INTRODUCTION

Hypertension is an important medical and public health issue. It exists worldwide at epidemic rates affecting an estimated 1 billion people. Worldwide, raised blood pressure is estimated to cause 7.5 million deaths, about 12.8% of the total of all deaths WHO [1]. The prevalence of hypertension in Indians is 25% in urban and 10% in the rural population. According to estimates, there are nearly 31.5 million hypertensive in rural and 34 million in urban populations. Projections show that by 2030, an additional 27 million people could have hypertension. Hypertension is directly responsible for 57% of stroke deaths and 24% of coronary artery disease deaths in India according to Bhushan et al. [2].

Laughter is a natural part of life and is the best medicine. Laughter is a powerful antidote to stress, pain, and conflict. Laughter lightens the burden, inspires hope, connects someone to others, and keeps the individual, focused and alert. With so much power to heal and renew, the ability to laugh easily and frequently is a tremendous resource for surmounting problems, enhancing relationships, and supporting both physical and emotional health. Laughter helps to control blood pressure by reducing the release of stress-related hormones and bring relaxation. As far as lowering the blood pressure, studies showed that people who laugh heartily on a regular basis have lower standing blood pressure than the average person. Hence, a study was conducted to identify the effectiveness of laughter therapy on blood pressure among patients with hypertension at a selected hospital in Kancheepuram District. The objectives of the study were the identification of the effectiveness of laughter therapy on blood pressure among patient with hypertension and association of demographic, health and clinical variables with the level of blood pressure in the post-test among patients with hypertension.
Part-II was health variables which encompassed body height, weight, BMI, sleeping pattern, dietary pattern, history of smoking, history of alcoholism, and history of chewing tobacco.

Part-III was clinical variables that consisted of comorbidity, time since diagnosis, use of anti-hypertensive medication, and duration of treatment.

Part-IV was assessment and classification of blood pressure as shown in Table 1.

### Data collection procedure
The data were collected using structured instruments Part I-IV. Pre-test was performed for all study participants. During the pre-test, demographic, health variables were collected by interview method, except height and weight by anthropometric measurements and clinical variables were obtained from the clinical records. The blood pressure was measured using calibrated sphygmomanometer and stethoscope. The design was divided into pre-test on day 1 and practice of laughter therapy for 2 weeks from day 2 to 15 which was taught for the patients with hypertension to maintain the blood pressure within normal limit. Post-test was done on day 15 for all study participants. Teaching was done by lecture cum demonstration method with audio-visual aids which included general information about hypertension and demonstration of laughter therapy after pre-test on day 1. Each bout of laughter should last for 30-40 seconds, followed by relaxation. It consists of 10 steps and two deep breaths are encouraged after every laughter exercise. This was practiced by the study participants along with routine care which was only antihypertensive medications.

Total duration: 20 minutes.

Initiation: Bend forward swing your hands in front of your body, inhale and exhale fully (2 minutes).

- Step 1: Deep breathing with inhalation through the nose and prolonged exhalation (3 times). (1 minute 30 seconds)
- Step 2: Hearty laughter - Laughter by raising both the arms in the sky with the head tilted a little backward. Feel as if laughter is coming right from your heart while laughing chant “Aaa” (1 minute 30 seconds)
- Step 3: Hearty laughter - Laughter by raising both the arms in the sky with the head tilted a little backward. Feel as if laughter is coming right from your heart while laughing chant “Eee” (1 minute 30 seconds)
- Step 4: Hearty laughter - Laughter by raising both the arms in the sky with the head tilted a little backward. Feel as if laughter is coming right from your heart while laughing chant “Uuu” (1 minute 30 seconds)
- Step 5: Silent laughter (with mouth closed) - Laughter with closed mouth and a humming sound, while humming keep on moving in the group and shaking hands with different people. (1 minute 30 seconds)
- Step 6: Greeting laughter - Joining both the hands and greeting in Indian style (namaste) or shaking hands in Western style with at least 4-5 people in the group. (1 minute 30 seconds)
- Step 7: Appreciation laughter - Join your pointing finger with the thumb to make a small circle while making gestures as if you are appreciating your group members and laughing simultaneously. (1 minute 30 seconds)
- Step 8: Swinging laughter - Stand in a circle and move toward the center by chanting Aee...Eee...Ooo...Uuu... (1 minute 30 seconds)
- Step 9: Lion laughter: Extend the tongue fully with eyes wide open and hands stretched out like the claws of lion and laugh from tummy. (1 minute 30 seconds)
- Step 10: Argument laughter - Laugh by pointing fingers at different group members as if arguing. (1 minute 30 seconds)

Relaxation: Sitting calmly. (3 minutes).

### Statistical analysis
The data were analyzed by the statistical package for social sciences version 16. Both descriptive and inferential statistics were used for analysis. The paired t-test was computed to test the differences in the blood pressure within study group participants between pre- and post-test. The hypothesis H1: “There is a significant difference in the systolic and diastolic blood pressure between pre and post-test among patients with hypertension who were subjected to laughter therapy” was tested in this study.

### RESULTS
The distribution of demographic variables as per Table 2 revealed that each 17 (34%) study participants were aged from 39-42 to 43-45 years, respectively. On the count of gender, male and female study participants were equal in numbers that is each 25 (50%). With regard to marital status, most of the 35 (70%) study group participants are married (8 (16%) were widow/widower, 5 (10%) were separated, and only 2 (4%) were unmarried. The majority of 39 (78%) study participant were Hindus, 6 (12%) were Muslims and only 5 (10%) were Christians. On the account of educational status 14 (28%).

### Table 1: Classification of blood pressure

| Classification of blood pressure | Systolic (mm of Hg) | Diastolic (mm of Hg) |
|----------------------------------|---------------------|---------------------|
| Normal                           | <120                | And <80             |
| Prehypertension                  | 120–139             | 0r 80–89            |
| Stage 1 hypertension             | 140–159             | Or 90–99            |
| Stage 2 hypertension             | ≥160                | Or ≥100             |

*National institute of health, seventh report of the national committee (2008), AHA[3] AHA: American Heart Association

### Table 2: Distribution of demographic variables among study group (n=50)

| S. No. | Demographic variables | n (%) |
|--------|-----------------------|-------|
| 1      | Age (years)           |       |
| 2      | Gender                |       |
| 3      | Marital status        |       |
| 4      | Religion              |       |
| 5      | Educational status    |       |
| 6      | Occupational status   |       |
| 7      | Income per month      |       |

| Age (years) | n (%) |
|-------------|-------|
| 35–38       | 16 (32)|
| 39–42       | 17 (34)|
| 43–45       | 17 (34)|
| Gender      |       |
| Male        | 25 (50)|
| Female      | 25 (50)|
| Marital status |     |
| Unmarried   | 2 (4)  |
| Married     | 35 (70)|
| Widow/widower | 8 (16)|
| Separated   | 5 (10) |
| Religion    |       |
| Hindu       | 39 (78)|
| Muslim      | 6 (12) |
| Christian   | 5 (10) |
| Educational status |     |
| Primary school | 14 (28)|
| High school  | 12 (24)|
| Higher secondary school | 10 (20)|
| Graduate     | 7 (14) |
| Post-graduate | 5 (10)|
| Vocational training | 2 (4) |
| Occupational status |     |
| Labor        | 12 (24)|
| Former       | 17 (34)|
| Government employee | 5 (10)|
| Private employee | 14 (28)|
| Business     | 2 (4)  |
| Income per month (Rs.) |     |
| <5000/-     | 17 (34)|
| 5001–7500/- | 12 (24)|
| >7500/-     | 21 (42)|
Table 3: Distribution of health variables among study group (n=50)

| S. No. | Health variables | n (%) |
|--------|------------------|-------|
| 1      | Height (cm)      |       |
|        | 140-150          | 8 (16) |
|        | 151-160          | 17 (34) |
|        | >160             | 25 (50) |
| 2      | Body weight (kg) |       |
|        | <45              | 5 (10)  |
|        | 45.1-55          | 15 (30) |
|        | 55.1-65          | 19 (38) |
|        | >65              | 11 (22) |
| 3      | Body mass index  |       |
|        | 18.5-24.9        | 18 (36) |
|        | 25-24.9          | 26 (52) |
|        | 30-34.9          | 4 (8)   |
|        | 35-39.9          | 2 (4)   |
| 4      | Sleeping pattern (h/day) |       |
|        | >6               | 7 (14)  |
|        | 6-8              | 22 (44) |
|        | >8               | 21 (42) |
| 5      | Dietary pattern  |       |
|        | Vegetarian       | 14 (28) |
|        | Nonvegetarian    | 36 (72) |
| 6      | History of smoking |     |
|        | Never            | 25 (50) |
|        | Occasional       | 8 (16)  |
|        | Always           | 17 (34) |
| 7      | History of alcoholism |    |
|        | Never            | 25 (50) |
|        | Occasional       | 13 (26) |
|        | Always           | 12 (24) |
| 8      | History of chewing tobacco |   |
|        | Never            | 29 (58) |
|        | Occasional       | 15 (30) |
|        | Always           | 6 (12)  |

Table 4: Distribution of clinical variables among study group (n=50)

| S. No. | Clinical variables | n (%) |
|--------|--------------------|-------|
| 1      | Comorbidity        |       |
|        | Yes                | 31 (62) |
|        | No                 | 19 (38) |
| 2      | Comorbid illness   |       |
|        | No comorbid illness| 19 (38) |
|        | Diabetes mellitus  | 12 (24) |
|        | Hypothyroidism     | 6 (12)  |
|        | Bronchial asthma   | 6 (12)  |
|        | Diabetes mellitus with hypothyroidism | 4 (8) |
| 3      | Time since diagnosis (years) | |
|        | <1                | 14 (28) |
|        | 1-5               | 24 (48) |
|        | >5                | 12 (24) |
| 4      | Use of anti-hypertensive medication | |
|        | Yes               | 50 (100) |
|        | No                | -      |
| 5      | Duration of treatment (years) |       |
|        | Since 1           | 14 (28) |
|        | 1-5               | 24 (48) |
|        | >5                | 12 (24) |

12 (24%), 10 (20%), and 7 (14%) study participants had primary school, high school, high secondary school, and graduate level of education, respectively. The distribution of occupational status revealed that 8 (16%), 17 (34%), and 25 (50%) study participants were formers, private employees, and labors, respectively. Out of 50 study participants, 21 (42%) had the income of Rs. >7500/- month, whereas 17 (34%) and 12 (24%) had Rs. <5000 and Rs. 5001-7500 per month, respectively.

The distribution of health variables as illustrated in Table 3 among study group participants disclosed that 8 (16%), 17 (34%), and 25 (50%) study participants had the height with the range of 140-150, 151-160, and more than 160 cms, respectively. With regard to the body weight 19 (38%), study group participants were between 55.1 and 65 kg, whereas 15 (30%) were between 45.1 and 55 kg. However, 11 (22%) study participants had the body weight of more than 65 kg and only 5 (10%) had >45 kg. On calculation of body mass index, 26 (52%), 18 (36%), 4 (8%), and 2 (4%) study group participants had between 25-29.9, 18.5-24.9, 30-34.9, and 35-39.9, respectively. On the account of sleeping pattern (hours/day) 22 (44%), 21 (42%), and 7 (14%) had >6 more than 8 and <6 hours/day. Most of the 36 (72%) study participants were vegetarians and only 14 (28%) were vegetarians. With respect to the history of smoking 17 (34%) were used to smoke “always” and 8 (16%) used it “occasionally”. Most of the 25 (50%) study group participants “never” used to smoke and drink alcohol. The distribution of history of alcoholism unveiled that 13 (26%) and 12 (24%) study participants used the alcohol “always” and “occasional” respectively. Out of 50 (100%) study group participants, 29 (58%) did not have the history of chewing tobacco whereas 15 (30%) and 6 (12%) used it “occasionally” and “always.”

The distribution of clinical variables as shown in Table 4 disclosed that 31 (62%) study group participants had comorbid illness, among which 12 (24%), 6 (12%), 6 (12%), 4 (8%), and 3 (6%) had diabetes mellitus, hypothyroidism bronchial asthma, diabetes mellitus with bronchial asthma, and diabetes mellitus with hypothyroidism, respectively.

Out of 50 (100%) study group participants 24 (48%), 14 (28%), and 12 (24%) were diagnosed to have hypertension since 1-5 years, <1 year and more than 5 years, respectively. All the 50 (100%) study group participants were on treatment, among these 24 (48%), 14 (28%), and 12 (24%) were on treatment for 1-5 years, for 1 year and more than 5 years, respectively.

The distribution of level of blood pressure in pre- and post-test as mentioned in Table 5 disclosed that all the 50 (100%) study group participants had Stage-1 systolic and diastolic hypertension in the pre-test whereas in post-test 45 (90%) had pre-hypertension systolic and diastolic, only 5 (10%) had Stage-1 systolic and diastolic hypertension.

The comparison of pre- and post-test blood pressure within study group as shown in Table 6 and Fig. 1 disclosed that there was a statistically significant difference between pre- and post-test systolic and diastolic blood pressure within study group participants at level p<0.001.

**DISCUSSION**

The distribution of level of blood pressure in pre- and post-test unveiled that all the 50 (100%) study group participants had Stage-1 systolic
The result revealed that the cost of therapy was higher for DM+HTN and DM. The percentage of expenditure was higher in low-income group and burden of therapy was directly proportional to the number of tablets, poor educational and occupational status; and inversely proportional to income [8]. These study findings are substantiated by another study done by Nachiya et al. which disclosed that the total therapy expenditure was likely to be influenced by hypertension comorbidity. The findings denoted that preventing hypertension comorbidity has the benefit to reduce total therapy expenditure. Thus, it proved that prevention is better than cure which has to be emphasized among people who are at risk to hypertension. Laughter therapy is very simple to practice by all age group of people which requires only attitude to adhere to it that will prevent hypertension [10].

CONCLUSION

Laughter therapy is an effective intervention to reduce the blood pressure among patients with hypertension. Since hypertension is a chronic disease, the regular practice of laughter therapy helps the patients with hypertension to sustain the blood pressure within normal limit throughout their survivorship. This will reduce the complications related to hypertension and cost of health care.

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