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# Evaluation of the potential of Probiotic Yogurts containing Lactobacillus acidophilus and Streptococcus thermophiles in hypertensive male patients

KEYWORDS

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**ABSTRACT** *Ninety mild hypertensive males aged 40 -50 years, free from serious complications were selected and equally divided into three groups viz. E1, E2 and C. Subjects of group E1 were provided 150 ml of probiotic yoghurt containing Lactobacillus acidophilus (MTCC-447) and E2 with 150 ml probiotic yoghurt Containing Lactobacillus acidophilus (MTCC-447) and Streptococcus thermophilus (MTCC-1938) for a period of two months respectively, while group C was not given any supplementation. Blood pressures of all the subjects were recorded before and after the supplementation period. It was observed that systolic blood pressure (SBP) decreased from131.46±1.62mmHg to124.16±1.50mm Hg and 132.42±2.10mm Hg to 124.12±2.25mm Hg whereas diastolic blood pressure (DBP) decreased from 86.42±1.24mm Hg to 82.32±1.25mm Hg and 88.24±1.98mm Hg to 83.34±1.68mm Hg in the subjects of group E1 and E2 respectively. The improvement was more in E2 group as compared to E1.subjects. Any added effect, therefore, is due to the consumption of fermented milk products. The hypotensive effect of the probiotics has been attributed to the consumed probiotic yogurts. As hypertension is an important factor leading to Coronary heart disease, hence can be a panacea in counteracting the problems of Coronary Heart diseases.*

## INTRODUCTION

Coronary Heart Disease is one of the major causes of mortality andmorbidity in population of both developed as well as developing countries.The WHO has predicted that by the year 2030, cardiovascular disease will remain the leading cause of death, affecting approximately 23.6 million people around the World. India will carry 60 percent of the world's heart disease burden, nearly four times, more than its share of the global population (Powel 2009). Major risk factors for CHD are high LDL cholesterol, low HDL cholesterol, hypertension, diabetes mellitus, improper diet, sedentary lifestyle, obesity, physical inactivity, cigarette smoking etc. leading to hypercholesterolemia and hypertriglyceridemia. Studies conducted have shown that dairy foods fermented with specific probiotic bacteria can produce modest reduction in the total LDL cholesterol levels and blood pressure. There are various experiments that suggest a range of potentially beneficial medicinal use of probiotics in CHD.

Probiotics found in food products and dietary supplements are one of the good bacteria. Probiotics, which means "for life", have been used for centuries as natural components in health promoting food.Streptococcus thermophilus is used, along with Lactobacillus spp., as a starter culture for the manufacture of several important fermented dairy foods, including yogurt and Mozzarella cheese. When organisms such as lactobacillus acidophilus are used medicinally then the term "probiotic" is used (NIH, 2010). Probiotic containing dairy products are associated with a range of health claims, including the alleviation of symptoms of lactose intolerance and treatment of diarrhea to cancer suppression and reduction of blood cholesterol and blood pressure (Gardiner et al 2002). Thus consumption of three or more servings of dairy products combined with probiotics each day is associated with lower levels of obesity, and hence lower incidence of hypertension and heart disease. Ingestion of fermented milk containing probiotic LAB might be a natural way to decrease serum cholesterol and blood pressure in humans (Bazarreet al 1983).

Hypotensive effect of probiotics has not been much experimented on human subjects as most of the studies are reported in the literature are on animal models. Keeping this in view the research problem is proposed to create a hope on new functional food discovery in controlling hypertension, with the supplementation of dietary probiotics.

## MATERIALS AND METHOD

### Selection of subjects-

Ninety 40-50 years old male mildly hypertensive subjects were selected and divided equally into three groups, (30 each). $E_1$ group was given 150 ml of Probiotic yogurt/day containing Lactobacillus acidophilus for a period of 60 days. $E_2$ group was given 150 ml of Probiotic yogurt/day containing both Lactobacillus acidophilus and Streptococcus thermophilus for a period of 60 days. C group was not supplemented with Probiotic Yogurt. The required data was collected through personal interview technique using the specially structured schedule.

### Preparation and Standardization of probiotic yogurt

Milk was standardized to 3.5-4.0 per cent fat and was heated to 70°C and then two-stage homogenized at 65°C. The homogenized milk was then pasteurized and cooled to 43°C. Milk was then inoculated with starter culture of Lactobacillus acidophilus (0.5%; 1.0%; 1.5%) in case of first set of samples. In case of another set Streptococcus thermophilusand Lactobacillus acidophilus were added at different rates (0.5:0.5; 1.0:1.0; 1.5:1.5) to the yogurt. Inoculated milk was poured into cups and incubated at 42±1$^0$C for 3hrs and 30 mins. The cups containing yogurt were immediately transferred to the refrigerator and stored at 4-7°C. The prepared product was evaluated for physiochemical parameters viz., appearance, setting, cut surface, pH and acidity. The prepared product was subjected to physiochemical and organoleptic evaluation and supplemented to the experimental group.

### Probiotic yogurt supplementatio

Freshly 150 ml of Probiotic yogurt was prepared and packed in disposable bowls. Feeding trials of probiotic

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yogurt were carried out for a period of two months to Group $E_1$ containing only one strain Lactobacillus acidophilus (MTCC-447). Group $E_2$ was supplemented with probiotic yogurt containing two strains Lactobacillus acidophilus (MTCC 48) and Streptococcus thermophilus(MTCC-1938). The subjects were advised to consume the probiotic yogurt along with their lunch.

**Record of blood pressure**
Blood pressure was recorded with the Sphygmomanometer by the physician (Maclead 1984) before and after supplementation.

**Statistical Analysis**
The data on the parameterviz. blood pressure was analyzed statistically before and after supplementation. The mean standard error, analysis of variance, paired t- test and their statistical significance was ascertained using a computer programme package (Cheema and Singh 1990).

## RESULTS AND DISCUSSION

Blood pressure of the subjects before and after the supplementation of probiotic yogurt-

Blood pressure of the subjects recorded before and after supplementation is presented in table1. Hypertension is a strong risk factor for cardiac and blood vessel damage and is associated with high morbidity and mortality.

1 Systolic Blood Pressure (SBP) - The initial and the final mean value for SBP reported in the three groups was 131.46±1.62, 132.42±2.01, 135.39±1.79 mm Hg and 124.16±1.50, 124.12±2.25, 134.19±1.92 mm Hg, respectively. A significant ($p \leq 0.01$) decrease was observed in $E_1$ (7.3 mm Hg) and $E_2$ (8.5 mm Hg) groups, whereas a non-significant decrease i.e. 1.2 mm Hg was observed in group C. Studies have indicated that consumption of milk fermented with various strains of LAB may result in modest reductions in blood pressure, an effect possibly related to the ACE inhibitor-like peptides produced during fermentation (Sander, 2010).

2 Diastolic Blood Pressure (DBP) - The data recorded revealed that the initial and final diastolic blood pressure recorded as 86.42±1.24, 88.24±1.98, 89.64±1.50 mm Hg and 82.32±1.25, 83.34±1.68, 88.01±1.58 mm Hg in all the three groups, respectively. A significant decrease in group $E_1$ (5.90mm Hg), $E_2$ (4.9mm Hg) and C (1.63mm Hg) in DBP was observed in group $E_1$ and$E_2$ whereas a non-significant decrease was observed in group C. The decrease in blood pressure was highly appreciable in group $E_2$ as compared to group $E_1$. Antihypertensive effects have been documented in animal models and in mildly hypertensive adults for three compounds derived from the growth of certain lactobacilli: 1) fermented milk containing two tripeptides derived from the proteolytic action of L. helveticus on casein in milk; 2) bacterial cell wall components from cell extracts of lactobacilli; and 3) fermented milk containing fermentation-derived gamma-amino butyric acid. Systolic blood pressure was decreased on the order of 10-20 mm Hg. These results suggested that consumption of certain lactobacilli, or products made from them, may reduce blood pressure in mildly hypertensive people (USProbiotics.org, 2010).

The perusal of the data revealed that the mean blood pressure in the experimental groups decreased ($p \leq 0.01$) significantly after the supplementation period, whereas a non-significant decrease in blood pressure was observed in control group. Probiotic bacteria or their fermentation end products are effective in mediating a mild antihypertensive effect. Sanders (1999) concluded that the peptidase enzyme which acts on the peptide bonds of milk protein produces tripeptides which further inhibits angiotensin 1 converting enzyme and hence helps in reducing blood pressure. According to Lye et al, (2010) probiotics have exhibited antihypertensive potential via the improvement of lipid profiles, insulin resistance, and modulation of renin and the bioconversion of bioactive isoflavones. These positive findings suggested the potential use of dietary alternatives such as probiotics, to alleviate the occurrence of metabolic diseases. Moreover probiotic yogurt is rich in salts like magnesium and potassium which affect the control of blood pressure by regulating transmission of nerve impulse, vasodilatation, maintaining regular heart rhythm.

## SUMMARY AND CONCLUSION

Thus in our study a significant decrease in BP was observed after the supplementation of probiotic yogurt along with being good source of calcium, potassium and magnesium. After the supplementation period a significant ($p \leq 0.01$) reduction in SBP i.e. from 131.46±1.62 and 132.42±2.10 mm Hg to 124.16±1.50 and 124.12±2.25 mm Hg was observed in group $E_1$ and $E_2$ respectively and a significant ($p \leq 0.01$) reduction in DBP from 86.42±1.24 and 88.24±1.98 mm Hg to 82.32±1.25 and 83.34±1.68 mm Hg was observed in the experimental groups i.e. $E_1$ and $E_2$. Non- significant results were seen in case of control group i.e. group C. In the light of the present investigation use of yogurt containing probiotic strains like Lactobacillus acidophilus and Streptococcus thermophilusshould be encouraged as it helps to maintain normal blood pressure and could be easily incorporated in our daily diet along with meals. A dairy product containing probiotics is a safe alternative immunotherapeutic agent and healthy "functional food package" in addition to the vitamins, calcium, other minerals, and protein obtained from milk products. People should be encouraged to consume probiotic yogurt as it is natural, safe, has no side effects and economical alternative to the usually used hypotensive drugs.

**Tables**

**Table1: Mean blood pressure of the subjects before and after supplementation of Probiotic Yogurts**

| Variables | Before | After | Difference | % Change | t-value | Reference Standard |
|---|---|---|---|---|---|---|
| $E_1$ | | | | | | |
| Systolic BP | 131.46± 1.62 | 124.16± 1.50 | -7.30 | 5.55 | 3.12** | 120^ |
| Diastolic BP | 86.42± 1.24 | 82.32± 1.25 | -4.1 | 4.74 | 3.02** | 80^ |
| E2 | | | | | | |
| Systolic BP | 132.42± 2.10 | 124.12± 2.25 | -8.3 | 6.26 | 3.32** | 120^ |
| Diastolic BP | 88.24± 1.98 | 83.34± 1.68 | -4.9 | 5.55 | 3.50** | 80^ |
| C | | | | | | |
| Systolic BP | 135.39± 1.79 | 134.19± 1.92 | -1.2 | 0.88 | 0.32 (NS) | 120^ |
| Systolic BP | 89.64± 1.50 | 88.01± 1.58 | -1.63 | 1.82 | 0.35 (NS) | 80^ |

*Significant at 5% level of significance **Significant at 1% level of significance NS-Non-Significant

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^Raghuramet al (2007)

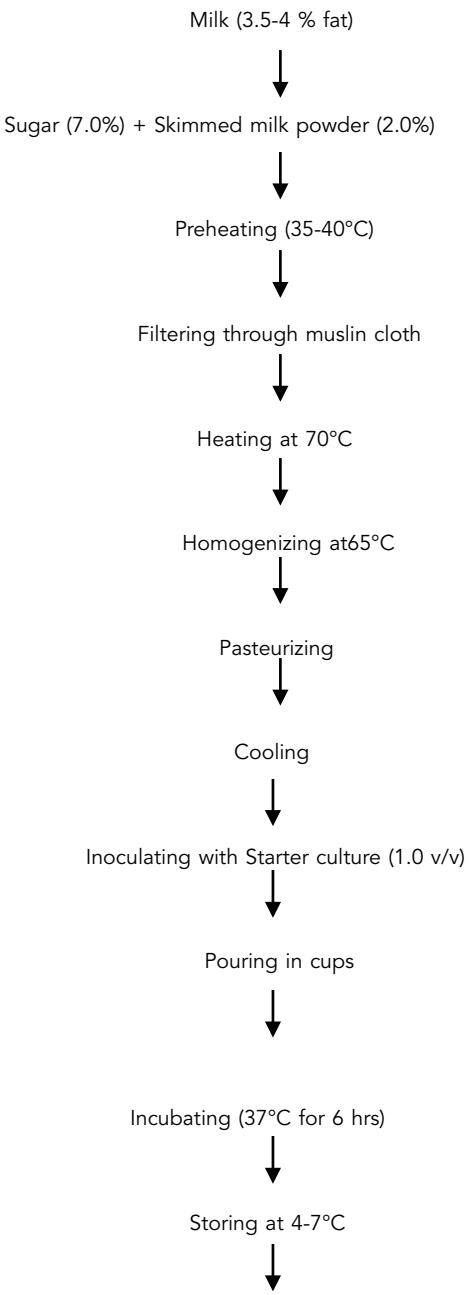


**Fig.1: Steps for making Probiotic Yogurt**

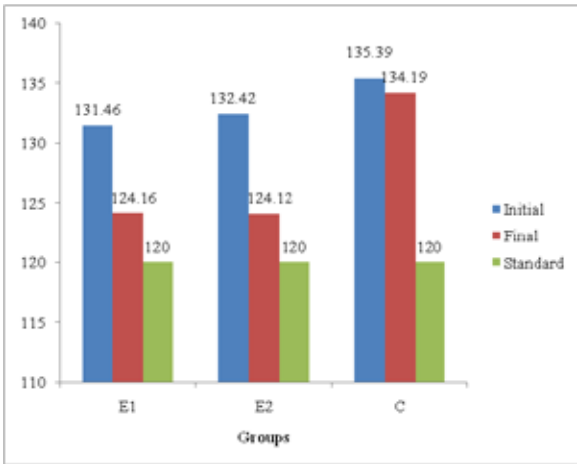


**Fig.2: Mean SBP of the subjects**

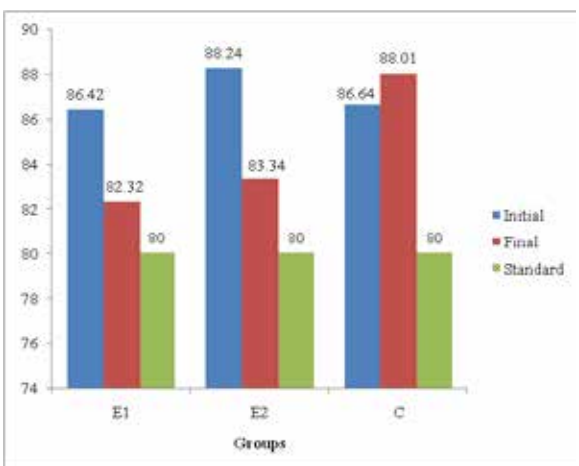


**Fig.3: Mean DBP of the subjects**

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