



ISSN Print: 2394-7500  
ISSN Online: 2394-5869  
Impact Factor: 5.2  
IJAR 2016; 2(6): 107-110  
www.allresearchjournal.com  
Received: 20-04-2016  
Accepted: 21-05-2016

**Pandey Gayatri**

Ph. D Scholar, Lakshmbai  
National Institute of Physical  
Education, Gwalior, Madhya  
Pradesh, India.

**Dr. Pandey Vivek**

Professor, Department of  
Exercise Physiology, National  
Institute of Physical  
Education, Gwalior Madhya  
Pradesh, India.

**Dr. Pathak Anju**

Assistant Professor  
Postgraduate Government  
College, Sector – 11,  
Chandigarh, Punjab, India.

## Prediction of maximum oxygen uptake via twelve minutes run and walk test of pre-orientated in opposition to randomized athletes: A comparative study

**Pandey Gayatri, Dr. Pandey Vivek and Dr. Pathak Anju**

**Abstract**

Oxygen is the most critical component for running at fast pace or long duration workout, the aim of present investigation was to find out the consequence of pre-orientation in opposition to randomization of subjects for the prediction of maximum oxygen uptake via twelve minutes run and walk test. For the study thirty athletes of 19 to 23 years with a mean and SD of  $20.83 \pm 1.17$  from L.N.I.P.E., Gwalior (M.P.) selected as subjects; subjects performed the 12-MRT in three variants: performing alone the 12-MRT on a 400 m track (Alone-V<sub>1</sub>); performing 12-MRT on a 400 m track in randomized groups of three (R-Group, V<sub>2</sub>); performing 12-MRT on a 400 m track in pre-oriented groups of three the (PO-Group, V<sub>3</sub>). To determine the difference of predicted VO<sub>2</sub> max among different groups the repeated measure analysis of variance (ANOVA) was employed and the significant level was set at 0.05. The significant difference ( $p > 0.05$ ) was found in calculated VO<sub>2</sub> max among testing protocol. The result of this study shows significance differences between V<sub>1</sub> & V<sub>2</sub>, V<sub>1</sub> & V<sub>3</sub> and V<sub>2</sub> & V<sub>3</sub>, which gives an idea that running in a group improves the VO<sub>2</sub> max performance of athletes.

**Keywords:** VO<sub>2</sub> max, 12-minutes run and walk, Randomized group, Pre-oriented group.

**1. Introduction**

VO<sub>2</sub> max is the maximal oxygen uptake during exercise. It is one aspect which can establish an athlete's competence to carry out continued exercise and is associated to aerobic endurance. It is usually noticed as the best pointer of aerobic fitness and cardio-respiratory endurance. It is measured as milliliters of oxygen used in one minute per kilogram of body weight (Elizabeth, 2014) [1]. It is considered as how much oxygen the lungs can obtain, pass it into the bloodstream which is then drive all the way through the body by means of heart and finally how efficient the muscles consume it for generating the energy. As running begins VO<sub>2</sub> max rate increases and continue to increase in anticipation to it arrive at a peak after which it stops fluctuating. This plateau after that person can no more exploit oxygen (Johnson, 2012) [3]. Albert Carron, a well-known sports social psychologist defined group cohesion as "a dynamic process which is reflected in the tendency from group to stick together and remain united in the pursuit of goal and objective". In sports, it is well-established principle that a group of individual working together is far more effective than the same individuals working independently of one another (Cox, 1998) [4]. In general, the renowned basic component of physical performance and health is aerobic power (Åstrand & Rodahl 1986, Johnson 1991) [5]. From many years the entire body's maximal oxygen uptake (VO<sub>2</sub> max) of human beings has interested researchers and continuous articles have been in prints (Saltin & Strange 1992, Nielsen 2003) [6, 7]. Its unconditional extent and bendiness with physical training has vital attention for the elite athletes, and for anyone participated in physical activity. The other important and interesting matter in this, that calculation of oxygen uptake not only is a measure of aerobic energy turnover, but also provides particular quantity of the ability to carry and consume oxygen, i.e., the combined working capacities of the cardio-respiratory system and muscle mitochondria. There were various methods available for measuring the VO<sub>2</sub> max but they were more expensive keeping this view in mind Dr. Kenneth Cooper developed the 12-minute running test in the 1960s while working for the Air Force.

**Correspondence**

**Pandey Gayatri**

Ph. D Scholar, Lakshmbai  
National Institute of Physical  
Education, Gwalior, Madhya  
Pradesh, India.

The Cooper Test estimates your VO<sub>2</sub> max from the distance cover in 12 minutes and this formula has the plus point that huge peoples can be tested at one time, as well as it is a very simple and contemptible to implement (Cooper, 1968) [2].

Few studies have explored the interpersonal relationship of the presence of peers during the estimation of the VO<sub>2</sub> max during the 12-MRT test. A recent study reported that the predicted VO<sub>2</sub> max was underestimated by 4% when participants ran alone (Assomo *et al.*, 2012) [8]. In some studies concerned with the reliability and validity of the 12-MRT with participants running in group, the groups formation is always randomized; whereas subjects forming a known group may have analogous or diverse performance. It is known; pairing provides some motivation (Jowett & Lavallee, 2008) [9] and is therefore a psychological aspect, which influences the final performance of participants. An important factor that affects the athletic performance is the motivational environment created by grouping. The influence of motivational factors on plan and performance is ambiguous, and while some studies have shown constructive effects (Perreault & Vallerand, 1998; Mauger *et al.*, 2011) [10, 11] others have not (Hulleman *et al.*, 2007) [12].

**1.1 Objectives of the Study:** The objectives of the study were as follows:

1. To examine the outcome of grouping on the improvement of maximum oxygen uptake.
2. To compare the effect of pre-orientated and randomized group on maximum oxygen uptake.

**2. Material and Methods**

**2.1 Sample of the Study:** To achieve the objectives of the study, total 30 female physical education students, age ranging between 19 to 23 years with a mean and SD of 20.83 ± 1.17 from Lakshmibai National Institute of Physical Education, Gwalior were selected as subject by utilizing randomize sampling technique. They were permanently involved in a variety of sports of endurance in nature with different levels of ability and training.

**2.2 Design of the study:** Subjects completed the 12-MRT in three variations (V): In V<sub>1</sub>, each subject ran alone (Alone), covering the greatest possible distance on a 400m athletic track in twelve minutes. In V<sub>2</sub>, the three subjects completed the test in pre-orientated group (PO-Group) i.e. subjects were set into three according to low, intermediate and high performances of the subjects obtained in V<sub>1</sub>. In V<sub>3</sub>, subjects performed the test in randomized groups of three (R-Group) but in the entire variation subjects complete the test on the same track. VO<sub>2</sub> max was predicted from the distance covered at the end of the twelve min period by substituting the distance covered in the Cooper regression equation:

$$VO_2 \text{ max (mL}\cdot\text{min}^{-1}\cdot\text{kg}^{-1}) = [D - 504.9] / 44.732.$$

\* Where D is the distance cover (in meters) during 12 minutes.

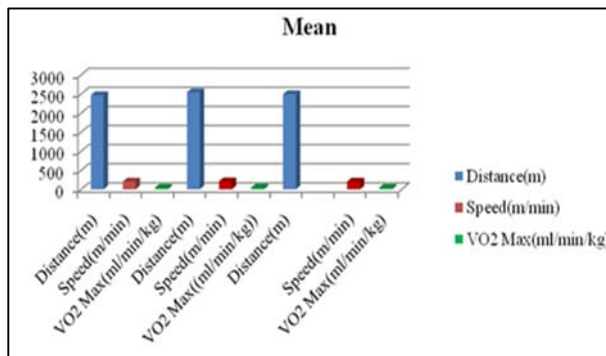
**2.3 Statistical analysis:** Statistical analysis was done with SPSS (Statistical Package for the Social Sciences, 20.0, USA). Mean and standard deviation was calculated as a descriptive statistics and analysis was done by the repeated measures analysis of variance (ANOVA), the level of significance was set at 0.05 levels of confidence. The assumptions required to be fulfilled for repeated measure ANOVA were tested through standard test, to test normality Shapiro Wilk test and to test the assumption of sphericity Mauchley’s test of sphericity was used. When differences were significant, for locating of mean difference bonferroni post hoc adjustment were done.

**3. Results**

**Table 1:** Descriptive Statistics of Three Different Performance Parameters during the Three Testing Protocols

Grouping		N	Mean	SD
Alone (V <sub>1</sub> )	Distance(m)	30	2471.00	210.65
	Speed(m/min)	30	205.92	17.55
	VO <sub>2</sub> Max(ml/min/kg)	30	43.95	4.71
Pre-oriented Group(V <sub>2</sub> )	Distance(m)	30	2546.33	200.04
	Speed(m/min)	30	212.19	16.67
	VO <sub>2</sub> Max((ml/min/kg))	30	45.63	4.47
Randomize Group (V <sub>3</sub> )	Distance(m)	30	2496.00	205.86
	Speed(m/min)	30	207.12	16.47
	VO <sub>2</sub> Max(ml/min/kg)	30	44.51	4.60

Table 1 show the mean & standard deviation of three testing protocol for distance, speed and VO<sub>2</sub> Max. The mean along with standard deviation of individual athletes for distance, speed and VO<sub>2</sub> Max were 2471.00 ± 210.65, 205.92 ± 17.55 and 43.95 ± 4.71 respectively. Similarly randomize group athletes the distance, speed and VO<sub>2</sub> Max were 2546.33 ± 200.04, 212.19 ± 16.67 and 45.63 ± 4.47 respectively, for pre-orientated group athletes the distance, speed and VO<sub>2</sub> Max were 2496.00 ± 205.86, 207.12 ± 16.47 and 44.51 ± 4.60 respectively. The mean score on all the parameters of testing are illustrated in Figure no. 1.



**Fig 1:** Mean Scores on Three Different Performance Parameters during the Three Variations

**Table 2:** Mauchly Test of Sphericity of VO<sub>2</sub> Max for Variatins

Measure: VO <sub>2</sub> Max							
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	p-value	Epsilon <sup>b</sup>		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Variations (vo <sub>2</sub> max)	.605	14.060	2	.001	.717	.744	.500

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Table 2 shows the result of mauchley’s test of sphericity, as statistics was significant for the score of VO<sub>2</sub> Max for variation effect as the p-value.001<.05 level of significance.

So, in this case the assumption of sphericity was considered to be violated and Green House-Geisser was considered as the correction for the purpose of later analysis.

**Table 3:** Tests of Within-Subjects Effects on VO<sub>2</sub> Max of Variations

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Variation_Effect	Sphericity Assumed	44.147	2	22.073	270.669	.000	.903
	Greenhouse-Geisser	44.147	1.434	30.787	270.669	.000	.903
	Huynh-Feldt	44.147	1.488	29.669	270.669	.000	.903
	Lower-bound	44.147	1.000	44.147	270.669	.000	.903
Error (Variation_Effect)	Sphericity Assumed	4.730	58	.082			
	Greenhouse-Geisser	4.730	41.584	.114			
	Huynh-Feldt	4.730	43.151	.110			
	Lower-bound	4.730	29.000	.163			

As the mentioned above assumption of sphericity was violated so from table 3 the Greenhouse-Geisser was used to

see the significance. VO<sub>2</sub> Max between all three variations were significantly different as p-value >.05.

**Table 4:** Pairwise Comparisons of VO<sub>2</sub> Max for Variations

Measure:VO <sub>2</sub> Max						
(I) Grouping	(J) Grouping	Mean Difference (I-J)	Std. Error	p-Value	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
V <sub>1</sub>	V <sub>2</sub>	-1.684*	.089	.000	-1.910	-1.458
	V <sub>3</sub>	-.559*	.046	.000	-.677	-.441
V <sub>2</sub>	V <sub>3</sub>	-1.125*	.079	.000	.924	1.326
Based on estimated marginal means						
*. The mean difference is significant at the .05 level.						
b. Adjustment for multiple comparisons: Bonferroni.						

Table4 shows the pairwise comparison of VO<sub>2</sub> Max for three variations that there was significant difference between V<sub>1</sub> & V<sub>2</sub>, V<sub>1</sub> &V<sub>3</sub>, V<sub>2</sub> & V<sub>3</sub> as p-Value is less than 0.05 level of significant.

**4. Discussion of Findings**

As result of this study showed significance difference occurs between V<sub>1</sub> & V<sub>2</sub>, V<sub>1</sub> & V<sub>3</sub> means that running in a group improves the VO<sub>2</sub> max performance of athletes. This result may be due to the fact that grouping generate motivational factor inside subjects as well competitive sentiment so they put their optimum effort and work hard. Every competitive occasion is a opportunity to beat the best performance (G4athlete). In games and sports, it is a deep-rooted belief that a cluster of persons working mutually is far more efficient than the same persons working separately of one another. As naturally assume that the performance has increased as the individual perceived competence as a function of hard work and absolute capacity.

Result of this study also showed significance difference between V<sub>2</sub> & V<sub>3</sub>, as proposed social cognitive theory offers a feasible way to describe exercise behaviour. Individual who are dissatisfied with their current exercise behaviour, who reveal high levels of exercise self-efficiency, and who put exercise purposes are usually talented to attain it. Exercise self-efficiency is a authoritative forecaster of exercise behaviour (Cox.1998) [4]. The feature of achievement motivation is the way to view the own perceived ability. Individuals can assess their capability in two different ways which will be evidenced in the acceptance of two different achievement goal orientations. The first is task orientation and second ego-orientation. The subjects of V<sub>3</sub> may be as called task-oriented athletes; they approve mastery policies and focus upon self-referenced criteria for determining success. They have faith in hard

working during practice sessions, in skill development and based their perception of success upon personal improvement and exerting maximum effort. They have faced complexity or failure, these athletes are mostly probable to persevere and demonstrate advantageous motivational behaviors. On the other hand, subjects of V<sub>2</sub> may be called ego-oriented athletes; focus upon external criteria for determining success. They think that opportunity and social comparisons are vital achievement criteria. The victory or performance measured normatively referenced by demonstrating superior ability and outperforming others (Cox.1998) [4]. Not only this in third variation the athletes work as pace-setter for one another so their performance improves. The athletes of pre-oriented group put more efforts and labor to retain their own position or defeat the others so, they give better performance than randomized group athletes.

**5. Reference**

1. Elizabeth Quinn VO<sub>2</sub> Max-definition Retrieved on 2014, 2015. From <http://sportsmedicine.about.com/od/glossary/g/VO2Max.htm> on 12 Aug, 2015
2. Cooper KH. A means of assessing maximal oxygen uptake. Journal of the American Medical Association, 1968; 203:201-204. Retrieved on Feb 2, 2016 from <http://www.topendsports.com/testing/tests/cooper.htm>.
3. Johnson M. What Is VO<sub>2</sub> Max?. Retrieved on 2012, 2015 from <http://runneracademy.com/what-is-vo2-max/>.
4. Cox H. Richard Sports psychology: concept and application (3rd ed.). McGraw-Hill, 1998.
5. Åstrand PO. Rodahl K. Textbook of work physiology (3rd ed). Mac Graw-Hill, New York, 1986.
6. Saltin B, Strange S. Maximal oxygen uptake: old and

- new arguments for a cardiovascular limitation. *Med. Sci. Sports Exerc.* 1992; 24(1):30-37.
7. Nielsen HB. Arterial desaturation during exercise in man: implication for O<sub>2</sub> uptake and work capacity. *Scan. J Med. Sci Sports.* 2003; 13:339-358.
  8. Assomo PB, Mandengue SH, Faye J, Diop M, Guessogo MR, Bâ A *et al.* Analysis of psychological effects of the presence of peers and space perception during the performance of the twelve minutes run test (12-MRT) in estimating maximal oxygen consumption. *Int J Perform Anal Sport.* 2012; 12:282-290.
  9. Jowett S, Lavallee D. Relations entre pairs dans le sport chez les jeunes. In: De Boeck(ed). *Psychologie sociale du sport.* Bruxelles, 2008, 45-60.
  10. Perreault S, Vallerand RJ. Coming from behind: on the effect of psychological momentum on sport performance. *J Sport Exerc Psychol.* 1998; 20:421-436.
  11. Mauger AR, Jones AM, Williams CA. The effect of non-contingent and accurate performance feedback on pacing and time trial performance in 4-km track cycling. *Br J Sports Med.* 2011; 45:225-229.
  12. Hulleman M, De Koning JJ, Hettinga FJ, Foster C. The effect of extrinsic motivation on cycle time trial performance. *Med Sci Sports Exerc.* 2007; 39(4):709-715.
  13. G4athlete Light Year Sports Biomechanics: Working Together. Retrieved on Feb 5, 2016 from <http://g4athlete.com/team-vs-individual-sport/>.