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Comparative Effect of Yogic Exercise and Physical Exercise on BMI of Elementary School Girls

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Abstract

The study aims to examine the relative effectiveness of yogic exercise and physical exercise in optimising the BMI of elementary school girls of Kerala. The pre-test and post-test parallel group design was employed to test three hypotheses. Three intact divisions of seventh grade students (n = 90) were selected conveniently from a girls' higher secondary school located in Thrissur district of the Indian state of Kerala. One of the class divisions were randomly designated as waitlist control group, and the others as treatment groups. One of the treatment groups was taken as yogic exercise group (Y-group) and the other as physical exercise group (P-group). The groups were pre-tested for BMI, followed by 12 classes of pedagogic intervention at the dose of weekly three classes each of 40 minutes duration. Post-test scores of BMI were collected at the end of experimentation, followed by data analysis. The results demonstrated that both yogic exercise and physical exercise are effective in optimising the body mass index of elementary school girls. Significant difference was noticed in the efficacy of yogic exercise and physical exercise in moderating BMI among elementary school girls, the yogic exercise was more effective than the physical exercise.

Keywords: Body mass index, Yogic exercise, physical exercise, Elementary school girls.

Introduction

Childhood obesity and related health issues have become a growing concern in recent years, especially among school-aged children (Dong et al., 2024; Jebeile et al., 2022). Body Mass Index (BMI), a widely used indicator of body fatness, has been instrumental in assessing the physical health of children and adolescents. An unhealthy BMI at an early age can lead to long-term health complications, including cardiovascular diseases, diabetes, and decreased physical fitness (Wills et al., 2022; Powell-Wiley et al., 2021). In this context, the role of regular physical activity in maintaining a healthy BMI has gained increased attention in both educational and healthcare settings.

Physical exercise and yogic exercise are two distinct forms of activity that have shown potential benefits in improving physical health and managing body weight (Govindaraj et al., 2016). While physical exercise typically involves aerobic and anaerobic activities aimed at improving strength, endurance, and flexibility, yogic exercise integrates physical postures (asanas), breathing techniques (pranayama), and mindfulness practices that promote overall well-being (Chen, 2024; Patel et al., 2017). Both approaches offer unique physiological and

psychological benefits (Tiwari, 2024; Wang & Ashokan, 2021), yet their comparative effectiveness on specific health indicators like BMI among young children remains underexplored. Elementary school girls, during their formative years, experience rapid physical and emotional development, making it essential to adopt interventions that promote healthy growth (Kliziene et al., 2021). Considering the rising sedentary behavior and lifestyle changes in children, it is crucial to identify effective, age-appropriate, and engaging physical activity interventions. This study aims to compare the effects of yogic exercise and traditional physical exercise on the BMI of elementary school girls, with the objective of determining which intervention is more effective in managing and improving body composition at this critical stage of development.

Objectives

The study has the following objectives in view:

1. To find out the effectiveness of yogic exercise in optimising BMI of elementary school girls.
2. To find out the effectiveness of physical exercise in optimising BMI of elementary school girls.
3. To compare the effectiveness of yogic exercise and physical exercise in optimising BMI of elementary school girls.

Hypotheses

The following null hypotheses were tested for the study:

1. Yogic exercise will be effective in optimizing BMI of elementary school girls.
2. Physical exercise will be effective in optimizing BMI of elementary school girls.
3. There will be no significant difference between yogic exercise and physical exercise regarding their effectiveness in optimizing BMI of elementary school girls.

Methodology

1) *Method:* Non-randomized parallel group design with a waitlist control was adopted for the study.

2) *Population:* The population of the present study is girls studying in elementary classes (Std. V to Std. VII) of schools affiliated with Kerala Board of Public Examinations and are located within the revenue boundary of Thrissur district of the Indian state of Kerala.

3) *Participants:* The study was conducted on a purposive sample of 90 seventh grade girls drawn from three divisions of a higher secondary school for girls, located at Thrissur district of Kerala. The three intact divisions were designated as one Control Group (C-group) and two experimental groups, viz., Yogic Exercise Group (Y-group) and the Physical Exercise Group (P-Group) of 30 students each.

4) *Tools:* Measurement Tape, Weighing Machine, Lesson Transcripts based on Yogic Exercise (Sreejith & Arjunan, 2024), and Lesson Transcripts based on Physical Exercise (Sreejith & Arjunan, 2024) were the tools used for measurement as well as pedagogic intervention.

5) *Procedure of Pedagogic Intervention:* The investigator contacted the head of the experimental school for permission for the administration of the test. The aim and scope of the study and the kind of information to be collected from the students were explained. The investigator fixed the time schedule

for the administration of the test. After the self-introduction, the investigator collected the pre-test BMI from C-group. The investigator explained briefly about yogic exercise to Y-group and physical exercise to P-group and collected the pretest BMI of both the groups. On month long pedagogic intervention of 12 classes were then given to the experimental groups at the dose of weekly three classes of 40 minutes duration by following the lesson transcripts. The post-intervention measurement was conducted on the 30th day in all the three classes.

6) *Statistical Techniques Employed:* Paired sample t-test and independent sample t-test were used to test the hypotheses apart from descriptive statistical techniques.

Analysis and Interpretation

The descriptive as well as the inferential statistical analyses performed to test the hypotheses are given in this section under appropriate subheadings:

1) Descriptive Analysis of Pre-Rest and Post-Test Scores of BMI

The major descriptive statistical indices such as Range (R), Mean (M), Median (Mdn), Standard Deviation (SD), Skewness (Sk), and Kurtosis (Ku), estimated from the pre-test and post-test scores of BMI in the C-group, Y-group and the P-group, and the indices are given in Table 1.

Table 1: Statistical indices pertaining to pre-test and post-test scores of BMI of control group and the treatment groups

Groups	Testing	N	R	M	Mdn	SD	Sk	Ku
C-group	Pre-test	30	17.29	17.84	17.11	4.33	0.93	0.31
	Post-test	30	17.29	17.94	17.11	4.38	0.90	0.27
Y-group	Pre-test	30	16.13	16.91	15.22	4.31	0.78	-0.11
	Post-test	30	13.69	16.32	14.95	3.78	0.80	-0.01
P-group	Pre-test	30	15.83	17.56	16.21	5.43	0.28	-1.46
	Post-test	30	16.01	17.27	15.88	5.29	0.24	-1.45

The data presented in Table 1 show that the distributions of pre-test and post-test scores of BMI in the control group and experimental groups are normal because the obtained values of skewness for the groups lie within the range from -1 to +1.

2) Comparison of the Groups Regarding the Pre-test BMI Scores

The control group (C-group) and experimental groups (Y-group and P-group) were compared with respect to the pre-test scores of BMI to check whether the groups differ significantly before experimentation. Table 2 presents the data and result of the independent sample t-test performed incidentally.

Table 2: Data and Results of the Comparison of Pre-test BMI Scores of Control Group and Experimental Groups

Groups	Statistical indices			t-value	Sig.
	N	M	SD		
C-group	30	17.84	4.33	0.83	NS
Y-group	30	16.91	4.31		
C-group	30	17.84	4.33	0.22	NS
P-group	30	17.56	5.428		

The results of the analyses, given in Table 2, show that the t-value obtained on comparing the pre-test BMI scores of the Control Group and Experimental Group-I (Yogic Exercise) is not significant ($t = 0.83$; $p>.05$). Similarly, the t-value estimated on comparing the pre-test BMI scores of the Control Group and Experimental Group-II (Physical Exercise) is also not significant ($t = 0.22$; $p>0.05$). It shows that the groups selected for the experimentation are alike with respect to their BMI before the pedagogic intervention.

3) Comparison of the pre-test and post-test BMI scores of the groups

The pre-rest and post-test scores of the control group and experimental groups were compared to find out whether there is any significant difference in the BMI scores during the period of experimentation. The data and result of the paired sample t-test performed in this context is given in Table 3.

Table 3: Comparison of the pre-rest and post-test scores of BMI for the groups

Groups	N	Pre-test		Post-test		t-value	Sig
		M	SD	M	SD		
C-group	30	17.84	4.33	17.94	4.38	0.09	NS
Y-group	30	16.91	4.31	16.32	3.70	5.04	.01
P-group	30	17.56	5.43	17.27	5.29	3.84	.01

The t-value estimated on comparing the pre-test and post-test of BMI for the control group is not significant ($t = 0.09$; $p>.05$). It shows that the waitlist control condition has not contributed to any significant change in BMI of the elementary school girls. The t-values estimated for the Y-group ($t = 5.04$; $p<.01$) and the P-group ($t = 3.84$; $p<.01$) are, however, significant. The t-values demonstrate that both the yogic exercise as well as the physical exercise has caused significant change in the BMI scores of the participants.

4) Comparison of the Yogic Exercise Group and Physical Exercise Group Regarding the Gain BMI Scores

The yogic exercise group and the physical exercise group were compared with respect to their gain scores of BMI. The gain score of BMI for each participant in the groups were estimated by subtracting the post-test score of BMI from the pre-test score of BMI for the individual. The Y-group and the P-group are then compared to find out the significant difference, if any, between the treatments. Table 4 presents the data and result of independent sample t-test performed in this regard.

Table 4: Comparison of the Y-group and P-group regarding the gain BMI scores

Groups	Statistical Indices			t-value	Sig.
	N	M	SD		
Y-group	30	0.59	0.64	2.10	.05
P-group	30	0.30	0.42		

The t-value estimated on comparing the yogic exercise group and physical exercise group with respect to the gain scores of their BMI is significant at 95% confidence interval ($t = 2.10$; $p<.05$). It shows that yogic exercise and physical exercise differ significantly in optimising the BMI among elementary school girls. Inspection of the mean scores indicates that yogic exercise is better than physical exercise in optimising the BMI of elementary school girls.

Conclusion

The analyses showed the normality of pre-test and post-test BMI scores in the control group as well as in the experimental groups. Neither the yogic exercise group nor the physical exercise group differed significantly from the control group regarding their BMI scores before the experimental treatment. No significant difference was noticed between the pre-rest and post-test scores of control group, revealing that the waitlist control condition does not cause any significant variation in BMI scores of elementary school girls. A significant difference was noticed between the pre-rest and post-test scores of BMI of the yogic exercise group, revealing that yogic exercise is effective in optimising the BMI of elementary school girls. The hypothesis formulated intelligence his context, viz., Hypothesis-1 *(yogic exercise will be effective in optimizing BMI of elementary school girls)* is, therefore, accepted. Comparison of the pre-rest and post-test scores of physical exercise group also demonstrated a significant difference in the BMI scores disclosing that physical exercise is also effective in moderating the BMI of elementary school girls. The Hypothesis-2 *(physical exercise will be effective in optimizing BMI of elementary school girls)* is, subsequently, accepted. Comparison of yogic exercise group and physical exercise group regarding the gain score of BMI showed a significant difference between the treatment, favouring the yogic exercise group. The Hypothesis-3 (there will be no significant difference between yogic exercise and physical exercise regarding their effectiveness in optimizing BMI of elementary school girls) is, hence, rejected. To sum up, both yogic exercise and physical exercise are effective in optimising the BMI of elementary school girls. However, yogic exercise is more effective than physical exercise in regulating the BMI of elementary school girls of Kerala.

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