

Impact of Vo₂ max development with high intensity on respiratory system and vital Endurance for kumite Players in Karate Sport

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Abstract: This study is regarded a methodological attempt to identify the impact of Vo₂ max development with high intensity on respiratory system and vital Endurance for kumite Players in Karate Sport, especially after the amendments of international law and increase the time of matches in the Semi-final and final than three minutes to four minutes led to increasing adoption of the player to production of energy sources by up to 70% and coupled high intensity may reach 95% of the maximum what an individual can afford, the experimental method with one group (pre-post measurements) was applied on a subject of 10 players from Zagazig University, majoring Kumite in age group of 18 to 21 years, The important results are of this research was an enhancement in (FVC),(MB),(NB),(HRAE),(HRAR),(FSORS),and(COT)(9.0%,14.05%,7.31%,8.0%,38.35%) consequently in the post measurement than the pre one. Also, there is an enhancement of the pre and post- measurements in (VO₂ Max, Alternative VO₂ Max, (FSORS), and (VE) testes (10.06%, 10.13%, 26.68%, 28.79%) consequently for the post one. [Mohamed,S.Abo-El-noor. **Impact of Vo₂ max development with high intensity on respiratory system andvital Endurance for kumite Players in Karate Sport.** *J Am Sci* 2012;8(12):212-216]. (ISSN: 1545-1003). <http://www.jofamericanscience.org>. 32

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1. Introduction

The karate combat sports competitive of being variable positions play show through sudden circumstances requiring the player to multiple reactions and variety is to use methods of Defence and attack as well as the foot work , and require fast performance for relatively long periods of time, which requires a high level of functional efficiency of the player, which showed a biological adaptation of the organs of the body with the requirements of the game, reflecting his ability to continue in the performance, scoring and winning(1).

Kumite competition is one of contests karate harvester for medals in regional championships and international and competitions that have specific requirements due to the nature of the competition between the players are equivalent in age and weight and the degree of belt as he tries each frustrate attempts rival attack to get as many points using Parties (arms, the two men) and directing the attack to the authorized areas where the attack at a specified time and according to international law governing games Kumite. According to international law amendments to karate and private sectors to increase the time of the game in the competition Kumite in the semi-finals and finals (medal matches) than 3 minutes still real to 4 minutes in the games men over 18 years old. The researcher noted the importance of directing special training on the development level of the functional status of the respiratory system and vital endurance for players Kumite in training

programs to increase the contribution of the antenna, and that by relying on systems applications energy production, as the endurance training .Endurance training is the applied area for production the energy systems aerobic and anaerobic abilities. And systems of energy production in the human body works among themselves so as not to appear where any system of systems independent of other systems, depending interaction between these systems on the changes that occur in the power and speed of performance, distance and time, and when long time performance, the sources of wind energy contributes to a greater role in performance.

The physical preparation represents one of the important aspects of performance art in the Karate sport as it is based upon the ability of players to carry out the requirements and duties of performance, both defensive and offensive in training and competition requires upgrading the technical performance and development of training programs are codified according to the latest developments in the framework of the resulting legal changes and plans. The different play modes for all what is happening in the sport of karate. Vital endurance (VE) training is a common component of sports and physical fitness programs for young people. Some adolescents and players may use strength training as a means to enhance muscle size and definition or to simply improve appearance. Foss and Keteyian (1998), Hayes (1998) Indicates that the sporting activities that extend the durability to 4 minutes or more are

mainly dependent on the system oxygen source cushions to produce the energy needed to restore tri-Adenosine tri - phosphates (ATP). (2,3)

Salameh, B (1999) refers that the maximum oxygen up take (VO₂ Max) is one of the factors affecting the efficiency of physical, is to identify the (VO₂ Max) of the important things in sports training in general and particularly endurance exercises (4). Martin & Coe (1997) and Dick (2007) refer that the (VO₂ Max) is considered the best measure of fitness for wind energy. (5, 6)

The (VO₂ Max) combined with the endurance periodic respiratory and is optimized intensity medium periods Time long but the player bout actual (Kumite), especially after the amendments of international law and increase the time the matches in the final round and finals to 4 minutes led to increasing adoption of the player to sources produce wind energy by up to 70% and is coupled intensity high may reach 95% of the maximum individual can afford, which called for the researcher to develop the maximum oxygen consumption using wrenches high that simulate actual conditions of the games Kumite which could contribute to raising the level of case functional respiratory endurance vital Kumite players in the sport of karate. The researcher finds that the importance of improving the level of functional

efficiency of these vital organs through the development of (VO₂ Max) distressed high as consistent both Sharkey (1997), Hayes (1998) that the (VO₂ Max) gaining more with training, high intensity, and interest we get when training strongly up to 95% of maximum heart rate. (3, 7) The researcher tries to conduct a scientific study of the use of Impact of Vo₂ - max development with high severity for respiratory system and vital Endurance for Kumite Players in Karate Sport.

2. Material and Methods

The Subject

The subject was 10 male kumite Players in Karate Sport mean age (19.01± 0.88 years), weight (68.60 ±7.01 kg), height (171.90 ± 3.08 cm), Heart rate(70.0 ± 1.60 beats.min) and training experience (7.20 ± 0.79 years), volunteered to participate in this investigation. The subject were informed about the experimental procedures and signed informed consent statement and medical history. The subject consisted of 10 kumite players. All players were members of Zagazig University team in Egypt and participated in the best local league within their age group in the Egyptian national league. The physical characteristics of the subject are given in table (1)

Table(1) The physical characteristics of the subject

(*n=10)

Variable	Mean	±SD	Median	Kurtosis	Skewness
Age (y)	19.01	±0.88	19.00	1.73	0.342
Height (cm)	171.90	±3.08	171.75	1.15	0.146
Weight (Kg)	68.60	±7.01	69.00	1.46	0.171
Resting (HRM) beats.min	70.0	±1.60	69.5	0.41	1.43
Training experience (y)	7.20	±0.79	7.00	0.63	0.761

*Means, SD Standard Deviation, Median, Kurtosis ,and Skewness

There are no significant differences in the following variables (age, height, weight, resting heart rate and training experience) ($P < 0.05$) which indicates the harmony of sample's research as well as the possibility of conducting such an experiment in such a sample Table (1). This study has been conducted of three steps.

First Step:

doing the pre-measurement on Saturday and Sunday 14-15 /1/2012 by measuring height, weight, vo₂ max tests by using Cosmed Quarq Cpet system in Appendix 1 to measure vo₂-max. The protocol starting with 10 minutes warm – up and stretching, pitch trade mile 3 degrees during the test whole, begins Protocol with 3 s fast 4.8 km / h in the first minute, 6.0 km / h in the second minute, 7.2 km / h in the third minute, then increase after minute third by

1.2 km / h in every two minutes until the player reaches to a state of exhaustion, and record maximum speed on Treadmill and reached to maximum oxygen consumption while accessing the state of overheating and the inability to continue the performance .and we used Skybenesky equation to determine the efficiency of respiratory system , Kretcheken equation to evaluate (VE) for kumite players ,Spiro Meter Electronic to measure the vital capacity and Polar Heart rate to measure heart rate (HR), The researcher measured the following variables in Table 2 (Absolute Vital Capacity (FVC), Mute Breathing Time, Number of times breathing, Heart Rate After The effort and Correct offensive skills) To their importance in the equations that measure (the Functional state of respiratory system and Vital Endurance).

Skybenesky equation:**Functional state of respiratory system (FSORS):**

$$\text{FSORS} = \frac{\text{Mute Breathing Time} \times \frac{\text{Vital Capacity}}{100}}{\text{Resting (HRM)}}$$

Kretchikan equation:**Coefficient endurance (C. E):**

$$\text{C. E} = \frac{\text{Max P} + \text{Max P} \cdot \text{R} \cdot \text{M}}{\text{(S)}}$$

C. E = Endurance coefficient

Max P = maximum pulse rate immediately after the effort

Max P.R.M = the maximum pulse rate after a minute rest of the direct effort

S = Total number of attacks correct

Second step:

Applying a training course (TC) from Wednesday day 18/1/2012 to Monday 19/3/2012, using (TC) in this training course.

Third step:

Post-measurements on Wednesday 21-22/3/2012 are performed on all variables we already performed in pre-measurements.

The content of the training course are :

- Time period for the application of the program 9 weeks.
- The total number of training units 27.
- Weekly training units are 3 units
- Training intensity (75%: 90%).
- Time performance exercises ranged between 30:240 seconds
- Rest from 30 – 270 second..
- Pulse at least at the end of the rest period for 120 beats / min
- Exercises numbers are in Appendix 2
- Warming-up before the beginning of every training unit
- Warm-up time ranged through training units between 10: 15 minutes
- Calm during the time ranged training units between 5: 10 minutes
- Training method used is interval training is high intensity.

- Reached the time of exercise Peace compatibility 242.5 minutes
- Reached the time of exercise, stepping box 242.5 minutes.
- Reached the time of exercise Partridge associated performance skills 242.5 minutes
- Reached the time of the performance of all exercises 727.5 minutes
- Ranged intensity of exercise during the first week , the fourth and seventh (75:80) and pulse rate ranged between (167: 174) beats per minute
- Ranged intensity exercise in the second week and the fifth and eighth (80:85) and pulse rate ranged between (174: 180) beats per minute
- Ranged intensity of exercise during the third week , sixth and ninth (85: 90) and pulse rate ranged between (180: 187) beats per minute
- Slowdown at the end of every training unit.
- Warming-up in all training units:
- Doing 10 laps around the playground.

Statistical analysis

Data analysis was performed using SPSS version 15.0. Where the researcher analyzed the results using the mean, Standard deviation, median, kurtosis, skewness, t.test and change ratio

3. Results and Discussion

Table (2): the pre and post measurements for. Absolute Vital Capacity (FVC), Mute Breathing Time, Number of times breathing, Heart Rate After The effort and Correct offensive skills (n=10)

Variable	Pre- measurements	Post-measurements	% Change
Absolute Vital Capacity(FVC)	5.53 ± 0.51 L / min	6.03 ± 0.49 L / min	9.04%
Mute Breathing Time (MB)	67.0 ± 7.32 sec	86.40 ± 6.94 sec	29.0%
Number of times breathing(NB)	21.10 ± 1.37 No	18.50 ± 1.18 No	14.05%
Heart Rate After The effort (HRAE)	199.2 ± 2.34 HR/M	185.7 ± 2.16 HR/M	7.31%
Heart Rate after the rest of the effort by minute(HRAR)	169.7 ± 2.87 No	157.2 ± 2.20 No	8.0%
Correct offensive skills (COT)	7.30 ± 0.95 Dg	10.10 ± 1.30 Dg	38.35%

The results indicate that there are significant differences between pre - and post measurements in (FVC) , Mute Breathing Time (MB), (NB) , (HRAE), (HRAR)and (FSORS) ,and (COT) testes in favour of post- measurement as there was an improvement in all variables of the post- measurement than in pre-one. Results have also showed there are an enhancement between pre - and post measurements in the all variables range between (7.31% and 38.35%). (Table 2).The results indicate that there are an enhancement and changes between the pre- and post measurements (FVC) , (MB), (NB) , (HRAE),(HRAR),(FSORS),and(COT)(9.0%,14.05%, 7.31%,8.0%,38.35%)consequently for the post one. The researcher refer that to influence of the training program systematized scientifically and various exercises which used the (TC) which led to an

enhancement of muscular work among back and abdominal muscles in motor control of limbs Which matches what was mentioned in previous studies that trunk area is the control area in motor performance especially if this performance depends on the strength of limbs through keeping the balance in improving forward and backward trunk muscles (12,13).The researcher refer that to the impact of the training program systematized scientifically and various exercises which used the (TC) which led to an enhancement in (VE) and physical fitness, that is consistent with Barenosik,(2005) cardio- respiratory fitness is commensurate with the ability of the body to take up and use oxygen and internationally accepted reference standard for cardio-respiratory fitness (14)

Table (3) the pre and post measurements for VO2 Max, Alternative VO2 Max, and Functional State of respiratory system and (VE) Vital Endurance. (n=10)

Variable	Pre- measurements	Post-measurements	%Change
Vo2 Max	3280.30 ± 210.28 ml/min	3610.40 ± 231.55 ml/min	10.06%
Alternative VO2 Max	48.14 ± 4.53 ml/min/kg	53.02 ± 5.41 ml/min/kg	10.13%
(FSORS) Functional state of respiratory system	52.06 ± 6.42 Dg	65.95 ± 5.92 Dg	26.68%
(VE) Vital Endurance	50.14 ± 5.00 Dg	35.70 ± 4.66 Dg	28.79%

Results show that there are significant differences between pre - and post measurements in VO2 Max, Alternative VO2 Max , (FSORS) ,and (VE) testes for the post one(Table 3). The results show also there are an enhancement and changes between the pre- and post measurements in VO2 Max, Alternative VO2 Max, (FSORS) ,and (VE) testes (10.06%, 10.13%, 26.68%, 28.79%) consequently for the post one. The researcher refer that to influence of the Effectiveness of the training program systematized scientifically and diversity exercises used, in addition to the gradient carry training ranged time performance exercises during training modules between 30 seconds to 240 seconds, and strongly between 75%: 90% of the maximum rate of heart a high intensity ranging pulse between (167: 187) beats per minute. Studies indicate that the Training high severity as an important means to improve Vo2 max and intensity training between 80% to 90% is optimize for the maximum oxygen consumption, and the work rate which is equal to or slightly more than the threshold of lactate leads to increase capacity maximum aerobic, and thus be useful for planning training programs. These results are consistent with the results of each study of Esfarjani and Paul (8), Denadai (9) Billat et al. (10), Herbert et al. (11) Marcelo et al. (12), Hardmann, and Williams(14) and Barenosik et al.(15) which indicate

that Training high severity and a great way to improve VO2 Max.

Conclusion

- Regular use of (TC) exercises leads to an enhancement in (FVC) ,(MB), (NB), (HRAE), (HRAR), (FSORS),and(COT)(9.0%,14.05%,7.31%,8.0%,38.35 %)consequently
- Regular use of (TC) exercises leads to an enhancement in VO2 Max, Alternative VO2 Max, (FSORS) ,and (VE) testes (10.06%, 10.13%, 26.68%, 28.79%) consequently.

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Recommendations

- Develop the Vo2-max high intensity ranging between (75%: 90%) because it has positive impact on raising the functional status of the respiratory system and the (VE) for Kumite players in the sport of karate.
- The coach must take into account individual differences and rationing training loads depending on the (equations karvonen) by measuring the maximum (HR) to the player.
- The use of special exercises similar to the kinetic paths and temporal psychomotor skills that mimic what happens in the games of different positions.

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