

# Auditory and Visual Reaction Time in Taekwondo Players

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## Research Article

**Abstract: Background:** Excellence in a combat sport like Taekwondo relies on the ability to execute a technique with enough force in as little time as possible. Hence reaction time, speed and agility are essential in these practitioners. **Objectives:** The purpose of this study was to find out the Auditory and Visual Reaction time in Taekwondo players and compare it with non athletes. **Method:** Reaction time was measured with the response analyzer in trained taekwondo practitioners and non athletes. **Results:** The practitioners of Taekwondo responded significantly earlier to both auditory and visual stimuli. **Conclusion:** It can be concluded that shorter reaction time in these players is beneficial as it would prevent them from opponent attacks and help them to score better. Training to achieve a suitable reaction time can significantly influence performance especially during competitions.

**Key words:** Taekwondo, reaction time, perception.

## Introduction

Taekwondo is originally a Korean martial art .An unarmed combat for self defense it involves skillful application of techniques particularly powerful kicks directed towards the opponent's frontal upper trunk & head. Performance of these athletes relies on power, speed, tactics, precision and perfect agility [1]. Besides these, reaction time and response to opponent action appear to be key elements for victory. There are two types of reaction time, the "complex" reaction time occurs in a combat situation wherein the athlete observes the situation, anticipates further progression to take its advantage [2]. "Simple" reaction time is the physiological response towards a neutral sense stimulus. Here a receptor excitation initiates a signal which is transmitted via central nervous system to motor cortex .Simple reaction time is hence an indicator of one's perception, decision making ability and motor co-ordination. The aim of this study was to measure the simple reaction time to auditory and visual stimuli in trained Taekwondo practitioners and compare it with those who lead a more sedentary lifestyle.

## Material and Methods

**Participants:** Prior to the study the purpose and procedures were explained to the participants and their consent was obtained. Thirty practitioners of Taekwondo from Martial arts training centre were recruited for the

study. These players were in regular practice for more than three years and had participated at various district and state level competitions. Thirty age - matched student volunteers who were not involved in any athletic training programme were also chosen for the study. All the participants were males. All the subjects were healthy and did not suffer from any visual disorder or hearing disorder or injury to upper limb. They had normal visual acuity or corrected to normal visual acuity and no color blindness. They were non diabetic, non smokers and non alcoholics. They had no clinical evidence of any illness or peripheral neuropathy. None of them took any form of drugs. Their psychomotor abilities were normal.

**Procedure:** The study was carried out in the Department of Physiology, Government Medical College, Akola. Reaction time was measured with the Response Analyzer (INCO). This instrument has a resolution of 0.001 seconds. It provides two types of stimuli, Auditory - Low and High frequency sounds, Visual - Blue and Red Lights. Subject was instructed to press the switch with both hands at the beginning and release the index finger of his dominant hand as soon as he perceived the stimulus. Display was recorded in seconds. Three readings were recorded for each variable and average of the readings was noted as the reaction time in the subject's record profile. Data was subjected to statistical analysis using students unpaired 't' test.

## Results

Mean age of the participants was  $16.8 \pm 1.55$  years. As shown in the table, Mean ART and Mean VRT of the non athletes were greater than that of the players, the difference between the two groups being statistically significant ( $p < 0.05$ ). The mean ART was lesser than the mean VRT for both groups.

**Table 1:** Auditory and Visual Reaction Time In Seconds

Stimuli	Control Group n=30 (Mean ± SD)	Taekwondo Players n=30 (Mean ± SD)
Blue light	0.242 ± 0.056*	0.198 ± 0.050
Red light	0.196 ± 0.043*	0.172 ± 0.039
Low frequency sound	0.187 ± 0.0259*	0.167 ± 0.026
High frequency Sound	0.184 ± 0.023*	0.168 ± 0.032

\*p &lt; 0.05

### Discussion

Taekwondo athletes responded faster to auditory high frequency and low frequency sounds, they responded faster to blue light and red light stimuli. The constant need to offend and defend against the opponents could lead athletes to develop their perceptual abilities; therefore they learn to perceive stimuli in the external environment earlier than non athletes [3] resulting in fast reactions. Training in taekwondo improves concentration and focus of attention [4, 5]. Continuous, quick direction changes characteristic of martial arts, improves neuromuscular coordination and speed of movements [6]. Overall the neural transmission and response execution is better in these athletes so their reaction time is lesser. Similarly athletes are known to have lower eye hand visual reaction time and higher visuospatial intelligence [7] and physical activity of any type facilitates cognitive process and induces alertness thereby reducing reaction time [8-11]. To conclude, trained taekwondo practitioners develop a faster reaction time to both auditory and visual stimuli. Periodic assessment of simple reaction time can be used as a reference for detection and selection of talents [12]; it can be a low cost, non-invasive, sensitive indicator of perceptual ability. We suggest training methods in the form of running specific drills of combat situations, video aided learning [13] and choice reaction time [3] which can help athletes to anticipate a situation and start their actions earlier thereby enhancing performance.

### References

1. Abdossaleh Z., Azadeh G., Ebrahim K., A survey of physical fitness of male taekwondo athletes of national Iranian team. *Facta Univ Phy Edu Sport* 2008 ;6 (1): 21-29
2. Manfred V, Markus S, Hashem K. Markus K .Reaction time in taekwondo ISBS Symposium 2007 Ouro Preto, Brazil.
3. Mori S, Ohtani T, Imanaka K. Reaction times and anticipatory skills of karate athletes. *Hum Mov Sci* 2002 (21): 213 – 230.
4. Oliver D, Jeanette. C., Maria C., Alison H., Paul H. An Investigation of leg and trunk strength and Reaction times of hard style martial arts practitioners. *J Sports Sci* 2006 CSSI, 5-12.
5. Heller J, Peric T, Dlouha R. Kohlikova E, Melichna J, Novakova H. Physiological profiles of male and female taekwondo ITF black belts *J Sports Sci* 1998 ;16 : 243-249.
6. Lee J. B. Marsumoto T, Othman T, Yamuchi M , Taimura A, Kaneda E et al Co-activation of flexor muscles as a synergist with the extensors during ballistic extension movement in trained Kendo and Karate athletes. *Int J Sports Med* 1999; 20: 7-11.
7. Akarsu S, E Caliskan, S Dane. Visual reaction time and visuo-spatial intelligence in athletes. *Turk J. Med Sci*; 39(6): 871-874.
8. Mouelhi G, Bouzaouach I, Tenenbaum G, Ben Kheder A, Feki Y. Simple and choice reaction time under varying levels of physical load in high skilled fencers. *J. Sports Med Phys Fitness* 2006; 46: 344 – 351.
9. Cho JW. A study on physical performance in children. *WTF Taekwondo Seoul –Korea* 1988, 8(4): 34-39.
10. Arito H, Oguri M. Contingent negative variation and reaction time of physically trained subjects in simple and discriminative tasks. *Ind Health* 1990; 28:97-106.
11. Brisswalter J, Arcelin R, Audeffren M, Delignieres D. Influence of physical exercise on simple reaction time: Effect of physical fitness. *Percept Mot Skills* 1997; 85:1019-1027.
12. Cojo Cariu A .Measurement of reaction time in Qwan Ki Do. *Biol Sport* 2011; 139-143.
13. Kersten W, Peter E, Nicole B. Usage of virtual reality technology to study reaction in karate. *Int J Sports Sci Eng* 2012; 6 (1): 17-24.