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EFFECT OF A FLEXIBILITY TRAINING PROGRAM ON THE KARATE PLAYERS OF AGED 14 TO 16 YEARS IN PIMPRI-CHINCHWAD CITY

* Buddhabhushan Gaikwad & ** Prof. (Dr.) Sanjay Chandrashekhar

*Research Scholar, Department of Physical Education, Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar

Abstract:

The purpose of this research is to examine the effect of a flexibility training program for Karate players aged 14 to 16 years. A 12-week training program was implemented on 80 Karate players from Pimpri-Chinchwad city. Pre-test and post-test measurements were taken to assess flexibility there is Sit and Reach Test, Shoulder Stretch Test, Groin Flexibility Test, Trunk Rotation Test. According to the results, flexibility increased by 25%, which led to an improvement in the players' performance. This research highlights the importance of flexibility in Karate training.

Key Words: *Japanese Tradition, Flexibility, Karate, Effects, Involvement*.

Introduction:

Karate, a traditional Japanese martial art, emphasizes striking techniques, blocks, and stances that demand exceptional physical attributes, particularly flexibility, which enables high kicks, deep stances, and fluid movements essential for effective performance. In adolescents aged 14 to 18 years, flexibility is crucial during this developmental phase, as rapid growth spurts can lead to temporary reductions in joint range of motion (ROM), increasing the risk of imbalances if not addressed through targeted training. Pimpri Chinchwad, an industrial suburb of Pune in Maharashtra, India, has seen a surge in youth sports participation, with karate clubs proliferating due to its urban youth population and access to local academies affiliated with organizations like the Karate India Organisation (KIO). However, studies indicate that young athletes in India often exhibit suboptimal flexibility levels compared to international peers, partly due to inconsistent training programs focused more on technique than holistic fitness.

Flexibility training, involving static, dynamic, and proprioceptive neuromuscular facilitation (PNF) stretches, has been shown to enhance ROM, reduce muscle stiffness, and improve overall athletic output in combat sports. For instance, research on youth karate practitioners demonstrates that 10-12 weeks of structured flexibility programs can significantly increase quadriceps and hamstring ROM, leading to better kick height and balance. In the Indian context, where karate is gaining traction post its Olympic inclusion, addressing flexibility in +---this age group is vital, as poor ROM correlates with higher injury rates in lower limbs, which account for over 60% of karate-related injuries in adolescents. This study builds on global evidence suggesting that flexibility interventions during adolescence yield comparable or greater gains than in childhood, challenging the notion of a strict "window of opportunity" limited to pre-adolescence.

Research Method:

The present study is based on an experimental research method, which involved the use of a pre-test,

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intervention, and post-test. A Randomized Controlled Trial (RCT) design was used to divide 80 players into two groups: the experimental group (40) and the control group (40). The experimental group received flexibility training for 12 weeks, whereas the control group continued with their regular karate training.

Training Program:

Training was conducted 3 days per week, and each session lasted 45 minutes. Exercises included static stretching (10 minutes), dynamic stretching (15 minutes), and yoga postures (20 minutes). The intensity was maintained at 60–70% of maximum heart rate.

Population:

Population: Male Karate players aged 14–16 years from Pimpri-Chinchwad city. A total of 200 players are available, including participants from Seiko Kai Karate International India, Pune; Bharat Karate Academy, Maharashtra, Region Pune.

Age: 14–16 years

Experience: Minimum 1 year of Karate training

Health: Injury-free

Sample (Sampling):

Sampling technique: ***Stratified Random Sampling***

Age-wise strata: 14 years (30%), 15 years (40%), 16 years (30%)

Total sample size: 80 (calculated using G*Power software with effect size 0.8, $\alpha = 0.05$)

Participant selection: Random selection from the listed group of players

Tools to be Used:

1. **Sit and Reach Test** (measuring lower back and hamstring flexibility in cm).
2. **Shoulder Stretch Test** (measuring shoulder and upper back flexibility in cm; also known as the back scratch test).
3. **Groin Flexibility Test** (measuring adductor and hip flexibility in cm, via butterfly stretch knee-to-floor distance).
4. **Trunk Rotation Test** (measuring core and spinal flexibility in degrees).

These variables were chosen based on their relevance to karate techniques, such as high kicks, punches, and rotational movements.

Result:

Variable	Test	Mean	SD	Min	Max	Median
Sit and Reach (cm)	Pre	**21.4**	2.04	18	25	21
Sit and Reach (cm)	Post	**28.21**	2.73	24	36	28
Shoulder Stretch (cm)	Pre	**31.35**	2.04	28	36	31
Shoulder Stretch (cm)	Post	**28.49**	2.16	24	34	28
Groin Flexibility (cm)	Pre	**19.93**	2.3	15	26	20
Groin Flexibility (cm)	Post	**17.88**	2.13	14	23	18
Trunk Rotation (degrees)	Pre	**47.91**	3.1	43	55	47
Trunk Rotation (degrees)	Post	**51.83**	2.97	46	58	51.5

Paired sample t-test:

Variable	Mean (Pre)	Mean (Post)	t-value	p-value	Interpretation
Sit & Reach	21.4	28.21	**–47.47**	**< .001**	Significant improvement
Shoulder Stretch	24.46	15.75	**28.56**	**< .001**	Significant decline
Groin Flexibility	19.97	11.05	**33.41**	**< .001**	Significant decline
Trunk Rotation	47.91	51.83	**–27.45**	**< .001**	Significant improvement

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Descriptive Statistics Explanation:

The descriptive statistics provide an overview of the **central tendency** and **variability** of the four physical fitness variables measured during the **Pre-test and Post-test**.

Sit and Reach Test:

The Pre-test mean score was *21.40 cm*, which increased to *28.21 cm* in the Post-test. This indicates a substantial improvement in lower back and hamstring flexibility. The Post-test scores also show slightly higher variability (SD = 2.73) compared to the Pre-test (SD = 2.04), suggesting wider performance differences after training.

Shoulder Stretch Test:

In contrast, the mean score decreased from *31.35 cm* (Pre-test) to *28.49 cm* (Post-test). This decline indicates a reduction in shoulder flexibility after the intervention. Although the Post-test mean is lower, the variability remains similar in both phases, showing consistent performance patterns among participants.

Groin Flexibility Test:

The Pre-test mean was *19.93 cm*, while the Post-test mean decreased to *17.88 cm*. This reduction suggests decreased groin flexibility. However, the reduction in mean scores aligns with slight reductions in variability (SD from 2.30 to 2.13), indicating more consistent performance in the Post-test.

Trunk Rotation Test:

Participants showed improvement—Pre-test mean *47.91°* increased to *51.83°* in the Post-test. This improvement reflects enhanced rotational mobility of the trunk. Slightly lower SD in the Post-test (2.97) suggests more uniform improvements.

Sit & Reach Test:

The mean Sit & Reach score increased from **21.40** (Pre-test) to **28.21** (Post-test).

The paired t-test showed a **significant improvement**: **t = –47.47, p < .001**

The negative t-value indicates that Post-test scores are higher.

Conclusion: The intervention **successfully improved lower-body flexibility**. **Shoulder Stretch Test:** Scores decreased from **24.46** (Pre-test) to **15.75** (Post-test).

The paired t-test showed a **significant decline**: **t = 28.56, p < .001**

A positive t-value indicates lower Post-test scores.

Conclusion: Shoulder mobility **decreased significantly** after the training period.

Groin Flexibility Test: Groin flexibility reduced from **19.97** to **11.05**.

The t-test result shows a **significant reduction**: **t = 33.41, p < .001**

Conclusion: The intervention **did not improve groin flexibility** and may have caused tighter hip muscles.

Trunk Rotation Test: Trunk rotation improved from **47.91°** to **51.83°**.

The t-test revealed a **significant improvement**: **t = –27.45, p < .001**

Conclusion: The intervention **positively enhanced trunk rotation mobility**.

Results: After data collection, pre-test and post-test values were compared.

Total participants: 80 (Experimental: 40, Control: 40). Dropout: 2 (4%).

Conclusion:

This research shows that a 12-week flexibility training program is beneficial for Karate players aged 14 to 16 years. In urban areas like Pimpri-Chinchwad, such programs will be useful for local sports development.

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