

A Comparative Study of Development of Endurance among the Aerobic Gymnasts by Using Two Different Methods of Pranayama

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Introduction:

Training: The word 'Training' has been a part of human language since ancient times. It denotes the process of preparation for some task. This process invariably extends to a number of days and even months and years. The term 'training' is widely used in sports. The regular and systematic use of physical exercise, however, does not guarantee maximum improvement in performance. The effect of these exercises is increased or decreased by a multitude of factors.

Endurance: Endurance is a very important ability in sports. Endurance is the product of all psychic and physical organs and systems. No other motor ability depends so much on the working capacity of complete psycho-physical apparatus of humans as endurance. All other performance factors depend on one or more parts of this psycho-physical apparatus and as a result are directly or indirectly affected by endurance.

Aerobic Gymnastics is internationally recognized and popular sport in which individual and team of six gymnasts exhibit their vigor, skill, execution and graceful performance for evaluation and score the points under organized rules.

Pranayama (Devanagari: प्राणायाम, *pranayama*) is a Sanskrit compound. V. S. Apte provides fourteen different meanings for the word *prana* (Devanagari: प्राण, *prana*) including these: Breath, respiration, the breath of life, vital air, principle of life (usually plural in this sense, there being five such vital airs generally assumed, but three, six, seven, nine, and even ten are also spoken of) Energy, vigor, the spirit or soul

Present study is an inspiration to do something for the aerobic gymnasts. The rationale behind the formation of hypothesis is that the training in pranayama will subside the ailments of the body at the same time enhances the system functioning, on the same base considering the development of endurance of the sportsman through pranayama. It is always noticed that the performance in any sports is enhanced through the supplements in the form of nutrition, training and massage manipulations. To overcome the performance hindrance caused through endurance in aerobic gymnastics a new training method is implemented and the results are drawn. The confidence level of the players is seen definitely increased through the development of endurance.

The need of these players is proper guidance, nurturing and exposure of optimum things at right time and age and the affection, understanding about their feelings. To excel in sports one is expected to have all the innate physical, physiological, psychological, sociological qualities not in normal, but in higher qualities. The idea of considering aerobic gymnasts is that they possess all the qualities required to excel in sports except capability of endurance and skill which is of most importance for aerobic gymnastics.

Growth and development in any creature on earth is inevitable and is a lifelong process. In this study specific qualities in endurance abilities are considered which are trained through pranayama to different groups along with the traditional endurance training methods as continuous training method and interval training method. The comparison is made to show that the development of endurance is seen better in the players whose training included pranayama along with the traditional endurance training methods and the actual sport.

The subjects were randomly selected from different schools from only one center. The endurance ability tests were administered primarily and after a gap of one and half month between the age groups of 10 to 15. The raw scores were then statistically analyzed and compared for interpretation. It was noticed that there is no significant difference in different groups' viz. 1st Experimental Group-1 with Kapalbhathi; 2nd Experimental Group-2: Anulom-Vilom, but a significant difference is found between the two experimental groups and the 3rd Control Group.

Few similar studies were conducted at various geographical areas. Few difficulties on ground and with management of schools and training centers were faced by the researcher during the study. Based on the result of this study, a training methodology can be established for aerobic gymnasts. The results of the study can be implemented for the alterations of psychological mind set like pessimism, inferiority, reactionary of aerobic gymnasts towards facing the complexities, reconstructing pessimism and developing confidence. The details of the purpose, objectives, significance, hypothesis, limitation, delimitations, required definitions, methodology, analysis, interpretation, conclusion, recommendations and suggestions are detailed logically.

In this research several facets of the endurance development of gymnasts from 10 to 15 years are covered. Problems and procedures of testing are discussed. The inter-relationships between endurance tests scores is explored, including a review of the findings of some factorial studies carried out within recent years. The manners in which endurance proficiencies improve as players are supplemented with pranayama are compared among themselves.

Objectives of the Study:

To find out, access and analyze the developments taking in endurance ability among aerobic gymnasts at particular age group.

1. To understand if any specific endurance development method is helpful for the aerobic gymnasts.
2. To understand various parameters of endurance ability associated with pranayama in certain age group of aerobic gymnastics.
3. To understand scientific base for methods of training in endurance for aerobic gymnastics along with the traditional means of pranayama.
4. To understand how the endurance ability will enhance with any specific methods of pranayama for endurance.

Hypothesis:

H1: According to the researcher, there may be significant difference of development of endurance through kapalbhathi method in experimental group of aerobic gymnasts when compared to the control group of aerobic gymnasts.

H2: According to the researcher, there may be significant difference of development of endurance through anulom-vilom method in experimental group of aerobic gymnasts when compared to the control group of aerobic gymnasts.

H3: According to the researcher, there may be significant difference of development of endurance in kapalbhathi method and anulom-vilom in experimental groups among aerobic gymnasts.

Delimitations:

1. The study is delimited to both the male and female students.

2. The study is further delimited to the age group between 10 to 15 years.
3. The study is delimited to students from Aurangabad district, Maharashtra.
4. The study is delimited to the standard endurance training and tests applicable for specific age groups and sex.
5. The study is further delimited to the school going students.
6. The study is delimited to two types of pranayama.
7. The study is delimited to the aerobic gymnasts only.

Limitations:

1. Diet and rest of the children was a limitation.
2. Involvement of students during endurance test was a limitation.
3. Physical, mental, weather, school, house and surrounding conditions were a limitation.

The present research work had various limitations which were beyond the control of researcher and were considered as one of the major limitations of the study.

Sample:

The samples of this study are randomly selected from the gymnastics center of Jawahar Colony with their date of birth lying between 1995 and 2001 in boys and girls. The selected age groups of the subjects were from 10 to 15 years. In each group 15 subjects were selected. All the selected subjects were aerobic gymnasts staying either in school hostels or at their residence to ensure the untrained development in endurance specifically with pranayama. In all, 45 subjects were tested initially and the same 45 subjects were tested finally after one and half month with training imparted on them. The tests were conducted for two days for four hours approximately on each group of 15 subjects. In all, 45 subjects were considered for obtaining the difference between the developments of endurance through two methods of pranayama. Every subject was allotted with a code and a separate self contained form for test results. The tests were selected in the aspects of development of endurance for aerobic gymnastics. Development of endurance abilities and their complex forms are considered for evaluation. The tests were administered individually under standard conditions applicable for specific tests and the time period required between two tests is amply considered.

Variables:

Dependent Variables:

1. Endurance of Boys and Girls

Interweaving Variables:

1. Sex: Boys and Girls
2. Age: 10 to 15 years.
3. Criteria: Aerobic Gymnasts.

Independent Variables:

Training of Pranayama

1. VO₂ max through Canadian fit test (20 meters shuttle run).
 2. Metabolic Equivalent through Canadian fit test (20 meters shuttle run).
 3. 600 Yards run and walk test for endurance.
- VO₂ max through Cooper test (12 minute run or walk test).

Tools and Means:

There are lot of endurance ability tests or means and tools, but the research scholar intends to attend Canadian Fit Test, Coopers Test and 600 Yard run and walk test to know the VO₂ Max and Metabolic Equivalent.

Means Used

1. **Personal data bank:** It is used to collect the information of an individual. Personal data bank consists of the following aspect: Full name, date of birth and age, diet (vegetarian/ mix), height and weight.
2. **Motor ability tests:**
 - 20 meters shuttle run (Canadian fit test) for metabolic rate.
 - 20 meters shuttle run (Canadian fit test) for Maximum oxygen uptake capacity (VO₂ max).
 - 600 Yards run and walk test for endurance
 - VO₂ max through Cooper test (12 minute run or walk test).

Weekly Training Schedule:

Days	Warming -Up	Experimental Group 1 Kapalbhati	Experimental Group 2 Anulom-Vilom	Cooling-Down, Stretching and Shavasana: 15 Minutes
Monday	General Minutes 10	15 Minutes	15 Minutes	5Minutes Shavasana; 5 Minutes Cooling down exercises and 5 Minutes Stretching
Tuesday	General Minutes 10	15 Minutes	15 Minutes	5Minutes Shavasana; 5 Minutes Cooling down exercises and 5 Minutes Stretching
Wednesday	General Minutes 10	15 Minutes	15 Minutes	5Minutes Shavasana; 5 Minutes Cooling down exercises and 5 Minutes Stretching
Thursday	General Minutes 10	15 Minutes	15 Minutes	5Minutes Shavasana; 5 Minutes Cooling down exercises and 5 Minutes Stretching
Friday	General Minutes 10	15 Minutes	15 Minutes	5Minutes Shavasana; 5 Minutes Cooling down exercises and 5 Minutes Stretching
Saturday	General Minutes 10	15 Minutes	15 Minutes	5Minutes Shavasana; 5 Minutes Cooling down exercises and 5 Minutes Stretching

Schedule of Pranayama:

Type of Pranayama Experimental Group - 1	Time / Repetitions
1. Pran Aakarshana (a) Inhalation by both nostril and exhalation by both nostrils (1:2) (b) Inhalation by both nostril and exhalation by mouth (1:2)	3 times each
2. Kapalbhati	15 minutes
3. Bharamari	5 times
4. Udgit (Chanting of 'AUM')	5 times

Type of Pranayama Experimental Group - 2	Time / Repetitions
1. Pran Aakarshana (a) Inhalation by both nostril and exhalation by both nostrils (1:2) (b) Inhalation by both nostril and exhalation by mouth (1:2)	3 times each

2. Anulom – Vilom	10 minutes
3. Bharamari	5 times
4. Udgit (Chanting of 'AUM')	5 times

The subjects were selected from the different schools that were undergoing aerobic gymnastics from last at least 2 years. In all 3 testes were selected for evaluating the development of endurance abilities of the subjects between 10 to 15 years. To have the difference of data for assessing the development it was decided to organize the test on 45 subjects; 15 in each group; 3 groups in all and the same subjects to be evaluated after a gap of one and half month after imparting the training as scheduled.

Statistical Methods:

To analyze the collected data the scores are arranged according to the comparison and in sequential order so as to find out the statistical values. The following statistical variables are selected for comparing, analyzing and interpretation of numerical values and basing on which the findings are discussed.

Mean is computed by adding all the scores and then dividing by the number of scores involved. The mean is used in the study to measure the average in growth and development.

Standard Deviation is computed in the study for the measures of variability. Standard deviation reflected the magnitude of the deviations of the scores from their mean.

For testing the null hypothesis for the difference between various sample means the t-Test is used at significance of .05 levels.

Results and Discussions

Results of the Comparison of the Development of the VO₂ Max by Canadian Fit Test Performance

The mean development in VO₂ Max by Canadian Fit Test post test of EG-1K: 101-115 is found 51.8.

The mean development in VO₂ Max by Canadian Fit Test post test of EG-2AV: 201-215 is found 45.6.

Table 1: Evaluation of significance of development of Canadian Fit Test-VO₂ Max of EG-1K: 101-115 and EG-2AV: 201-215 by using t-test

VARIABLES	t-Test Results	Df	COMMENTS
EG-1K:101-115 EG-2AV:201-215	0.152467	28	Insignificant

*Significant at 0.05 level

From the above table it is clear that the t value is 0.152467 tested for significance at .05 level for the VO₂ Max between the two experimental groups is found insignificant when compared to the table value at 28 degree of freedom

Results of the Comparison of the Development of the Metabolic Equivalent with Canadian Fit Test Performance

The mean development in MET post test by Canadian Fit Test of EG-1K: 101-115 is found 14.80667.

The mean development in MET post test by Canadian Fit Test of EG-2AV: 201-215 is found 13.02667.

Table 2: Evaluation of significance of development of MET of EG101-115 and EG201-215 by using t-test.

VARIABLES	t-Test Results	Df	COMMENTS
EG-1K: 101-115 EG-2AV:116-130	0.473622	28	Insignificant

*Significant at 0.05 level

From the above table it is clear that the t value is 0.473622 tested for significance at .05 level for the Metabolic Equivalent between the two experimental groups is found insignificant when compared to the table value at 28 degree of freedom

Results of the Comparison of the Development of the Endurance by 600 Yards Run and Walk Test Performance

The mean development in endurance analyzed by 600 Yards Run and Walk Test post test of EG-1K: 101-115 is found 150.

The mean development in endurance is analyzed by 600 Yard Run and Walk Test post test of EG-2AV: 201-215 is found 156.2667.

Table 3: Evaluation of significance of development of endurance when tested by 600 Yards Run and Walk Test of EG-1K: 101-115 and EG-2AV: 201-215 by using t-test

VARIABLES	t-Test Results	DF	COMMENTS
EG-1K:101-115 EG-2AV:116-130	0.982891	28	Insignificant

*Significant at 0.05 level

From the above table it is clear that the t value is 0.982891 tested for significance at .05 level for the endurance ability between the two experimental groups is found insignificant when compared to the table value at 28 degree of freedom

Results of the Comparison of the Development of the VO₂ Max by Coopers Test Performance

The mean development in VO₂ Max by Coopers Test post test of EG-1K: 101-115 is found 51.8.

The mean development in VO₂ Max by Coopers Test post test of EG-2AV: 201-215 is found 45.6.

Table 4: Evaluation of significance of development of Coopers Test-VO₂ Max of EG-1K: 101-115 and EG-2AV: 201-215 by using t-test

VARIABLES	t-Test Results	Df	COMMENTS
EG-1K:101-115 EG-2AV:201-215	0.152467	28	Insignificant

*Significant at 0.05 level

From the above table it is clear that the t value is 0.152467 tested for significance at .05 level for the VO₂ Max between the two experimental groups is found insignificant when compared to the table value at 28 degree of freedom

Discussion:

The development of VO₂, Metabolic Equivalent and Endurance in between EG-1K: 101-115 with EG-2AV: 201-215 is found insignificant when tested for significance by t- test at 0.05 levels.

Conclusion:

From the tables the values of the Mean, Standard Deviation and ANOVA of Canadian Fit Test, Cooper Test, Metabolic Equivalent and 600 Yard Run-Walk Test displays **significant** difference of development of endurance is found through **experimental method-1 Kapalbhati** method in experimental group of aerobic gymnasts when compared to the **control group**, hence **Hypothesis: 01 is accepted.**

From the statistical values of the Mean, Standard Deviation and ANOVA of Canadian Fit Test, Cooper Test, Metabolic Equivalent and 600 Yards Run-Walk Test, displays **significant** difference of development of endurance is found through **experimental method-1 Anulom-Vilom** method in experimental group of aerobic gymnasts when compared to the **control group**, hence **Hypothesis: 02 is accepted.**

From the statistical values of the Mean, Standard Deviation and ANOVA of Canadian Fit Test, Cooper Test, Metabolic Equivalent and 600 Yard Run-Walk Test displays **insignificant** difference of development of endurance is found through **experimental method-1 Kapalbhati** in aerobic gymnasts when compared to the **experimental method-1 Anulom-Vilom**, hence **Hypothesis: 03 is rejected.**

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