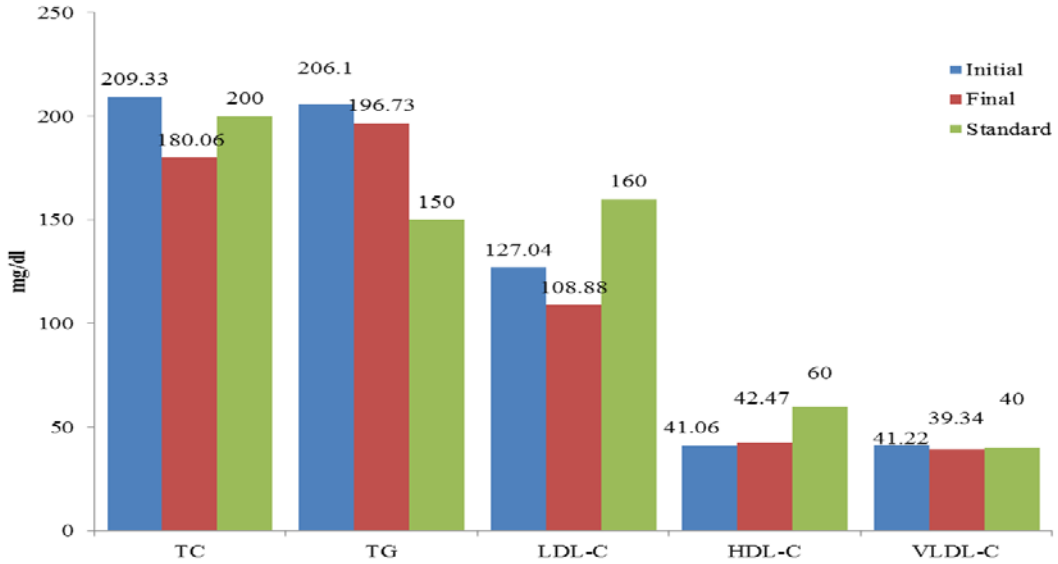
Blood lipid profiles of the subjects were assessed before and after the supplementation and are presented in Table.2.The mean values of total cholesterol before and after supplementation period in all the three groups were 209.33±5.12, 212.90±5.61, 218±4.47 and 180.06±4.46, 178.36±4.54, 219.5±5.14 mg/dl. A highly significant ($p \leq 0.01$) decrease was reported in E_1 and E_2 groups, whereas decrease was observed in group C but it was non-significant. The cholesterol lowering effect of the probiotic yogurt could be due to assimilation of the cholesterol by the stains for their own metabolism. As depicted in the Table.2, the initial and final mean values of TG recorded in the three groups were 206.1±6.51, 202.23±7.22, 210.6±5.45 and 192.73±5.62, 186.96±5.17, 212.4±4.77 mg/dl. A highly significant ($p \leq 0.01$) decrease was observed in group E_1 (Fig 1) and E_2 (Fig 2), whereas a non-significant decrease was observed in group C (Fig 3). The triglycerides are important since they influence lipid deposition and clotting mechanism. The initial and final mean values of HDL-C was reported as 41.06±1.46, 43.96±1.86, 44.73±2.25 mg/dl and 42.47±1.41, 45.67±0.97, 44.9±2.23 mg/dl in all the three groups, respectively. A highly significant ($p \leq 0.01$) increase was reported in group E_1 and E_2 whereas, a non-significant

decrease was observed in group C. The data collected revealed that the mean initial

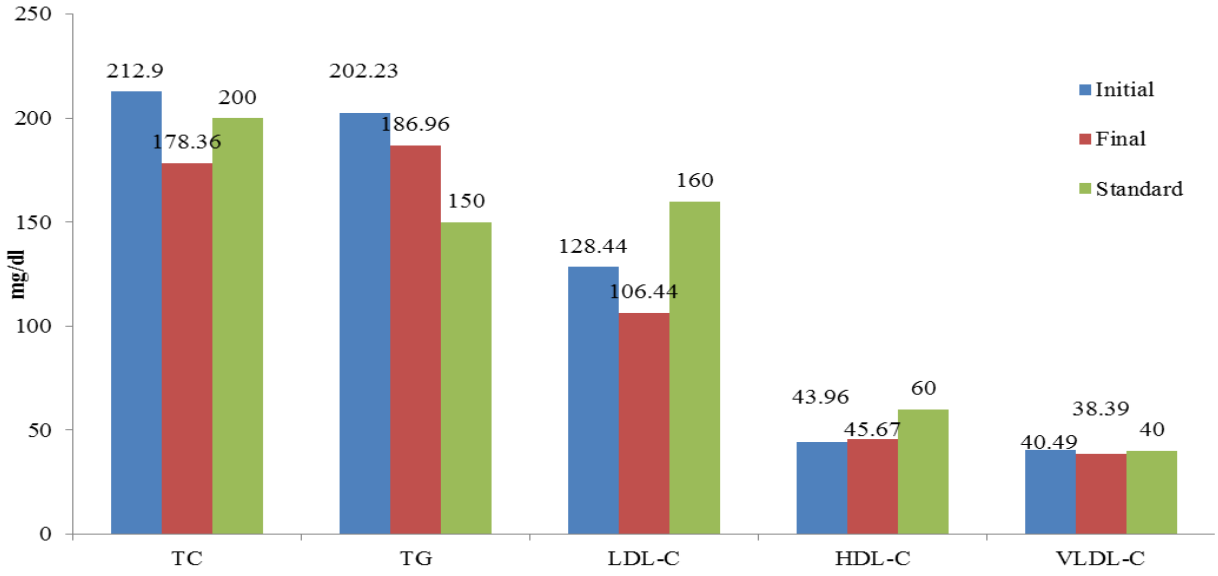
Table 2: Lipid profile of the subjects before and after supplementation of Probiotic Yogurts

Variables	*Group*	*Before*	*After*	*Difference*	*% Change*	*t-value*	*Reference standard*
TC (mg/dl)	E_1	209.33±5.12	180.06±4.46	-29.27	13.98	7.81**	
	E_2	212.90±5.61	178.36±4.54	-34.54	16.22	5.40**	<200^
	C	218±4.47	219.5±5.14	1.5	0.68	1.97**	
TG (mg/dl)	E_1	206.1±6.51	196.73±5.62	-13.37	6.48	7.82**	
	E_2	202.23±7.22	186.96±5.17	-15.27	7.75	5.27**	<150^
	C	210.6±5.45	212.4±4.77	1.8	0.85	1.97NS	
LDL-C (mg/dl)	E_1	127.04±5.25	108.88±4.92	-16.16	12.02	8.08**	
	E_2	128.44±5.72	106.44±4.94	-22	17.12	9.53**	130-160^
	C	131.14±5.01	132.12±4.76	0.98	0.75	1.40(NS)	
HDL-C (mg/dl)	E_1	41.06±1.46	42.47±1.42	1.41	3.21	5.91**	
	E_2	43.96±1.86	45.67±0.97	1.71	3.89	3.14**	40-60^
	C	44.73±2.25	44.9±2.23	0.17	0.38	1.07(NS)	
VLDL-C (mg/dl)	E_1	41.22±1.30	39.34±1.12	-1.88	4.56	7.02**	
	E_2	40.49±1.47	38.39±1.15	-2.1	5.18	5.36**	<40^
	C	42.12±1.10	42.48±1.00	0.36	0.85	1.19(NS)	
TC :HDL-C (mg/dl)	E_1	5.10±0.21	4.23±0.11	-0.87	17.06	11.71**	
	E_2	4.84±0.21	3.91±0.75	-0.93	19.21	10.10**	<4.5@
	C	4.88±0.23	4.89±0.23	0.01	0.21	0.92(NS)	
LDL-C:HDL-C (mg/dl)	E_1	3.09±0.18	2.56±0.13	-0.53	17.15	10.49**	
	E_2	2.92±0.18	2.33±0.17	-0.59	20.20	9.81**	<3#
	C	2.90±0.20	2.94±0.18	0.04	1.37	0.87(NS)	

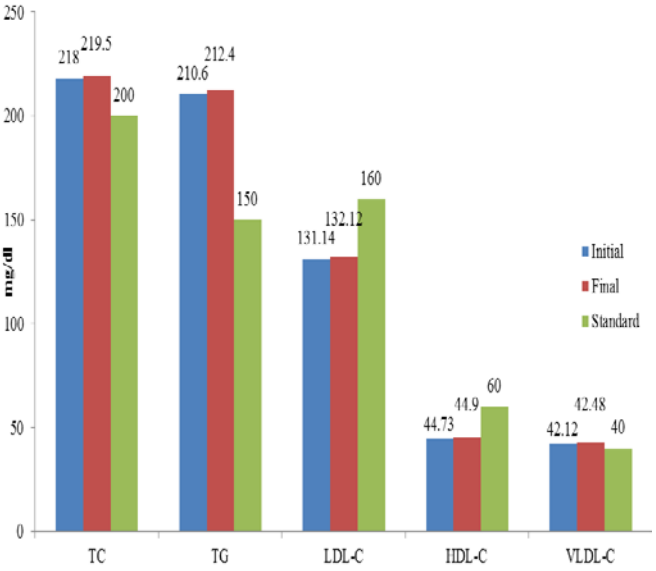
*Significant at 5% level of significance **Significant at 1% level of significance NS (non significant)
^ATP III (2010) @ Anonymous (2007)
Castelli *et al* (1997)



Mean Lipid Profile of E1 group



Mean Lipid Profile of E2 group



Mean Lipid Profile of C group

and final values were 127.04±5.25, 128.44±5.72, 131.14±5.01mg/dl and 108.88±4.92, 106.44±4.94, 132.12±4.76 mg/dl in all the three groups respectively. A highly significant ($p \leq 0.01$) decrease was reported in group E_1 and E_2, whereas a non-significant decrease was observed in group C. The initial mean values of VLDL-C were 41.22±1.30, 40.49±1.47 and 42.12±1.10 mg/dl and after the supplementation period, the values decreased to 39.34±1.12, 38.39±1.15and 42.48±1.00 mg/dl in all the three groups E_1, E_2 and C, respectively. A statistically ($p \leq 0.01$) significant reduction was observed in group E_1 and E_2, whereas a non-significant decrease was observed in group C.

6. Conclusion

Overall scrutiny of data indicated that maximum change was observed in the values of subjects in E_2 group followed by E_1 group. Hence, from the foregoing results, it can be inferred that 150 ml probiotic yogurt containing more than one strain supplementation for two months is an effective measure to bring favorable and significant improvements in coronary heart disease patients as compared to probiotic yogurt containing single strain and thus helps in the retardation of secondary complications. Thus probiotic yogurt is surely a panacea for patients who are at risk of CHD. A dairy product containing probiotics makes a healthy "functional food package" in addition to the vitamins, calcium, other minerals, and protein obtained from milk products. Consumption of three or more servings of dairy products each day has been associated with lower levels of obesity, and hence lower incidence of hypercholesterolemia and heart disease. The DASH (Dietary Approaches to Stop Hypertension) diet also recommends three servings of low fat dairy products. Considering all these findings, dairy products combined with probiotic bacteria results into improved health status.

7. Future Scope

Use of yogurt contains probiotic strains other than *Lactobacillus acidophilus* and *Streptococcus thermophilus* can be encouraged as it helps to improve lipid profile and could be easily incorporated in our daily diet along with meals.

People should be encouraged to consume probiotics in various other types of fermented products as it is natural, safe, has no side effects and economical alternative to the usually used hypolipidemic drugs. Dietary modifications such as increased consumption of whole cereals, whole pulses, sprouts, fresh fruits and green leafy vegetables can be incorporated to see the cumulative effect of both.

Excess intake of refined and processed food, whole milk and milk products, sugar, fats and oils, added salt and salty foods should be discouraged among at risk CHD subjects. Instead

skimmed or low fat milk and milk products should be consumed as it is rich source of calcium, potassium, magnesium and protein, which are cardio protective. Alcohol, tobacco and smoking should also be avoided. Nutritional counseling for long duration should also be imparted to risk of CHD.

Therapeutic lifestyle change is recommended which along with dietary modifications, includes regular exercise for 30 minutes a day for basic level of fitness. As physical activity reduces total cholesterol, triglycerides and fibrogen in the blood, increases HDL-C and lowers systolic and diastolic BP. Knowledge about the importance of regular health checkups, for identification and estimation of the risk factors especially after the age of 40 yrs can be stressed upon. As it is advisable to maintain ideal body weight and follow healthy active lifestyle.

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