

## THE EFFICACY OF COOPER PROTOCOL DANCE AEROBICS IN CAUSING PHYSIOLOGICAL CHANGES IN THE ENDURANCE CAPACITY OF MIDDLE AGED WOMEN.

Pallavi Sawant<sup>1\*</sup>, J.V.Gadkari<sup>\*\*</sup>,

\*EX-Assistant Professor, Dept of Physiology ,GGMC & JJ hospital, Mumbai 400008 \*\* Professor & Head, Department of Physiology, Seth GSMC & KEMH, Mumbai 400016

**Abstracts: Introduction: Critical Training Threshold** is an important parameter to consider before engaging in any kind of physical activity. It depends on the frequency, Intensity, type of training and initial fitness level as proposed by Karnoven. The following study analyses the effect of Cooper Protocol formulated Dance Aerobics on fitness parameters of middle aged women. The aim is to see if this Protocol causes physical exertion enough to cross Critical Training Threshold **Material & Method:** 120 middle aged female volunteers were tested for  $VO_{2max}$ , heart rate, BP of which 60 (group I) engaged in regular dance aerobics (Cooper protocol). **Conclusion:** The aerobic dancers exhibited lower values of resting HR ( $z = -4.431$ ) BP( $p=0.00746$ ) higher values of  $VO_{2max}$  ( $p = 0.00201$ ). This elucidates the hitherto controversial aerobic dance as an effective fitness activity and proves the efficacy of Cooper Protocol Dance Aerobics, which should be made popular at the aerobic gyms.

**Key Words:** Cooper Protocol, Aerobic Dance,  $VO_{2max}$ , Blood Pressure

**Author for correspondence:** Pallavi Sawant, C/O S S Uttekar, 102, B wing, Bholenath Apt, Patilwadi, Savarkar Nagar, Thane West, Mumbai 400606 .E- mail: drpallavisawant@yahoo.in

### Introduction:

The lifestyle disorders which plague the population today are, to a large extent attributable to the stress related to urban living<sup>15,19</sup>. Modern India is, by all means health conscious, with a lot of working population engaging themselves in one kind of health related activity or another. In the era of expensive gyms and costly anorexic medications, it is vital that the people realise the importance of 'Critical Training Threshold'<sup>16</sup>. Karnoven et al provided a simple method to gauge the critical training threshold from initial level of fitness, training frequency, training duration, training intensity<sup>(12,16)</sup> to ensure optimum benefit from their respective training protocols whether, followed in gymnasiums or at home. This study takes into consideration these four factors during an aerobic dance protocol. It may serve to determine whether, **Cooper Protocol**, an aerobic dance protocol inculcates the above four parameters in sufficient quota to be established as an effective fitness regimen in middle aged women<sup>9</sup>. This age group was specifically chosen because Dance Aerobics is a popular fitness activity at this age<sup>3</sup>.

The study analyses the effect of dance aerobics on endurance capacity and blood pressure levels in middle aged women. The dance aerobics is a recent, very popular method of exercise<sup>15</sup>. It has advantages of not requiring costly equipment music and gyms. However, any random dance movement does not constitute dance aerobics<sup>13</sup>. Perhaps due to this very misconception, many studies conducted on dance aerobics have yielded mixed results<sup>6,10,12,17,18</sup> in the fitness parameters of the volunteers. The following study uses aerobic dance steps designed according to the Cooper Protocol, Dr. Kenneth Cooper, the founder of dance aerobics<sup>3</sup>.

The protocol is as follows: A short warm – up period consisting of alternate flexion relaxation of shoulder joint, elbow joint, wrist joint, hip joint, knee joint, ankle joint accompanied by deep breathing is followed by a section of more strenuous aerobic exercise. Exercise intensity increases the heart rate to a level, at which cardiovascular training effects will occur. This 'training zone' is dependent upon age and fitness, and is usually between 60% and 90% of the maximum heart rate and is predetermined by Dr. Cooper in his protocol<sup>3</sup>. The protocol is as follows:

STEPS	REPETITIONS
Jogs on spot	2 X 8
4 gallops, two star jumps	2 X 4 Left & Right
Raise knee and kick	2 X 4 Left & Right
Double skips on spot	2 X 8
Flex foot and elbows	2 X 8 Left & Right
4 gallops, two star jumps	2 X 8 Left & Right
Raise knee and kick	2 X 4 Left & Right
Double skips on spot	2 X 4
Flex foot and elbows	2 X 8 Left & Right
4 gallops, two star jumps	2 X 8 Left & Right
Raise knee and kick	2 X 4 Left & Right
Double skips on spot	2 X 4
Flex foot and elbows	2 X 8 Left & Right
4 gallops, two star jumps	2 X 8 Left & Right
Double skips on spot	2 X 4 Left & Right
Flex foot and elbows	2 X 4
4 gallops two star jump, repeat	2 X 8 Left & Right

- After maintaining this intensity for some time, the heart rate is reduced slowly in preparation for a period of muscular conditioning

wherein all the joints of upper and lower limbs are stretched and relaxed alternatively.

#### **Material and Methods:**

The following study was carried out in Seth GSMC and KEM Hospital after the approval from the institutional ethics committee. 120 women volunteers divided in two groups participated in the study.

**Inclusion Criteria: Group I consisted of** 60 women of age group 30 – 45 practicing aerobic dancing regularly for atleast three months. The Intensity of training was thrice a week for one hour each. **GROUP II consisted of working women of** 30 – 45 year age group working in Tertiary health centre of Municipal Corporation Greater Mumbai. These women were not performing any trained exercise.

**Exclusion Criteria:** The following individuals were excluded from the study:

1. Volunteers having history of cardiovascular diseases, asthma, respiratory diseases.
2. Volunteers suffering from arthritic disorders, skeletal deformities, or neuromuscular abnormalities.
3. Individuals with any acute illness such as respiratory tract infection, gastroenteritis.
4. Volunteers who were engaged in other forms of exercise in addition to the aerobic dancing.

Group I women were selected from a Dance academy wherein Cooper Protocol was specifically implemented by the author. Group II consisted of the nursing staff of the hospital. It was ensured that both groups had a similar routine, namely 2 hours of daily train travel, 8 hour sedentary job, similar meals and one weekly off.

Prior to testing, required pre-test instructions were given to all volunteers the tests were properly explained and demonstrated.

Written informed consent was obtained from both groups before the procedure. Total participants of age group 30 to 45 (average 37.5 yrs) fulfilling the inclusion criteria were included in the study. Weight, Resting heart rate, blood pressure and  $VO_{2max}^{2,16}$  were measured for both the groups. The first two parameters were measured after giving complete rest to volunteers for 10 minutes lying down. Resting Heart Rate estimated for one minute on the radial pulse by the digital palpation method. The resting blood pressure was estimated by a sphygmomanometer on the right brachial artery in phase V korotkoff. The weight was taken by the electronic weighing machine, Biometrix system, on empty stomach in the morning. The  $VO_{2max}$  was measured using Queens Step Test<sup>2,16</sup>. A Three-minute step test (each step 16.25 inches) was used to evaluate the exercise heart rate. The subjects performed each stepping cycle to a four step cadence, 'up up down down'. The women performed 22 step ups per minute, regulated by a metronome set at 88 beats per minute. The step test began after a brief demonstration and practice. At the completion of 3 minutes, pulse rate was measured for 15 seconds, after 5 to 20 secs of recovery<sup>(7)</sup>. (STPULSE) Recovery Heart Rate was converted to beats per minute and calculated as:

$$VO_{2max} = 65.81 - (0.1847 \times STPULSE) \text{ for women}^{16}$$

### Result:

The results obtained were statistically analysed. Unpaired "t" test was used to compare the resting heart Rate, systolic and diastolic blood pressure, and  $VO_{2max}$ . P- Value < 0.05 was considered as significant. In cases where t test failed, Mann Whitney Test was applied as in RHR, SBP and the resulting p value indicated extremely high significance.

The values of resting heart rate, Systolic BP(SBP), Diastolic BP(DBP) were significantly lower in group I compared to group II. The mean weight in two groups did not differ significantly

**P < 0.05 was significant.**

Z value < 2.96 was significant.

**Table1:** Comparison of  $VO_{2max}$  and physiological parameters in the two groups.

### Discussion:

Due to absence of specific protocol the studies conducted on dance aerobics, have yielded mixed results<sup>(1,10,17,18)</sup> Most of these studies have focused

Variables	Aerobic dancer		Working woman		Mann-Whitney Test applied		
	Mean	SD	Mean	SD	z-value	p-value	Difference is-
Weight	62.36	8.93	63.98	9.93	-0.945	0.3464	Not significant
Resting HR	73.21	8.15	80.67	8.03	-4.431	9.39E-06	Significant
SBP (mm Hg)	119.08	12.12	131.43	15.11	-4.481	7.42E-06	Significant
DBP (mm Hg)	77.70	8.16	81.43	6.86	-2.676	0.00746	Significant
Queen step test	38.88	5.33	35.19	5.48	-3.089	0.00201	Significant

on Body lipids, and the comparison of  $VO_{2max}$  is not elucidated<sup>(6,13)</sup>. The study shows a positive correlation between dance aerobics and cardiovascular benefits. The women engaged in regular aerobic dance followed according to a proper protocol exhibited a lower resting heart rate and blood pressure. There was no significant change in body weight.  $VO_{2max}$  was also on higher side, reflecting better endurance capacity of women engaged in aerobic dance. Higher values of  $VO_{2max}$  in the dancers may be due to improved pulmonary function owing to the increased vital capacity due to opening of the dormant pulmonary capillaries<sup>(14, 16)</sup>. The increased cardiovascular endurance may be due to decreased peripheral resistance as well as the increased coronary vessel cross sectional area. All the above effects may be due to release of nitrous oxide from the vascular endothelium<sup>(4, 16)</sup>. The Exercise training induces marked vascular remodeling by increasing angiogenesis and arteriogenesis<sup>(4, 16)</sup>. Regular aerobic dancing causes alternate contraction and relaxation of the larger muscle groups causing Opening of dormant capillaries in muscle to accommodate the increased flow to blood to muscles, angiogenesis Increased synthesis of enzymes required for the TCA cycle and ETC,

especially the slow twitch fibers. Increased capacity to remove lactate from the circulation. The NPY released during exercise may improve the vagal tone causing lower levels of BP/ RHR<sup>(14)</sup>.

Above adaptations cause better extraction of oxygen from the blood, reducing the work of heart. The advantage of incorporating dance as fitness measure is a high motivation factor. **Conclusion:** Optimum benefits of exercise are only availed by proper techniques. The population needs to be sensitised regarding the proper aerobic exercise protocols as determined for particular gender, age groups for optimal benefits before undertaking dance aerobics or any other exercise as fitness activity.

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**Conflict Of Interest:** none