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# A Comparative Study on the Effectiveness of Sport-Specific and General Conditioning Training for Performance Parameters in Young Mixed Martial Arts Athletes

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**Abstract:**
Mixed martial arts (MMA) is a combat discipline sport that demands athletes to perform an variety of high-intensity movements involving in striking, grappling, takedowns, and ground-based techniques. The ability to execute these actions effectively depends on several physical and neuromuscular characteristics, particularly rapid movement, adequate joint mobility, and efficient responses to visual or external stimuli. Physical conditioning is a essential part of MMA preparation that can be broadly categorized into general and sport-oriented approaches. General conditioning aims to develop overall physical fitness, while sport-specific conditioning is designed around the movement patterns and performance requirements encountered during MMA activities. Since MMA involves repeated changes in movement, intensity, and technical demands, conditioning that closely reflects the characteristics of the sport may offer greater performance benefits. However, there is limited comparative evidence regarding the influence of these two conditioning approaches on specific performance abilities in young MMA athletes. Hence, the present study is designed to determine and compare the effects of sport-specific conditioning and general conditioning on selected performance parameters, namely speed, mobility, and reaction time, among young mixed martial arts athletes.

**keywords:** Mixed martial arts, sport-specific conditioning, speed, mobility, reaction time.

## Introduction:

Mixed Martial Arts (MMA) is a physical combat sport that combines techniques from disciplines such as boxing, wrestling, Brazilian jiu-jitsu, and Muay Thai. Athletes must perform a wide variety of striking, grappling, clinching, takedown, and ground-fighting movements, requiring well-developed strength, power, speed, agility, flexibility, endurance, aerobic and anaerobic fitness, and reaction ability . MMA competition consists of repeated high-intensity activities interspersed with short recovery periods, placing substantial demands on the cardiovascular, metabolic, and neuromuscular systems. These demands, together with weight-management practices and repeated exposure to physical contact, may increase fatigue and the risk of musculoskeletal injury. Conditioning is therefore an essential component of MMA training and can be broadly classified as general or sport-specific. General conditioning

develops fundamental physical qualities like cardiovascular endurance, strength, flexibility, balance, and muscular endurance, whereas sport-specific conditioning that reproduce the movement patterns, intensity, and physiological demands of the targeted sport. The principle of training specificity suggests that adaptations are influenced by the nature of the training stimulus and may be more transferable when exercises closely resemble competitive activities [10]. In MMA, sport-specific conditioning may include reactive agility drills, combat-based circuits, interval training, movement-specific resistance exercises, and controlled sparring activities. Previous research has demonstrated beneficial effects of sport-oriented conditioning on performance characteristics such as anaerobic capacity, agility, muscular endurance, and movement efficiency [12, 13]. Speed, agility, and reaction time are particularly important in MMA because athletes must rapidly change position, evade attacks, close distance, and respond to an opponent's movements . Movement quality is also relevant to performance, as movement screening can identify limitations or dysfunctional patterns that may influence biomechanical efficiency and injury risk. Furthermore, muscular endurance and anaerobic fitness enable athletes to repeatedly perform explosive actions such as strikes, takedowns, escapes, and positional transitions while experiencing fatigue (19). Although both general and sport-specific conditioning can improve physical fitness, limited research has directly compared their effects on performance-related outcomes in young MMA athletes. Establishing the effectiveness of these approaches may help coaches and strength and conditioning professionals develop more appropriate training strategies for this population. Therefore, the study aims to compare the effects of sport-specific conditioning and general conditioning on selected performance parameters, including speed, mobility, and reaction time, in young mixed martial arts athletes.

**Methods and procedure:**

This study was an experimental study design with pre and post comparative type. The study included 30 mixed martial arts (MMA) players aged 16–25 years who had a minimum of 1 year of consistent MMA training and were currently training at least 3 times per week. Subjects with musculoskeletal injuries, medical conditions affecting training, medications affecting performance or recovery, or inability to comply with the protocol were excluded. All adult participants provided written informed consent . For participants under 18 years of age written informed consent was obtained from a parent or legal guardian. The subjects were randomly divided into two groups of 15 each using simple random sampling. Group A received sport-specific conditioning training and Group B received general conditioning training for 8 weeks, 3 sessions per week. Pre- and post-intervention assessments were performed using the Simple Light Reaction Test, Linear Sprint Test, and Deep Squat Test. The measurement tools used were a sensor light, stopwatch, and dowel. GROUP A – SPORT-SPECIFIC CONDITIONING TRAINING Group A received sport-specific conditioning focusing on speed, movement screening, and reaction time. The training was progressively advanced over four phases. For speed training, phased medicine ball exercises, resistance band punching, and ladder drills were performed. Medicine ball exercises included chest passes, rotational throws, overhead throws, rebound throws, and throw-punch combinations. Resistance band training included jab-cross combinations, fast punching, step-back punches, sprawl-to-punch movements, and band shadowboxing. Ladder drills included single-leg hops, in-in-out-out hops, lateral hops, zigzag hops, and reactive hop-and-strike drills. For movement screening and functional conditioning, goblet squats, single-leg deadlifts, and lunges with rotation were performed. The exercises progressed from basic mobility and movement control during weeks 1–2 to loaded and explosive movements during weeks 3–6, followed by MMA-specific

movements such as squat-to-jump-to-sprawl, single-leg deadlift with high knee or kick, and lunge with rotation followed by strike during weeks 7–8. For reaction-time training, two-handed toss and catch, wall bounce catch, single-hand toss, random-direction toss, tennis ball catch with shuffle, and tennis ball juggle were performed. During the final phase, catch-and-strike and catch-with-defensive-slip or bob drills were incorporated to improve MMA-specific reaction and defensive movement. GROUP B – GENERAL CONDITIONING TRAINING Group B received general conditioning training for 8 weeks, 3 sessions per week. The training protocol focused on funndamental components of physical fitness including speed, strength, balance , coordination, functional movement and reactive ability while explicitly excluding combat specific or mixed martial arts(MMA). The intensity and complexity of exercises were progressively increased throughout the intervention period. Pre- and post-intervention results of both groups were compared to determine the effectiveness of sport-specific conditioning training compared with general conditioning training in MMA players

**Results :**

On comparing the mean values of Linear Sprint Test score of Group-A and Group-B, both the groups showed decrease in the posttest means with sports specific conditioning (Group-A) showing a mean of 6.40which is more effective than general conditioning (Group-B) showing a mean of 6.77Hence null hypothesis is rejected.

On comparing the mean values of Simple Light Reaction Test score of Group-A and Group-B, both the groups showed decrease in the post test means with sports specific conditioning (Group-A) showing a mean of 268.66 which is more effective than general conditioning (Group-B) showing a mean of 295.66 Hence null hypothesis is rejected.

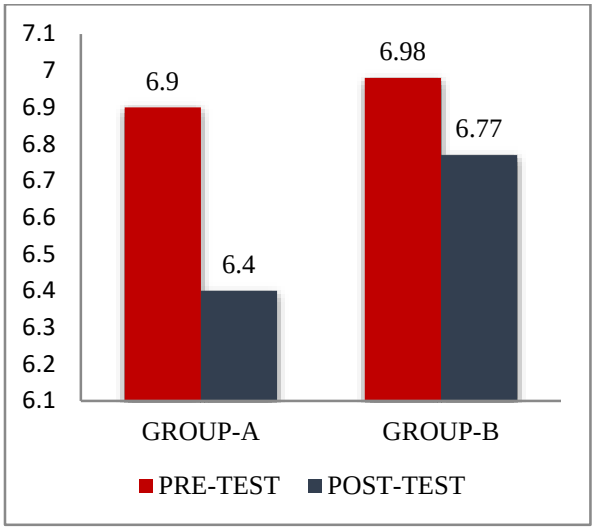
On comparing the mean values of Deep Squat Test value score of Group-A and Group-B, both the groups showed increase in the post test means with sports specific conditioning (Group-A) showing a mean of 2.73which is more effective than general conditioning (Group-B) showing a mean of 2.00Hence null hypothesis is rejected

**COMPARISON OF LINEAR SPRINTTESTSCORE WITHIN GROUP-A AND GROUP-B BETWEEN PRE AND POST TEST VALUES**

| #LST | PRE-TEST | | POST-TEST | | t-TEST | Sig. |
|---|---|---|---|---|---|---|
| | MEAN | S. D | MEAN | S. D | | |
| GROUP-A | 6.90 | 0.108 | 6.40 | 0.134 | 17.656 | .000*** |
| GROUP-B | 6.98 | 0.116 | 6.77 | 0.088 | 23.722 | .000*** |

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value of the Linear Sprint Test score between pre-test and post-test within Group-A and Group-B.

In the Linear Sprint Test score, there is a statistically highly significant difference between the pre-test and post-test values within Group-A and Group-B **(***-P≤0.001)**




**COMPARISON OF LINEAR SPRINTTESTSCORE WITHIN GROUP-A AND GROUP-B BETWEEN PRE AND POST TEST VALUES**

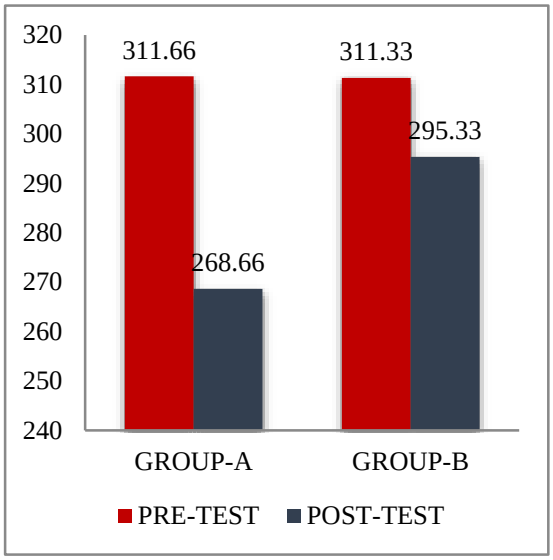
**COMPARISON OF SIMPLE LIGHT REACTIONTEST WITHIN GROUP-A AND GROUP-B BETWEEN PRE AND POST TEST VALUES**

| #SLRT | PRE-TEST | | POST-TEST | | t-TEST | Sig. |
|---|---|---|---|---|---|---|
| | MEAN | S. D | MEAN | S. D | | |
| GROUP-A | 311.66 | 6.172 | 268.66 | 5.498 | -16.000 | .000*** |
| GROUP-B | 311.33 | 6.672 | 295.33 | 7.187 | 7.247 | .000*** |

(***-P≤0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value of the Simple Light Reaction Test value between pre-test and post-test within Group-A and Group-B.

In the Simple Light Reaction Test values, there is a statistically highly significant difference between the pre-test and post-test values within Group-A and Group-B **(***-P≤0.001)**




**COMPARISON OF SIMPLE LIGHT REACTIONTESTTEST SCORE WITHIN GROUP-A AND GROUP-B BETWEEN PRE AND POST TEST VALUES**

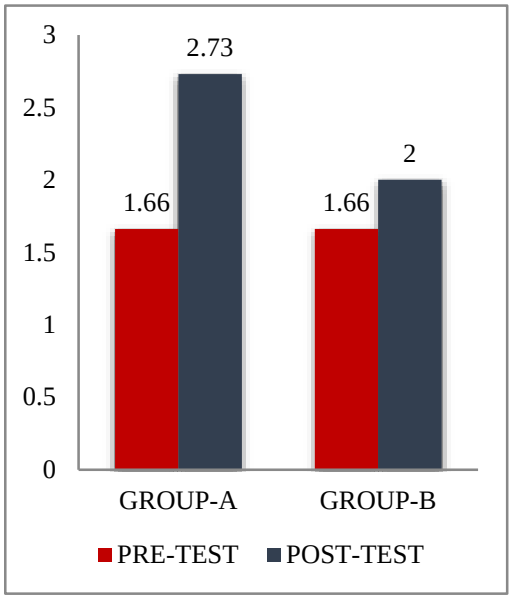
**COMPARISON OF DEEP SQUAT TEST SCORE WITHIN GROUP-A AND GROUP-B BETWEEN PRE AND POST TEST VALUES**

| #DST | PRE-TEST | | POST-TEST | | t-TEST | Sig. |
|---|---|---|---|---|---|---|
| | MEAN | S. D | MEAN | S. D | | |
| GROUP-A | 1.66 | 0.487 | 2.73 | 0.457 | 16 | .000*** |
| GROUP-B | 1.66 | 0.487 | 2.00 | 0.000 | -2.646 | .019** |

(**P≤ 0.01) (***-P≤0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value of the Deep Squat Test value between pre-test and post-test within Group-A and Group-B.

In the Deep Squat Test value values, there is a statistically highly significant difference between the pre-test and post-test values within Group-A and Group-B **(***-P≤0.001)** .




**COMPARISON OF DEEP SQUAT TEST SCORE WITHIN GROUP-A AND GROUP-B BETWEEN PRE AND POST TEST VALUES**

**Discussion;** This study was conducted to compare the effects of sport-specific conditioning and general conditioning on selected performance parameters in young Mixed Martial Arts (MMA) athletes. Group A received sport-specific conditioning and Group B received general conditioning. The performance parameters were assessed using the Linear Sprint Test, Simple Light Reaction Test, and Deep Squat Test. Improvements in the above parameters were observed in both groups. This study shows that the mean Linear Sprint Test score in Group A decreased from the pre-test value to a post-test mean of **6.40**, whereas Group B showed a post-test mean of **6.77**, indicating greater improvement in Group A. Similarly, the Simple Light Reaction Test showed a decrease in the post-test mean, with Group A showing a mean of **268.66**, compared with **295.66** in Group B, demonstrating better improvement in reaction time in Group A.

Similarly, the Deep Squat Test showed an increase in the post-test mean values in both groups. Group A demonstrated a post-test mean of **2.73**, whereas Group B demonstrated a post-test mean of **2.00**, indicating greater improvement in functional movement performance in Group A. The findings suggest that sport-specific conditioning was more effective than general conditioning in improving selected performance parameters among young MMA athletes.

The findings of the present study are supported by Amtmann et al. (2008), who stated that MMA is a physically demanding sport requiring strength, power, endurance, agility, speed, flexibility, and coordination. Franchini et al. (2011) emphasized that sport-specific conditioning involves exercises that replicate the movements and situations encountered during MMA competition, such as pad work, shadow boxing, grappling drills, and sparring. Slimani et al. (2017) reported that MMA-specific training can improve reaction time, anaerobic endurance, and fight-specific performance. Kirk et al. (2015) also reported improvements in neuromuscular efficiency, timing, and tactical awareness following sport-specific training.

The present study also indicates that general conditioning remains beneficial for developing overall physical fitness. Turner et al. (2011) explained that general conditioning exercises such as running, resistance training, flexibility exercises, and circuit training improve cardiovascular fitness, muscular

balance, joint stability, and postural control. Myer et al. (2011) and Behm et al. (2008) further emphasized that general conditioning provides a foundation for strength, movement competency, and neuromuscular control in young athletes.

**Limitations Of The Study**

Sample size is less
Duration of the study is less
The age group was selected between 16-25 years
No long term follows up for the study.

**Recommendations Of The Study**

Larger sample can be analyzed
Larger duration of study can be done
All age group can be taken

**Conclusion:**

This study concluded that both sport-specific conditioning and general conditioning training improved the physical fitness and performance parameters of young MMA athletes. Comparing the two groups, the sport-specific conditioning group showed better improvement in MMA-related performance parameters such as striking power, takedown strength, reaction time, and fight endurance than the general conditioning group. The sport-specific conditioning group showed greater positive improvement in post-test performance compared to the general conditioning group. However, general conditioning training also contributed to improvements in cardiovascular endurance, flexibility, muscular balance, and injury prevention, supporting overall athletic development.

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