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Analyzing The Effects Of Indigenous Activity Intervention To Reduce The Cardiovascular Disease Risk Of The School Children

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Abstract:

Introduction:

The prevalence of childhood obesity and its impact on cardiovascular health have become global concerns. Elevated resting heart rate (RHR) in young individuals is a predictor of future cardiac risk; however, consistent physical activity can enhance cardiovascular fitness and autonomic nervous system function, leading to a decrease in RHR. The Indigenous Activity Intervention (IAI), which utilizes culturally relevant exercises, has demonstrated efficacy in promoting physical activity in indigenous populations. However, its effect on RHR in school-aged children remains largely unexplored. This research examines the impact of a 10-week IAI program on RHR in boys aged 12-14, addressing a critical gap in current knowledge. The results could inform public health strategies and school-based exercise initiatives aimed at mitigating cardiovascular disease risks in youth through culturally appropriate promotion of physical activity.

Methods:

The study employed a randomized controlled trial design, with the experimental group engaging in structured IAI and the control group receiving no intervention. The IAI comprised six indigenous activities conducted four times per week for sessions lasting 50-60 minutes. The study targeted male sedentary students (n=120) aged between 12 and 14 years.

Results:

The findings revealed a statistically significant correlation between the IA training program and RHR, as demonstrated by the substantial F-value [F (1,117) = 214.597, p < .05]. The eta squared value of 0.647 indicated that approximately 64.7% of the variation in RHR could be attributed to IAI.

Conclusion:

This study expands our understanding of the impact of structured IAI on cardiovascular health in school-aged children. The outcomes suggest that these programs can effectively reduce RHR through physiological adaptations, underscoring their potential significance in promoting cardiovascular fitness in young individuals.

Introduction

Cardiovascular health issues and childhood obesity are worldwide concerns. Elevated resting heart rate (RHR) in children is associated with future cardiovascular risks. RHR serves as a crucial indicator of cardiovascular health and fitness, particularly in young individuals. Lower RHR values generally indicate better cardiac function and overall fitness levels, making it an essential metric in pediatric health assessments (Pierpont et al., 2000; Levine et al., 1990). Regular physical activity has been shown to positively influence RHR by improving autonomic nervous system function and cardiac efficiency, thereby reducing heart strain at rest (Warburton et al., 2006; Rognmo et al., 2004). While extensive research has been conducted on various forms of physical training, the potential benefits of Indigenous Activity (IA) interventions – traditional games and activities – on children's cardiovascular health remain understudied.

This study aims to analyze the resting heart rates of schoolchildren aged 12 to 14 in relation to a 10-week Indigenous Activity intervention. The intervention utilizes culturally relevant and physically demanding activities to encourage participants to adhere to a regular exercise regimen and improve their cardiovascular health.

Methodology

Procedure:

A physical fitness assessment was conducted in the Cooch Behar region of West Bengal, India, involving 212 students from two prominent boys' schools. The study focused on pupils aged 12 to under 14. The Ministry of Youth Affairs and Sports established an Expert Committee to define fitness benchmarks, enabling students to complete the program. Based on these benchmarks, 120 students scoring in level 3 and level 4 categories were included in the analysis, suggesting their potential to complete the IA training program. Following the Pre-Post Random Group Design, participants were equally divided into an Experimental Group (N = 60) and a Control Group (N = 60). The investigation consisted of pre-testing and post-testing phases. To gather Pre-Test data for RHR, children were asked to rest in a chair for 5 minutes in

a designated school classroom. RHR measurements were taken from the right Radial Artery (Beats per Minute), with two readings obtained at one-minute intervals and their average used for analysis. Between pre- and post-tests, only the experimental group followed the Training Protocol of Indigenous Activities, which included six popular native activities. The researcher developed this protocol based on a detailed pilot study with subjects of similar age and guidance from renowned Physical Education Experts (Roy et al., 2024).

Ten Weeks Indigenous Activity Training Protocol

Total no. of Indigenous activities= **Six.**

Name of the activities : **Kit-kit, Golla-Chhut, Chhi-Buri, Pakki, Edur-Biral, Rumal Churi**.

	Days	Activity	Division
1st and 2nd Week	1st day	Kit-kit, Golla-Chhut.	5 min. warm up, 40 min. indigenous activity, 5 min cooling down.
	2nd day	Chhi-Buri, Pakki.	5 min. warm up, 40 min. indigenous activity, 5 min cooling down.
	3rd Day	Kit-kit, Chhi-Buri,	5 min. warm up, 40 min. indigenous activity, 5 min cooling down.
	4th Day	Golla-Chhut, Pakki.	5 min. warm up, 40 min. indigenous activity, 5 min cooling down.
3rd and 4th Week	1st day	Kit-kit, Golla-Chhut	5 min. warm up, 50 min. indigenous activity, 5 min cooling down.
	2nd day	Chhi-Buri, Pakki.	5 min. warm up, 50 min. indigenous activity, 5 min cooling down
	3rd day	Kit-kit, Chhi-Buri,	5 min. warm up, 50 min. indigenous activity, 5 min cooling down
	4th day	Golla-Chhut, Pakki.	5 min. warm up, 50 min. indigenous activity, 5 min cooling down
5th and 6th week	1st day	Kit-kit, Golla-Chhut, Pakki.	5 min. warm up, 50 min. indigenous activity, 5 min cooling down
	2nd day	Chhi-Buri, Pakki, Kit- kit.	5 min. warm up, 50 min. indigenous activity, 5 min cooling down

	3rd day	Kit-kit, Golla-chhut Pakki,	5 min. warm up, 50 min. indigenous activity, 5 min cooling down
	4th day	Golla-Chhut, Pakki, Chhi-Buri.	5 min. warm up, 50 min. indigenous activity, 5 min cooling down
7th & 8th week	1st day	Kit-kit, Golla-Chhut, Pakki, Rumal Churi.	5 min. warm up, 50 min. indigenous activity, 5 min cooling down
	2nd day	Chhi-Buri, Pakki, Rumal Churi, Golla-Chhut.	5 min. warm up, 50 min. indigenous activity, 5 min cooling down.
	3rd day	Kit-kit, Golla-chhut Pakki, Rumal Churi.	5 min. warm up, 50 min. indigenous activity, 5 min cooling down.
	4th day	Golla-Chhut, Pakki, Chhi-Buri, Kit-Kit.	5 min. warm up, 50 min. indigenous activity, 5 min cooling down.
9th & 10th Week	1st day	Kit-kit, Golla-Chhut, Pakki, Edur-Biral, Rumal Churi.	5 min. warm up, 50 min. indigenous activity, 5 min cooling down
	2nd day	Chhi-Buri, Pakki, Kit- kit, Edur-Biral, Rumal Churi.	5 min. warm up, 50 min. indigenous activity, 5 min cooling down.
	3rd day	Golla-chhut Pakki, Chhi-Buri, Edur-Biral, Rumal Churi.	5 min. warm up, 50 min. indigenous activity, 5 min cooling down.
	4th day	Golla-Chhut, Kit-Kit, Chhi-Buri, Edur-Biral, Rumal Churi.	5 min. warm up, 50 min. indigenous activity, 5 min cooling down.

Analysis of Data:

After the completion of ten weeks of training program anxiety level of both the groups was again measured and the collected data were analysed by using the IBM SPSS version 20. A one way analysis of covariance (ANCOVA) was conducted to compare the effects of IA on Post-test result of the Experimental (Mean= 61.83, SD=±3.34) and control Groups (Mean= 67.8, SD= ± 3.45) While controlling the Pre-test data as covariate. Shapiro-Wilk test and Levene's test was conducted to meet the assumptions.

Result:

There was a significant difference between Control and Experimental group [F (1,117)= 214.597, p=<.05] (Table 1). A Post hoc test showed there was a significant difference in between Resting Heart Rate of both groups. The partial Eta Squared value indicates the effect size and were compared with the Cohen's guideline (0.2 = Small effect, 0.5 = Moderate effect, 0.8= Large effect). According to that for both groups the effect size is moderate and near to large (0. 647). The Partial Eta Squared value showed the 64.7% of variance in Resting Heart Rate of both groups when controlling the Pre-test Resting Heart Rate.

	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	1091.434	1	1091.434	214.597	.000	.647
Error	595.057	117	5.086			

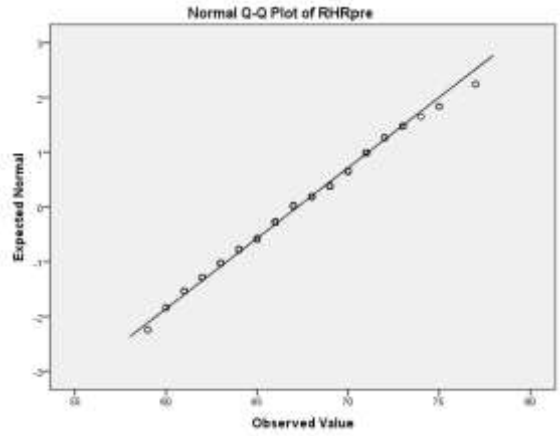
Table 2 shows the results of the Levene's Test is insignificant (p= >0.05), indicating that the group variances are equal. Hence, the assumption of homogeneity of variances was not violated.

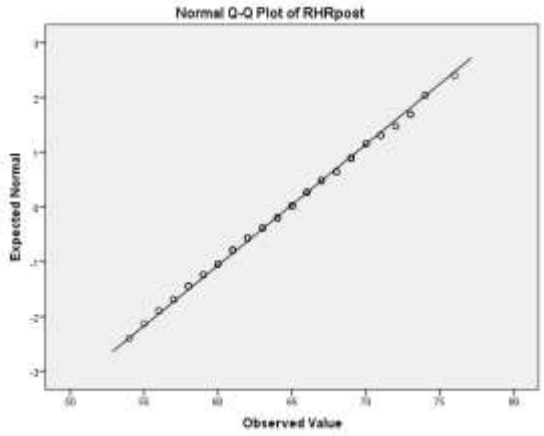
F	df1	df2	Sig.
3.267	1	118	.073

The normality of the data was tested by the Shapiro-wilk formal test. Table 3 shows the insignificant (p= >0.05), indicating the data were normally distributed. Also both Q-Q plot shows the same result.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
RHRpost	.058	120	.200*	.992	120	.674
RHRpre	.098	120	.007	.985	120	.220





Discussion:

This study examined the effects of a 10-week exercise program on the resting heart rates of adolescents aged 12 to 14. The findings demonstrated a statistically significant link between the Indigenous Activity (IA) training program and participants' Resting Heart Rate, as shown by the F-value [F (1,117)= 214.597, p= <.05]. The eta squared value of 0.647 suggests that the IA program was responsible for approximately 64.7% of the variation in Resting Heart Rate.

Studies have shown that exercise training can lead to various cardiovascular improvements. Warburton et al. (2006) found that it enhances stroke volume, enabling the heart to pump more blood with each beat, gradually lowering resting heart rate (RHR). Pierpont et al. (2000) observed that consistent exercise reduces RHR by enhancing parasympathetic tone and decreasing sympathetic activity. Rognmo et al. (2004) noted that exercise triggers the release of hormones like adrenaline, initially elevating heart rate but ultimately enhancing metabolic efficiency and lowering baseline hormone levels and RHR. Levine et al. (1990) pointed out that improved cardiac efficiency reduces the need for frequent heartbeats to circulate blood, resulting in a lower RHR. A combination of high-intensity interval training (HIIT) and moderate-intensity continuous exercise has been shown to enhance autonomic nervous system function in football players, balancing parasympathetic and sympathetic activity, which leads to a lower resting heart rate (RHR) (Plews, D. J. et al, 2013). Football exercise enhances overall fitness and body composition by improving cardiovascular performance, decreasing body fat, increasing lean muscle mass, and reducing resting heart rate (Wisloff et al., 2007). However, Bahrainy et al. suggest that the decrease in RHR following regular exercise may not be solely attributed to increased parasympathetic tone or a reduction in the beta-adrenergic response and potential increase in parasympathetic output (Bahrainy, S., et al,2016). In this research, a gradual decline in RHR levels was observed among the children participating in the training program.

Conclusion

This study offers strong evidence that children aged 12 to 14 can significantly reduce their resting heart rate (RHR) through a 10-week Indigenous Activity (IA) intervention plan. The findings indicate that culturally appropriate physical activities, when performed regularly, can improve children's cardiovascular efficiency and overall fitness. The substantial decrease in RHR observed in the experimental group compared to the control group underscores the potential of Indigenous Activities as an effective tool for enhancing children's health.

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