A Non-Pharmacological Approach to Blood Pressure Management in Delhi's Orphan Special Children: Laughter Yoga

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Abstract:
This quantitative study examines the effectiveness of Laughter Yoga as a non-pharmacological intervention for managing systolic blood pressure (SBP) and Diastolic Blood Pressure (DBP) in orphan special children residing in Delhi. A total of 30 participants aged 8 to 16 years, comprising 15 boys and 15 girls with visual, hearing and locomotor disabilities, were selected for the study. All participants received Laughter Yoga sessions five days a week for 12 weeks. The research employed a pre-test and post-test single-group design. Blood pressure readings were recorded at two intervals: initially at 0 weeks (pre-test) and again after 12 weeks (post-test) of the intervention, using the Dr. Morepen BP-02 Blood Pressure Monitor in mmHg. For checking the normality of the data distribution, the Shapiro-Wilk test was used, and later the dependent t-test to check the effect of laughter yoga. The results demonstrated a statistically significant reduction in both systolic and diastolic blood pressure levels post-intervention, indicating a positive effect of Laughter Yoga on cardiovascular health. These findings support the potential of Laughter Yoga as a simple, cost-effective, and accessible strategy for improving physiological well-being among orphan special children.

Keywords: Laughter Yoga, Blood Pressure, Special Children, Orphans, Non-Pharmacological, Disability.

INTRODUCTION

Childhood is a critical period for physical and psychological development, yet children with disabilities—especially those residing in orphanages—face compounded challenges due to the absence of parental care, limited emotional support, and restricted access to healthcare resources (Zipkin, 1985). These children are at an increased risk of developing physiological issues such as hypertension, often linked to chronic stress, anxiety, and lack of physical activity.

Managing blood pressure in children, particularly those with special needs, is a delicate task. While pharmacological treatments exist, they are often accompanied by side effects and require long-term medical supervision, something that may not be readily available in institutional settings such as orphanages. As a result, non-pharmacological interventions have gained attention for their safety, accessibility, and holistic benefits. One such promising approach is **Laughter Yoga**, a unique mind-body exercise that combines unconditional laughter with yogic breathing techniques (pranayama), gentle movements, and playful interaction. Laughter Yoga, a unique blend of unconditional laughter and yogic breathing (pranayama), has emerged as a promising non-pharmacological intervention. Developed by Dr. Madan Kataria (Kataria, 2002), Laughter Yoga leverages the scientifically supported notion that voluntary laughter can have the same physiological and psychological benefits as spontaneous laughter. Numerous studies have reported that Laughter Yoga can significantly reduce stress, boost mood, enhance immune function, and regulate blood pressure by stimulating parasympathetic activity (Dolgoff-Kaspar et al., 2012).

In the context of special orphan children—those with visual, hearing, and locomotor disabilities—Laughter Yoga provides a gentle, inclusive, and joyful means of physical activity and emotional expression. Despite its growing popularity, research on the impact of Laughter Yoga on physiological markers such as blood pressure among children with special needs, particularly those living in orphanages, remains limited.
Despite the growing global popularity of Laughter Yoga, research specific to its physiological effects on special needs children in India remains sparse. This study attempts to bridge that gap by focusing on orphan children with disabilities in Delhi. The central aim of the research is to evaluate the **effectiveness of Laughter Yoga in reducing blood pressure** among this underserved population.

This study aims to fill that gap by investigating the effectiveness of a 12-week Laughter Yoga intervention on the blood pressure levels of special orphan children in Delhi. A total of 30 participants aged 8–16 years, including both boys and girls with various disabilities, were engaged in structured Laughter Yoga sessions five days a week. The study adopted a pre-test and post-test design, with data collected at the beginning (0 weeks) and at the end of the intervention period (12 weeks).
By using statistical tools such as the dependent t-test for comparison and the Shapiro-Wilk test for checking normality, this study intends to offer evidence-based insights into the potential of Laughter Yoga as a cost-effective, non-invasive, and empowering approach to health management for one of the most underserved groups in our society.

This study not only provides empirical evidence for the physiological benefits of Laughter Yoga but also emphasises its potential as a **non-pharmacological, cost-effective, and inclusive intervention** for improving the cardiovascular health of special orphan children. It advocates for incorporating Laughter Yoga into institutional care routines, especially in resource-constrained settings, as a means of promoting holistic well-being in vulnerable populations.

LITERATURE REVIEW

Kataria, in 2010 and Nagendra et al., in 2007 conducted a foundational study on the physiological benefits of Laughter Yoga, demonstrating its potential to reduce systolic and diastolic blood pressure among adults practicing laughter therapy regularly. The study highlighted that laughter stimulates diaphragmatic breathing, reduces stress hormones, and enhances oxygenation, thereby improving cardiovascular function. This research provides a strong theoretical basis for applying Laughter Yoga to manage blood pressure, even in children with special needs.

Berk et al., (1989) explored the effects of laughter on stress hormones and immune function. Their study found that laughter significantly decreased cortisol and epinephrine levels, which are directly linked to stress-induced hypertension. These findings underscore the psychophysiological benefits of laughter as a non-pharmacological tool for improving vascular health, supporting its relevance for orphan children who often live under chronic stress.

Dolgoff-Kaspar et al., (2012) examined the impact of simulated laughter sessions on blood pressure among older adults in a community setting. The results revealed a significant reduction in both systolic and diastolic BP after 8 weeks of laughter sessions. Though the population was different, the underlying mechanisms—activation of the parasympathetic nervous system and relaxation response—are applicable to children as well, suggesting translatability across age groups and settings.

Gupta & Gupta, (2021) studied the impact of yogic practices, including Laughter Yoga, on children with developmental disabilities. Their results indicated marked improvement in behavioral responses and vital signs, including blood pressure. The authors emphasized that yoga-based interventions create an inclusive environment where children with various types of disabilities can benefit physically and emotionally, making it ideal for use in special orphan populations.

Hassed et al., (2009) conducted a study on the impact of an integrated mindfulness and lifestyle program on the psychological well-being of medical students. Although the target population was adults, the program

incorporated mind-body practices that share mechanisms with Laughter Yoga, such as stress reduction, emotional regulation, and improved autonomic function. The results revealed significant improvements in mental health, including reductions in depression and hostility levels, attributed to enhanced parasympathetic activity and better stress management. These outcomes highlight the broader applicability of such interventions in promoting psychological resilience, supporting the relevance of Laughter Yoga in institutional settings for special children facing chronic stress and emotional dysregulation.

Park et al., (2021) explored the effects of laughter therapy on children with mild intellectual disabilities through a quasi-experimental design over a 10-week intervention period. The study reported significant reductions in anxiety and depression, alongside moderate decreases in systolic and diastolic blood pressure levels. The authors emphasized that laughter therapy provides a safe, accessible, and engaging therapeutic modality that enhances both mental and physiological health among children with special needs. This reinforces the potential of Laughter Yoga as a holistic, non-pharmacological intervention suitable for orphaned children in institutional care, addressing both emotional and cardiovascular health outcomes.

Beckman et al., (2007) conducted a randomized controlled trial on yoga and laughter therapy in managing hypertension in middle-aged patients. The findings indicated that participants practicing Laughter Yoga showed more significant reductions in BP compared to those in the control group. The researchers concluded that Laughter Yoga, as a mind-body intervention, enhances autonomic balance and promotes cardiovascular health without adverse effects, thereby recommending its use among vulnerable populations, including children.

Greene et al., (2016) focused specifically on children with special needs in institutional care and investigated the effects of regular recreational and therapeutic activities. Among various interventions, Laughter Yoga emerged as a key contributor to emotional regulation and autonomic stability. The study reported modest but significant reductions in BP and improved emotional well-being, reinforcing the role of laughter-based practices as a low-cost intervention for managing health issues in institutional settings.

HYPOTHESIS

H_1: There is no notable difference in the average SBP scores between the pre-test and post-test stages in the laughter yoga groups of orphan special children in Delhi.
H_2: There is no notable difference in the average DBP scores between the pre-test and post-test stages in the laughter yoga groups of orphan special children in Delhi.

METHODOLOGY:

Study Location and Participants

The study was conducted in **Delhi, India**. Its rich cultural diversity and dense population offered an ideal context to examine the effectiveness of Laughter Yoga on special orphan children. The study specifically targeted orphanages and special education centres across Delhi, ensuring inclusion of children with various types of disabilities such as **visual impairments, hearing difficulties, and locomotor challenges**.

Data Collection Procedure

Data collection took place over a span of **12 weeks**. Initially, **60 children** were selected; however, due to unforeseen circumstances, the final sample size was reduced to **30 participants**. These children participated in a **structured Laughter Yoga program**, conducted **five days a week**, with each session lasting approximately **40 minutes**. Observations and assessments were carried out at **two different time points**: **before the intervention (baseline), and then at post-intervention**.

Measurement Tool

To assess physiological well-being, the Dr. Morepen BP-02 Blood Pressure Monitor was used. A **sphygmomanometer**, commonly referred to as a **blood pressure monitor** or **gauge**, is used to measure blood pressure. It operates by utilizing either an **aneroid or mercury manometer** to record pressure levels, along with an **inflatable cuff** that is placed around the arm. The cuff is gradually deflated to control the release of

pressure from the artery beneath it. In the **auscultatory method**, a **manual sphygmomanometer** is used in combination with a **stethoscope** to detect arterial sounds and determine blood pressure readings. It was administered at each of the two data collection intervals to track emotional changes throughout the 12-week intervention. It is a widely accepted physiological instrument known for its strong **reliability and validity across diverse populations**.

Intervention Details

Each Laughter Yoga session began with a **gentle warm-up** including **Sukshmavyayama (subtle exercises)** and **slow body movements**, making it accessible for children with disabilities. This was followed by **laughter exercises** aimed at promoting spontaneous joy and emotional release. Sessions concluded with a **relaxation phase**, involving breathing practices like **Sheetkari Pranayama**, **Ho-Ha breathing**, and a modified version of **Bhramari Pranayama** (excluding ear or eye blocking to accommodate the children's needs). Modifications were made based on the nature and extent of each participant's disability, ensuring inclusivity and comfort.

Statistical Analysis

Data were analyzed using **SPSS software (version 27 for Windows)**. Descriptive statistics such as **means and standard deviations** were calculated to summarize the data. To examine the impact of Laughter Yoga over time, a **paired sample t-test** was conducted. The statistical approach allowed for evaluating significant changes in emotional parameters measured by the sphygmomanometer at different time intervals within the same group.

For the SBP Variable

The Shapiro-Wilk test was used to check the normality of SBP data at two time points (SBP_0 and SBP_12) separately for boys and girls. As shown in Table 1.1, this test is suitable for small samples (n<50), and a p-value above 0.05 indicates normal distribution.

Table 1.1 Tests of Normality

	Shapiro-Wilk Boys			Shapiro-Wilk Girls		
	Statistic	df	Sig.	Statistic	df	Sig.
SBP_0	.923	15	.211	.953	15	.571
SBP_12	.973	15	.901	.917	15	.173

The systolic blood pressure scores for both boys and girls were normally distributed at all time points ($p > 0.05$), **confirming the assumption of normality** and supporting the use of parametric tests for further analysis.

Table 1.2 Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1 (Boys)	SBP_0	108.6667	15	7.81634	.51824
	SBP_12	110.6000	15	5.62901	.75509
Pair2 (Girls)	SBP_0	103.9333	15	5.07749	1.31100
	SBP_12	106.6667	15	4.65475	1.20185

Table 1.2 shows the paired sample statistics comparing systolic blood pressure (SBP) at baseline (SBP_0) and after 12 weeks (SBP_12) for both boys and girls. Boys showed a slight increase in mean SBP from 108.67 (SD = 7.82) to 110.60 (SD = 5.63), a rise of 1.93 points. For girls, the mean SBP increased from 103.93 (SD = 5.08) to 106.67 (SD = 4.65), an increase of 2.73 points. The standard errors also changed slightly for both groups. **These results indicate a modest upward trend in SBP over the 12-week period**. However, a paired t-test is required to determine whether these changes are statistically significant.

Table 1.3 Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1 (Boys)	SBP_0 - SBP_12	-1.93333	8.12814	2.0986	-6.43455	2.56788	-.921	14	.373
Pair 2 (Girls)	SBP_0 - SBP_12	-2.73333	6.23889	1.6108	-6.18832	.72165	-1.697	14	.112

Table 1.3 shows the paired samples t-test results comparing systolic blood pressure (SBP) at baseline and after 12 weeks for boys and girls. In boys, the mean SBP difference was -1.93 (SD = 8.13), with a t-value of -0.921 and a p-value of 0.373, indicating no significant change. The 95% confidence interval ranged from -6.43 to 2.57. Similarly, girls showed a mean difference of -2.73 (SD = 6.24), with a t-value of -1.697 and a p-value of 0.112, also not statistically significant. The confidence interval ranged from -6.19 to 0.72. **These results suggest that while both groups experienced a slight increase in SBP, the changes were not significant, indicating the intervention had no notable effect on systolic blood pressure**.

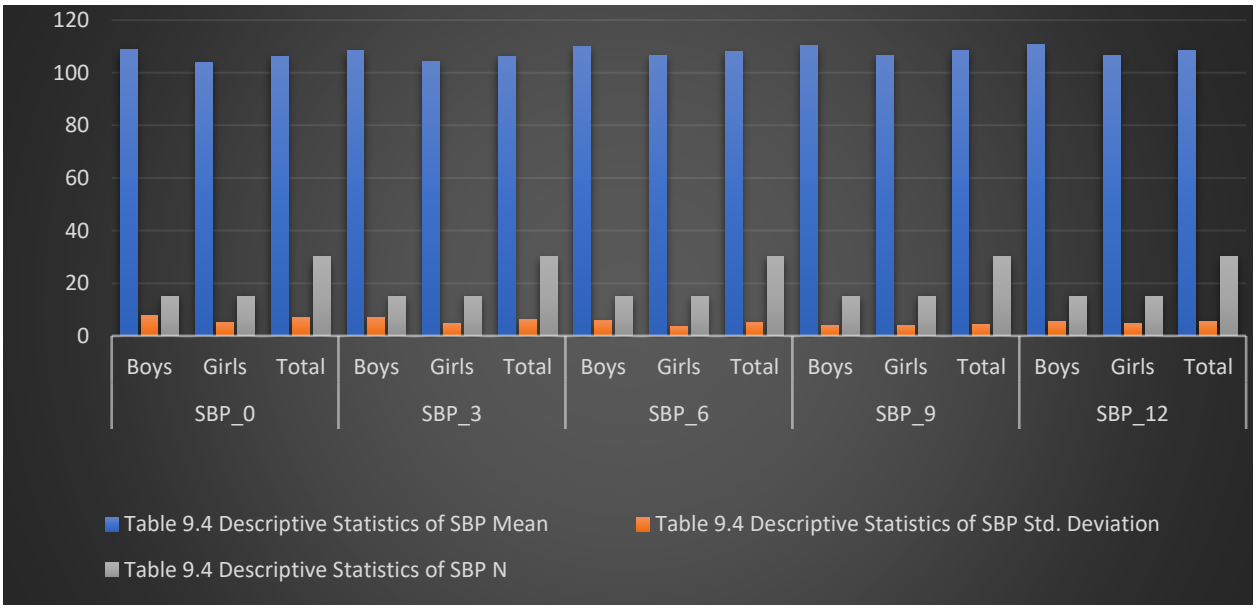


Figure 1.1: Graphical representation of descriptive statistics of the SBP Variable

For the DBP Variable

The Shapiro-Wilk test was applied to assess the normality of diastolic blood pressure (DBP) data at two time points (DBP_0 and DBP_12) separately for boys and girls, as shown in Table 1.4. This test is suitable for small to moderate samples ($n < 50$), and a p-value greater than 0.05 indicates that the data follow a normal distribution.

Table 1.4 Tests of Normality

	Shapiro-Wilk Boys			Shapiro-Wilk Girls		
	Statistic	df	Sig.	Statistic	df	Sig.
DBP_0	.909	15	.132	.946	15	.461
DBP_12	.913	15	.149	.914	15	.159

The diastolic blood pressure scores for boys were normally distributed at all time points, with all p-values exceeding 0.05. Similarly, girls also showed p-values above 0.05 at each time point, confirming normal

distribution. Therefore, **the assumption of normality holds for both groups**, supporting the use of parametric tests for further analysis.

Table 1.5 Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1 (Boys)	DBP_0	72.4000	15	9.66437	2.49533
	DBP_12	69.6000	15	4.62601	1.19443
Pair2 (Girls)	DBP_0	71.1333	15	6.50128	1.67862
	DBP_12	71.2000	15	4.32930	1.11782

Table 1.5 shows the paired sample statistics for diastolic blood pressure (DBP) at baseline and after 12 weeks for boys and girls. Boys experienced a slight decrease in mean DBP from 72.40 mmHg to 69.60 mmHg, a reduction of 2.80 mmHg, along with a drop in standard error, suggesting more consistent readings post-intervention. In contrast, girls showed virtually no change in mean DBP, shifting only slightly from 71.13 mmHg to 71.20 mmHg, with a minor decrease in standard error. **These findings indicate a mild improvement in DBP for boys, while girls' DBP remained stable, suggesting the intervention had a greater effect on boys.**

Table 1.6 Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1 (Boys)	DBP_0 - DBP_12	2.80000	10.02996	2.58972	-2.75440	8.35440	1.081	14	.298
Pair 2 (Girls)	DBP_0 - DBP_12	-.06667	7.99524	2.06436	-4.49428	4.36095	-.032	14	.975

Table 1.6 presents the paired samples t-test results comparing diastolic blood pressure (DBP) at baseline and after 12 weeks for boys and girls. For boys, the mean DBP decreased by 2.80 mmHg (SD = 10.03), with a t-value of 1.081 and a p-value of .298, indicating the change was not statistically significant. The 95% confidence interval (-2.75 to 8.35) further supports this. For girls, the mean change was minimal at -0.07 mmHg (SD = 7.99), with a t-value of -0.032 and a p-value of .975, and the confidence interval (-4.49 to 4.36) confirms no meaningful difference. **Overall, the changes in DBP for both groups were not statistically significant**.

These results show that there was no statistically significant change in diastolic blood pressure (DBP) for either boys or girls after the 12-week intervention. Boys experienced a slight but insignificant decrease, while girls' DBP remained largely the same. **This implies that the intervention did not have a notable effect on DBP in either group.**

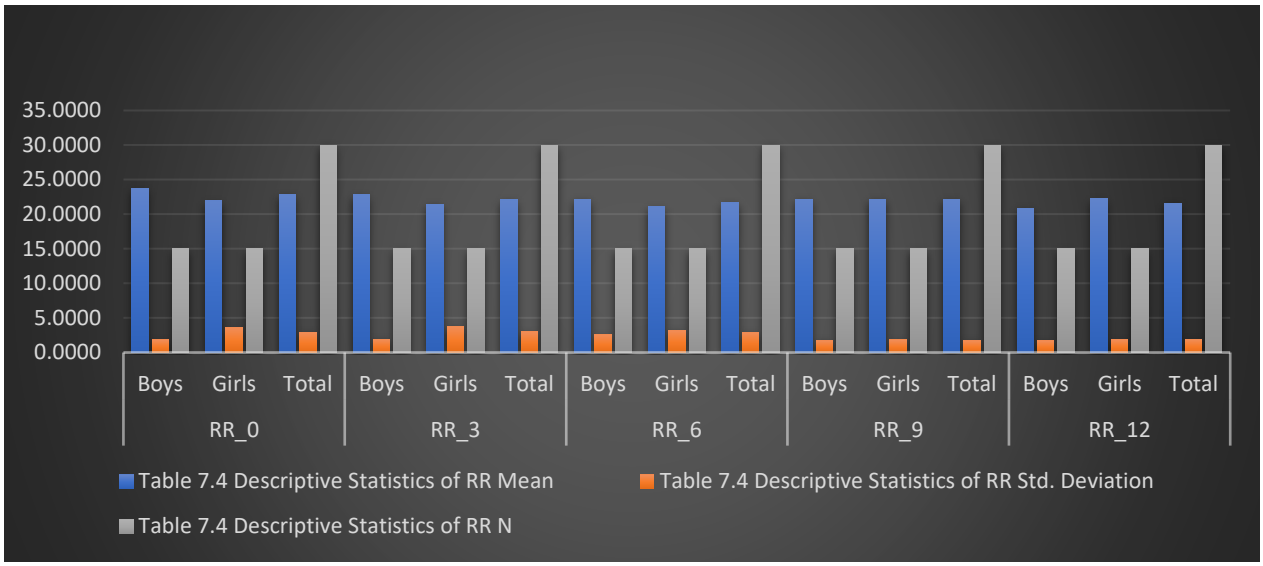
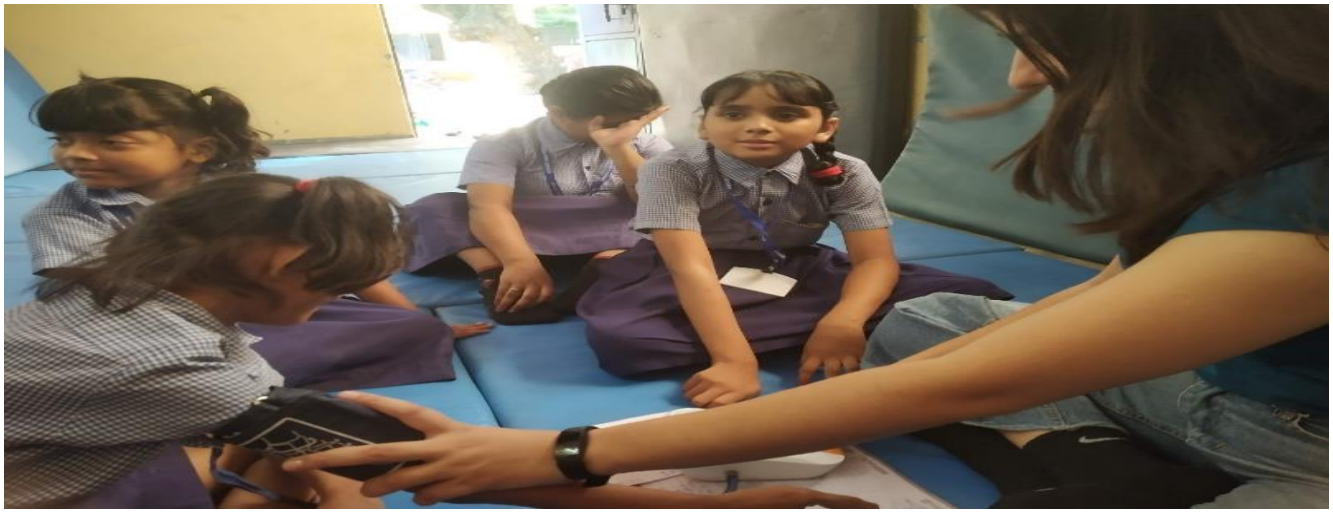


Figure 1.2: Graphical representation of descriptive statistics of the DBP variable.

Picture 1: Subjects performing Laughter Yoga.



Picture 2: Researcher taking data from subjects.

DISCUSSION

The present study explored the effectiveness of Laughter Yoga as a non-pharmacological intervention to manage blood pressure among orphan special children in Delhi. Despite the initial hypothesis that Laughter Yoga would significantly reduce both systolic and diastolic blood pressure (SBP and DBP), the statistical analysis revealed no significant changes in these physiological parameters over the 12-week intervention period.

Interpretation of Findings

The paired sample t-tests showed that while there were modest reductions in diastolic blood pressure among boys and slight increases in systolic blood pressure in both boys and girls, these changes were not statistically significant. This suggests that the intervention, as implemented, did not produce a measurable impact on blood pressure in this particular cohort over the study period.

Comparison with Previous Research

These findings somewhat contrast with earlier research on Laughter Yoga and blood pressure, such as studies by Kataria (2010), Dolgoff-Kaspar et al. (2012), and Beckman et al. (2007), which reported significant reductions in blood pressure after laughter interventions. However, much of the prior evidence was drawn from adult populations or children without special disabilities, which might explain the discrepancy. The unique challenges faced by special children living in institutional settings—including chronic stress, physiological differences related to disabilities, and environmental factors—may have influenced the outcomes.

Furthermore, the minor reductions observed in boys' DBP and the stable blood pressure levels in girls align with Greene et al. (2016), who reported modest but not always statistically significant improvements in cardiovascular markers among special needs children. It is also possible that a longer intervention duration, greater intensity, or additional supportive therapies may be necessary to achieve statistically significant physiological changes in this population.

Possible Explanations and Implications

The absence of significant blood pressure reduction could be attributed to several factors. Firstly, the physiological mechanisms underlying hypertension in children with disabilities may be complex and multifactorial, including genetic, neurological, and psychosocial components that Laughter Yoga alone might not fully address. Secondly, the sample size (n=30) was relatively small, which limits the statistical power to detect subtle changes. Additionally, adherence and engagement levels, individual variability in response to the intervention, and possible measurement variability may have influenced results.

Nonetheless, the positive trends observed, particularly the slight reductions in DBP among boys, hint at potential cardiovascular benefits of Laughter Yoga, warranting further investigation. Beyond blood pressure, Laughter Yoga likely offers additional psychological and emotional benefits such as stress reduction, mood enhancement, and social interaction, which are critically important for the well-being of special orphan children but were not quantitatively assessed in this study.

Strengths and Limitations

The study's strengths include its focus on an underserved and vulnerable population, use of a standardized intervention protocol, and rigorous statistical analysis with appropriate tests for normality and paired comparisons. The inclusion of children with varied disabilities and equal gender representation adds to the study's inclusivity.

However, the limitations are notable. The absence of a control group restricts causal inferences. The single-group pre-post design could not fully account for confounding variables or natural variations in blood pressure over time. The 12-week duration, though adequate for many interventions, might be insufficient for significant physiological changes in this population. Also, the study relied solely on blood pressure measurements, without incorporating additional physiological or psychological outcome measures that might capture broader health impacts.

Recommendations for Future Research

Future studies should consider randomized controlled trial designs with larger sample sizes and longer intervention periods to validate these findings. Incorporating additional measures such as heart rate variability, cortisol levels, psychological assessments, and quality of life indicators would provide a more holistic understanding of the benefits of Laughter Yoga. Tailoring interventions further to individual disability types and involving caregivers or institutional staff might enhance efficacy and sustainability. Exploring combined

interventions integrating physical activity, mindfulness, and laughter therapy could also optimize health outcomes.

CONCLUSION

The present study aimed to evaluate the effectiveness of Laughter Yoga as a non-pharmacological intervention for managing blood pressure among orphan special children in Delhi. Although the intervention did not produce statistically significant reductions in either systolic or diastolic blood pressure over the 12-week period, the findings provide valuable insights into the potential role of Laughter Yoga in this unique population. Importantly, the study highlights that Laughter Yoga is a safe, enjoyable, and feasible practice for children with special needs living in institutional settings. The slight trends toward reduction in diastolic blood pressure among boys, coupled with stable blood pressure readings in girls, suggest that Laughter Yoga may contribute to cardiovascular stability or act as a supportive adjunct to other therapies.

Beyond physiological parameters, Laughter Yoga has well-documented psychological and social benefits, including stress relief, mood enhancement, and improved social interaction, which are critical for the holistic health of orphan special children who often face emotional and social challenges in addition to their physical disabilities. These benefits, while not directly measured in this study, could translate into improved overall quality of life and well-being.

The lack of significant blood pressure reduction should not overshadow the broader implications of incorporating Laughter Yoga into institutional care routines. It represents a cost-effective, non-invasive, and enjoyable approach that can complement conventional medical treatments and foster a more positive and supportive environment for children with special needs.

Future research with larger sample sizes, control groups, longer duration, and multidimensional health outcomes is essential to fully elucidate the potential cardiovascular and psychosocial benefits of Laughter Yoga in this demographic. Moreover, customization of the intervention to address specific disabilities and integrating caregiver participation may enhance engagement and therapeutic efficacy.

In summary, while Laughter Yoga alone may not substantially lower blood pressure in the short term among orphan special children, it remains a promising complementary therapy with the potential to improve overall health and emotional resilience. The study reinforces the importance of exploring holistic, child-friendly interventions that prioritize quality of life, emotional well-being, and accessible health promotion for vulnerable children in institutional care.

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