

When tradition trains: Physical Fitness adaptations to Oppana, Karate, and Combined Training in Young Muslim Women

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Abstract

Physical inactivity among young women remains a significant public health concern, particularly in communities where sociocultural factors may limit participation in conventional forms of exercise. Culturally meaningful physical activity programs may provide an effective and sustainable approach to improving health while respecting community traditions. The present study investigated the effects of structured Oppana training, karate training, and their combination on selected components of physical fitness among young Muslim women in Kerala, India. A randomized pre-test–post-test experimental design was employed with 200 healthy Muslim women aged 18–21 years, who were randomly assigned to an Oppana Training Group (OTG), Karate Training Group (KTG), Combined Oppana and Karate Training Group (KOTG), or a Control Group (CG), with 50 participants in each group. The intervention was conducted over 12 weeks, with three sessions per week, each lasting 60 minutes. Physical fitness was assessed using standardized tests measuring muscular strength, muscular endurance, speed, cardiorespiratory endurance, and balance. Data were analysed using Multivariate Analysis of Covariance (MANCOVA), followed by Analysis of Covariance (ANCOVA) and Bonferroni post hoc comparisons at the 0.05 level of significance. The results revealed a significant multivariate effect of the interventions on overall physical fitness (Pillai's Trace = 1.670, $p < .001$). Significant improvements were observed in all five physical fitness variables among the intervention groups compared with the control group ($p < .001$). The combined Oppana and karate training group consistently demonstrated the greatest improvements across all measured outcomes, while karate training produced greater gains than Oppana training in muscular strength and speed. The findings suggest that integrating traditional cultural movement with evidence-based martial arts training provides a comprehensive and culturally acceptable strategy for enhancing physical fitness among young Muslim women and supports the inclusion of culturally responsive exercise programs in health promotion initiatives.

Keywords: Oppana; Karate; Combined Training; Physical Fitness; Young Muslim Women; Cultural Dance; Exercise Intervention.

INTRODUCTION

Regular physical activity is fundamental to the prevention of chronic disease and the maintenance of physical health. Nevertheless, insufficient participation remains a major public health concern, particularly among young women, despite international recommendations advocating regular moderate- to vigorous-

intensity physical activity (World Health Organization, 2020; Bull et al., 2020). Low participation rates are influenced not only by individual motivation but also by social, cultural, and environmental factors that determine whether an exercise program is acceptable, accessible, and sustainable within a given community.

Conventional exercise programs have demonstrated substantial health benefits, yet they may not always be suitable or attractive for women from culturally diverse backgrounds. In many communities, participation is influenced by social expectations, cultural identity, family support, and the availability of appropriate opportunities for physical activity. These considerations have increased interest in culturally responsive exercise interventions that combine scientific training principles with activities already embedded within local traditions. Such approaches have the potential to improve participation while maintaining cultural relevance (Bantham, 2021; Joseph, 2021).

Dance-based exercise has received considerable attention as an effective strategy for improving physical fitness. Systematic reviews have reported beneficial effects on muscular fitness, balance, functional capacity, and cardiorespiratory endurance across different age groups and populations (Tao, 2022; Lu, 2024; Fong Yan, 2024). Similarly, karate has been widely studied as an evidence-based exercise modality that can enhance strength, speed, balance, muscular endurance, and cardiovascular fitness through structured, progressive training (Douris, 2021; Origua Rios, 2022; Cynarski, 2024). Collectively, these findings indicate that both dance and martial arts represent effective approaches for improving physical performance.

Traditional regional movement practices remain largely unexplored within exercise science. Oppana, a traditional performing art of the Muslim community in Kerala, represents one such example. Although widely practiced as a cultural tradition, its potential as a structured physical activity has not been scientifically evaluated. Existing research has focused primarily on conventional dance programs or established exercise modalities, leaving little evidence regarding whether indigenous movement traditions can produce comparable physiological benefits. Moreover, no randomized experimental study has examined whether combining a traditional cultural movement program with an evidence-based martial art produces greater improvements than either intervention alone.

Addressing this gap is important because culturally acceptable exercise programs may offer practical strategies to increase physical activity among populations in which participation in conventional exercise is limited. Evaluating traditional movement practices within an experimental framework may therefore contribute not only to exercise science but also to the development of culturally appropriate public health interventions.

Accordingly, this randomized controlled study compared the effects of Oppana training, karate training, and a combined Oppana-karate program on selected components of physical fitness among young Muslim women. It was hypothesized that all intervention groups would demonstrate greater improvements than the control group, with the combined intervention producing the most favorable outcomes.

METHODOLOGY

Study Design

A randomized controlled pre-test–post-test experimental design was employed to examine the effects of Oppana training, karate training, and their combination on selected components of physical fitness among young Muslim women. Participants were allocated to four parallel groups: Oppana Training Group (OTG), Karate Training Group (KTG), Combined Oppana and Karate Training Group (KOTG), and Control

Group (CG). The intervention lasted 12 weeks, with physical fitness assessed before and after the training period.

Participants

Two hundred apparently healthy Muslim women aged 18–21 years were recruited from CHMKM Government Arts and Science College, Tanur, Kerala, India. Following baseline assessment, participants were randomly assigned to one of four groups ($n = 50$ each): OTG, KTG, KOTG, or CG. Ethical approval was obtained from the Institutional Ethics Committee of Tamil Nadu Physical Education and Sports University, Chennai, and written informed consent was obtained from all participants before enrolment.

Intervention

The intervention was conducted for 12 weeks, with three supervised sessions per week. Each session lasted 60 minutes and included a 10-minute warm-up, 40 minutes of activity-specific training, and a 10-minute cool-down. The OTG completed a structured Oppana training programme, the KTG participated in progressive karate training, and the KOTG performed both interventions within the same session while maintaining the total training duration. Participants in the control group continued their usual daily activities without participating in any structured exercise programme. All intervention sessions were supervised by qualified instructors to ensure consistency and adherence.

Outcome Measures

Physical fitness was assessed before and after the intervention using standardized field tests. Muscular strength was evaluated using the Standing Broad Jump Test, muscular endurance using the Bent Knee Sit-Up Test, speed using the 40-Yard Run Test, cardiorespiratory endurance using the Six-Minute Run/Walk Test, and balance using the Stork Stand Test. All assessments were administered according to standardized testing procedures.

Statistical Analysis

Data were analysed using IBM SPSS Statistics (Version 26.0). Descriptive statistics (mean $\pm$ standard deviation) were calculated for all variables. Normality, homogeneity of variance, and equality of covariance matrices were examined before conducting MANCOVA. Group differences across the combined physical fitness outcomes were examined using multivariate analysis of covariance (MANCOVA), with corresponding baseline values entered as covariates. Significant multivariate effects were followed by separate analyses of covariance (ANCOVA) for each outcome variable, and Bonferroni-adjusted pairwise comparisons were performed where appropriate. Statistical significance was set at $p < 0.05$, and partial eta squared (η^2_p) was reported as the measure of effect size.

ANALYSIS OF RESULTS

Table 1. Descriptive Statistics of Physical Fitness Variables Before and After the Intervention

Physical Fitness Variable	Group	Pre-test (Mean $\pm$ SD)	Post-test (Mean $\pm$ SD)
Muscular Strength Standing Broad Jump m	OTG	1.347 $\pm$ 0.011	1.521 $\pm$ 0.041
	KTG	1.347 $\pm$ 0.008	1.586 $\pm$ 0.028
	KOTG	1.351 $\pm$ 0.006	1.699 $\pm$ 0.041
	CG	1.348 $\pm$ 0.011	1.337 $\pm$ 0.032
Muscular Endurance Bent Knee Sit-Up repetitions	OTG	11.92 $\pm$ 0.44	12.78 $\pm$ 0.86
	KTG	12.00 $\pm$ 0.99	12.70 $\pm$ 1.11
	KOTG	12.02 $\pm$ 0.59	15.30 $\pm$ 2.02

	CG	11.98 ± 0.38	11.86 ± 1.31
Speed 40-Yard Run s	OTG	8.752 ± 0.373	8.572 ± 0.328
	KTG	8.776 ± 0.367	8.438 ± 0.255
	KOTG	8.758 ± 0.367	8.156 ± 0.305
	CG	8.778 ± 0.371	8.812 ± 0.335
Cardiorespiratory Endurance Six-Minute Run/Walk m	OTG	968.28 ± 50.97	1034.24 ± 46.89
	KTG	979.82 ± 38.38	1043.84 ± 36.63
	KOTG	986.04 ± 52.37	1150.60 ± 51.85
	CG	965.82 ± 56.19	966.18 ± 57.46
Balance (Stork Stand, s)	OTG	23.04 ± 3.22	28.50 ± 3.73
	KTG	21.16 ± 6.80	25.94 ± 8.24
	KOTG	22.48 ± 3.82	32.50 ± 3.82
	CG	22.46 ± 3.93	23.26 ± 1.76

Table 1 shows that the baseline values were similar across all four groups, indicating successful randomization. Following the intervention, all experimental groups demonstrated improvements in physical fitness compared with the control group, with the Combined Oppana and Karate Training Group consistently exhibiting the greatest gains across all measured variables.

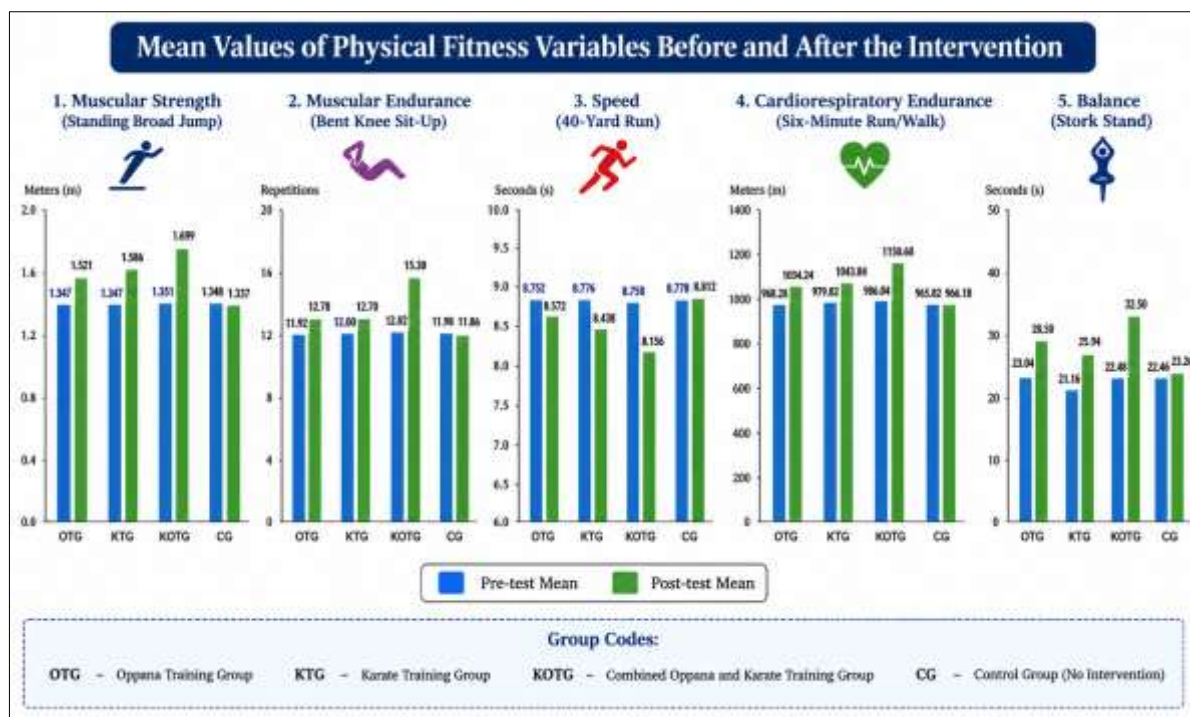


Figure 1. Physical Fitness Variables Before and After the Intervention

Table 2. MANCOVA Results for Overall Physical Fitness

Multivariate Test	Value	F	Hypothesis df	Error df	p	Partial η^2
Pillai's Trace	1.670	47.473	15	567	<0.001	0.557

Table 2 indicates that the four groups differed significantly in their overall post-intervention physical fitness after controlling for pre-intervention scores. The significant multivariate effect indicates that the intervention groups differed in their overall post-intervention physical fitness profile after adjusting for baseline values, thereby justifying follow-up univariate ANCOVA.

Table 3. ANCOVA Results for Individual Physical Fitness Variables

Physical Fitness Variable	F	p	Partial η^2
Muscular Strength	874.925	<0.001	0.932
Muscular Endurance	64.168	<0.001	0.502
Speed	40.402	<0.001	0.388
Cardiorespiratory Endurance	20326.518	<0.001	0.997
Balance	207.477	<0.001	0.765

Table 3 shows the follow-up analyses of covariance revealed significant group effects for all five physical fitness outcomes after adjustment for the corresponding baseline scores (all $p < 0.001$). Effect sizes ranged from moderate to very large, with the strongest effects observed for cardiorespiratory endurance and muscular strength. These findings indicate that the intervention programs produced significant improvements across all assessed components of physical fitness.

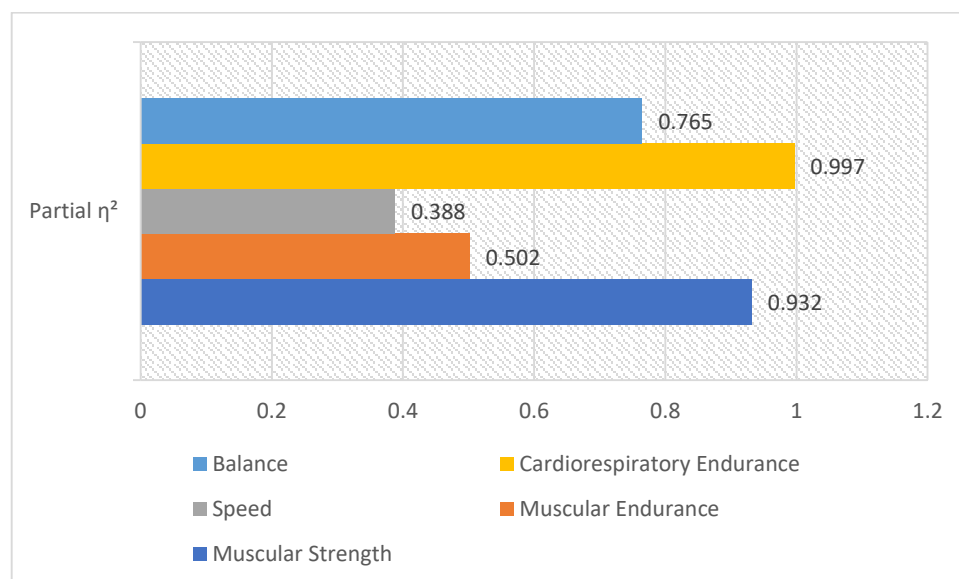


Figure 2 Analysis of Variance and Effect Sizes for Physical Fitness Components

Table 4. Marginal Means for Post-intervention Physical Fitness Variables

Group	Broad Jump	Sit-up	Speed	Cardio	Balance
OTG	1.520	12.83	8.580	1040.8	27.73
KTG	1.587	12.64	8.439	1039.2	27.08
KOTG	1.699	15.30	8.148	1139.7	32.34
CG	1.337	11.87	8.811	975.1	23.05

The Combined Oppana and Karate Training Group recorded the highest adjusted mean values for muscular strength, muscular endurance, cardiorespiratory endurance, and balance, together with the lowest adjusted sprint time. The Karate Training Group recorded higher adjusted mean values than the Oppana Training Group for muscular strength and speed, whereas the two groups showed similar adjusted mean values for muscular endurance, cardiorespiratory endurance, and balance. The Control Group consistently recorded the lowest adjusted performance across the assessed physical fitness variables.

Bonferroni-adjusted pairwise comparisons indicated that the Combined Oppana and Karate Training Group differed significantly from both the Oppana Training Group and the Karate Training Group for muscular strength, muscular endurance, cardiorespiratory endurance, and balance (all $p < 0.001$). Significant differences were also observed between each intervention group and the Control Group. No significant differences were identified between the Oppana Training Group and the Karate Training Group for muscular endurance ($p = 1.000$), speed ($p = 0.132$), cardiorespiratory endurance ($p = 0.128$), or balance ($p = 0.505$).

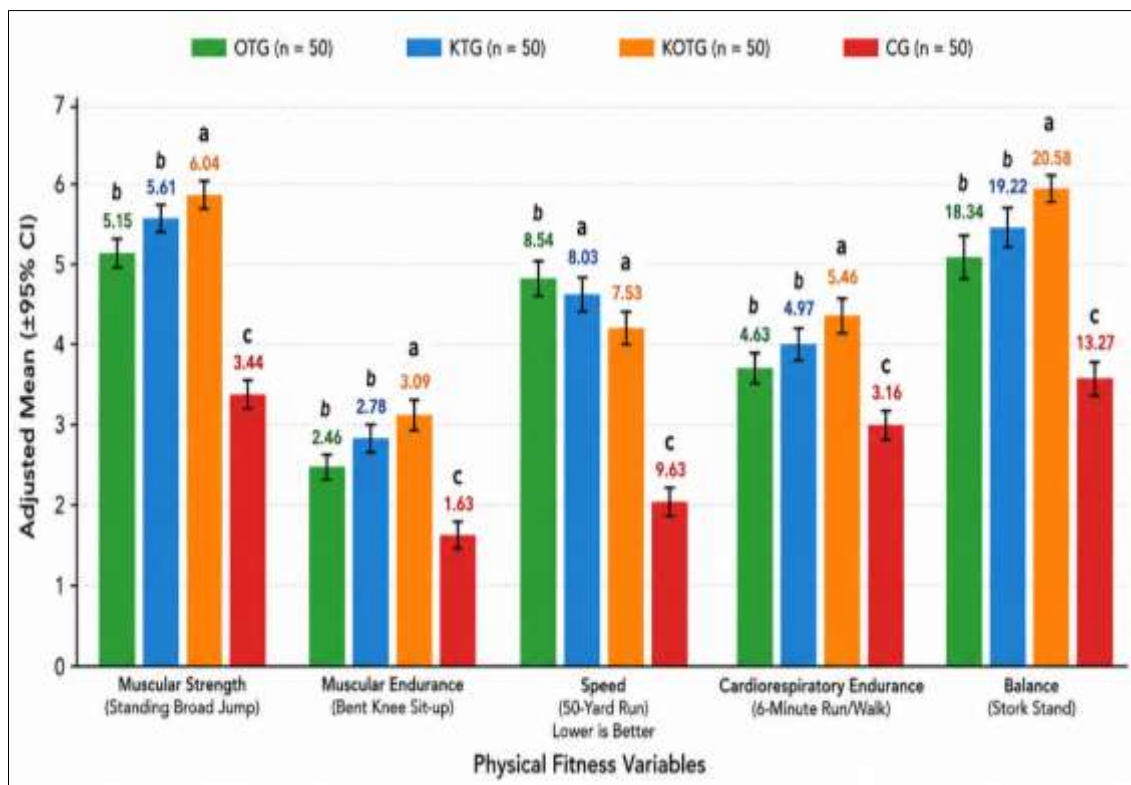


Figure 3. Adjusted Post-intervention Means (95% CI) for Physical Fitness Variables.

DISCUSSION ON FINDINGS

The intervention produced significant improvements in all measured components of physical fitness, indicating that structured physical activity, irrespective of modality, can effectively enhance health-related fitness in young Muslim women. However, the combined Oppana and karate program consistently produced the greatest improvements, suggesting that integrating two distinct forms of exercise provides a broader adaptive stimulus than participation in either activity alone. This finding supports the growing evidence that programs combining different movement demands may produce more comprehensive physiological adaptations than single-modality training.

The effectiveness of Oppana observed in this investigation demonstrates that traditional cultural practices can contribute meaningfully to physical fitness when organized within a structured training framework. Although previous research has established the benefits of dance-based interventions, scientific evidence concerning regional cultural dance forms remains limited. The improvements observed are consistent with reports that structured dance programs enhance functional fitness, balance, and exercise capacity while promoting regular participation (Amado, 2024; Mura, 2024; Santos-Rocha, 2023). Similar findings were reported by Singh (2022), who observed improved functional fitness following Indian folk-dance training. These findings broaden the existing evidence by demonstrating that Oppana also possesses measurable exercise value and may represent a practical physical activity option for populations where culturally acceptable forms of exercise are preferred.

Karate training also resulted in significant improvements across the assessed variables, confirming its effectiveness as a comprehensive exercise modality. Previous investigations have consistently reported favorable adaptations following karate training, particularly in muscular fitness, balance, speed, and cardiovascular endurance (Origua Rios, 2022). Improvements are generally attributed to repeated exposure to progressively demanding physical tasks that stimulate neuromuscular function and improve movement efficiency (Kostorz, 2023; Westcott, 2024; Kraemer, 2023). The present findings are therefore consistent with the established literature and further support the inclusion of karate within programs designed to improve overall physical fitness in young adults.

The superior performance of the combined intervention appears to reflect the complementary nature of the two training approaches rather than the influence of a single exercise modality. Exposure to varied movement demands is known to increase training specificity across multiple fitness components, allowing simultaneous development of muscular performance, balance, movement efficiency, and aerobic capacity. Similar conclusions have been reported in studies evaluating multimodal exercise programs, where combining different forms of physical activity resulted in greater functional improvement than isolated training methods (Bompa, 2019; Corbin, 2018). Recent evidence has likewise demonstrated that programs integrating diverse movement experiences produce broader improvements in physical competence and long-term functional performance (Conterato, 2026; Mkumbuzi, 2025; Basso, 2024). The present findings provide additional experimental support for this concept within a culturally relevant exercise setting.

Participation in conventional exercise programs is often influenced by social expectations, accessibility, and personal acceptability. Exercise strategies that incorporate culturally meaningful activities may improve engagement while maintaining scientific effectiveness. From a public health perspective, integrating traditional practices with established exercise methods offers an opportunity to increase participation without requiring substantial changes in cultural identity or community values. Similar recommendations have recently been proposed in culturally tailored physical activity research, which emphasizes that interventions aligned with local traditions are more likely to achieve sustained participation and long-term adherence (Ma'ea, 2025; O'Connor, 2025).

This investigation contributes to exercise science by providing one of the first randomized comparisons of a traditional regional dance, a martial art, and their combination using standardized physical fitness outcomes. Earlier studies have generally examined these activities independently, whereas the present findings demonstrate the added value of integrating culturally rooted movement with evidence-based exercise training. The results suggest that traditional movement systems should be considered alongside conventional exercise modalities when designing community-based fitness programs. Future research should examine whether similar benefits are observed across different populations, age groups, and

cultural settings, and explore the long-term maintenance of these adaptations and the mechanisms underlying the superior response to combined training.

CONCLUSION

Culture and exercise need not exist as separate domains of health promotion. The findings of this investigation indicate that traditional Oppana, when delivered as a structured training program, can meaningfully contribute to physical fitness, while combining it with karate yields broader adaptations than either intervention alone. These results provide evidence that culturally familiar movement practices can be integrated with established exercise modalities without compromising training effectiveness. Such an approach offers a promising direction for developing inclusive and culturally relevant physical activity programs, while encouraging future research exploring the role of traditional movement systems in exercise science and public health.

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