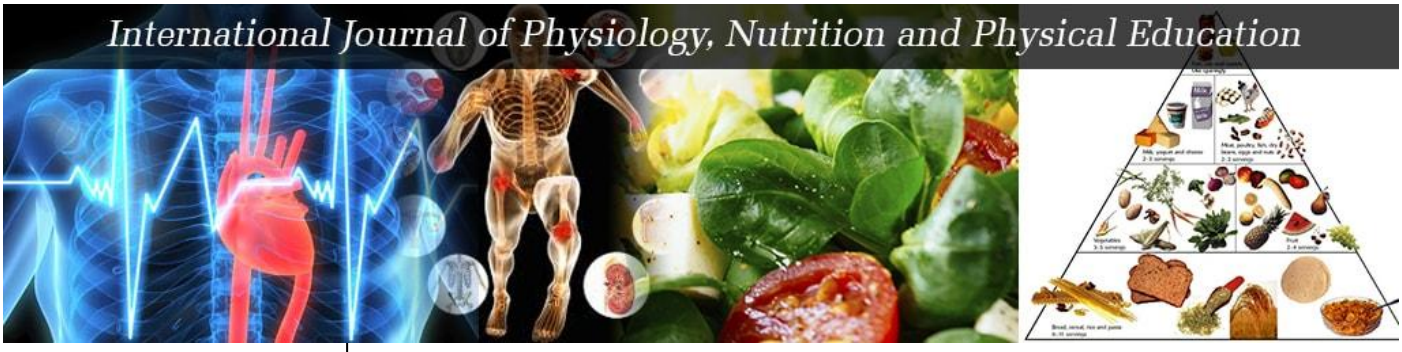


**ISSN:** 2456-0057
IJPNPE 2019; 4(1): 1073-1078

www.journalofsports.com
Received: 21-11-2018
Accepted: 23-12-2018

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# Effect of swimming training on body mass index of beginner swimmers

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**Abstract**
**Background**: Every training program has its own effects on the physiological functioning; the present study would serve in to know about these effects in depth. Keep in mind researcher investigated the effect of swimming Training on Body Mass Index of beginner swimmers.
**Materials and Methods**: For achieving the purpose of this study total 50 male beginner swimmers were selected as subject from H.V.P.Mandal's Amravati, Maharashtra. Their age was ranging from 13 to 15 years, Body Mass Index is an indicator of obesity. The index is expressed as the ratio of weight to height squared.Body Mass Index was calculated by using the

$$\text{Body Mass Index (BMI)} = \frac{\text{Body Weight (Kg)}}{(\text{Standing Height in Meter})^2}$$

Total body weight was recorded in Kilogram by using standard weighing machine. Height was recorded in centimeters and then converted in meters by using Stadiometer.All the selected subjects were divided in to two groups. Only experimental group underwent swimming Training for 48 weeks. Pre Mid and Post tests were applied for both the groups to find out the significant effect of swimming training on Body Mass Index Time.
**Result:** The data were analyzed through't'-test and ANOVA statistical techniques. The statistical findings revealed that experimental group insignificantly in Body Mass Index through swimming training.
**Conclusions**
1. Insignificant improvement has been shown by both the Control and Experimental group in Body Mass Index after 48 weeks of swimming programme.
2. Both the Experimental and Control group have shown insignificant improvement in Body Weight after 48 weeks of Experimental programme.
3. The Experimental as well as Control group have shown significant improvement in Standing Height after 48 weeks of Experimental treatment. The Experimental group also shown significant improvement in between mid and Post-test, whereas Control group did not shown such result in between mid and Post-test.

**Keywords:** body mass index and swimming training.

## Introduction
Every training program has its own effects on the physiological functioning; the present study would serve in to know about these effects in depth. The result of the study would indicate the effect of swimming training on Body Mass Index of school going boys.
The findings of the study would throw light on the effect of different duration of swimming training for the better result as well as physiological adaptation among adolescent boys.

### Hypothesis
In the beginning of the study, it was hypothesized that there would be significant effect of swimming training on, Body Mass Index of school going boys. It was further hypothesised that there would be significant difference between the effect of 24 weeks and 48 weeks of training on the selected dependent variables.

### Body Mass Index (Operational Definitions of the Term)
Body Mass Index is an indicator of obesity. The index is expressed as the ratio of weight to height squared.

$$\text{Body Mass Index (BMI)} = \frac{\text{Body Weight (Kg)}}{(\text{Standing Height in Meter})^2}$$

**Methodology**

The school going male swimmers who used to come for regular practice at Hanuman Vyayam Prasarak Mandal's swimming pool, Amravati served as the sources of data. Total 50 school going male swimmers were selected by employing purposive sampling method, who had the ability to swim at least 500 meters in any survival stroke. The average age of the subjects were thirteen (13) years, ranging between 13 to 15 years. Their age was verified from the school admission register. The subjects were divided randomly into two groups viz. Experimental group and Control group; each group consisted of twenty five subjects.

**Analysis of the data**

To determine the significance of difference between the means of the Control and Experimental groups, independent t-test was employed for Pre-test, Mid-test and Post-test separately for each variable. The data were further analysed by applying One Way Analysis of Variance (ANOVA) in order to determine the significant difference among the groups for each selected dependent variables. When the difference was found to be significant, the LSD Post Hoc Test was applied to assess the significance of difference between the paired means of the selected variables for the Pre, Mid and Post-test of Control and Experimental groups. All the data were analysed by using (SPSS) Statistical Package for Social Sciences. To test the hypothesis the level of significance was set at 0.05, and it has given in the following tables.

**Table 1:** Mean, standard deviation and t-ratio for the pre, mid and post- test of control and experimental groups in body mass index

| Test | Group | Mean | Standard Deviation | Mean Difference | Standard Error | t-ratio |
|---|---|---|---|---|---|---|
| Pre-test | Control | 17.840 | 2.498 | 0.054 | 0.665 | 0.082@ |
| | Experimental | 17.786 | 2.196 | | | |
| Mid-test | Control | 17.308 | 2.411 | 0.480 | 0.649 | 0.740@ |
| | Experimental | 16.828 | 2.168 | | | |
| Post-test | Control | 16.750 | 2.402 | 0.085 | 0.642 | 0.133@ |
| | Experimental | 16.664 | 2.132 | | | |

@ Not significant at 0.05 level

Tabulated $t_{0.05\,(48)} = 2.0106$

From the above Table-27 it is evident that there is no significant difference between the Control and Experimental group in Pre-test, Mid-test and Post-test means of Body Mass Index as the calculated t-values of 0.082, 0.740 and 0.133 respectively are less than the tabulated t-value of 2.0106 at 0.05 level of confidence for the 48 degrees of freedom. The mean values of Body Mass Index are graphically depicted in Figure-1.

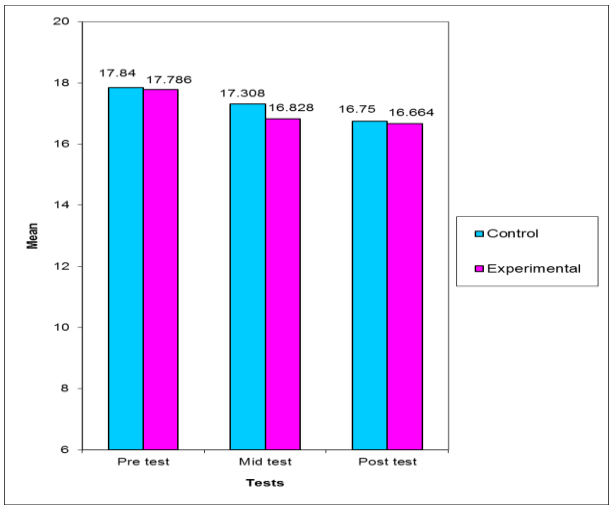


**Fig 1:** Comparison of Means among the Pre, Mid and Post-Test of Control and Experimental Groups in Body Mass Index

**Table 2:** Summary of one way analysis of variance for the data on body mass index of pre, mid an post-test of Control group

| Source of Variance | Degree of Freedom | Sum of Square | Mean Sum of Square | F-ratio |
|---|---|---|---|---|
| Between the Groups | K-1<br>3 – 1 = 2 | 14.867 | 7.433 | 1.251@ |
| With in Group | N –0020K<br>75 – 3 = 72 | 427.853 | 5.942 | |

@ Not Significant at 0.05 level Tabulated $F_{0.05\,(2,\,72)} = 3.123$

An examination of Table-28 reveal that there is no significant difference among the Pre, Mid and Post-test of Control group in Body Mass Index, because the calculated F-ratio of 1.251 which is less than that of tabulated F-value of 3.123 at 0.05 level for the 2/72 degrees of freedom.

Since the calculated F-ratio was not found to be significant, Least Significant Difference (LSD) Post Hoc Test was not applied.

**Table 3:** Summary of one way analysis of variance for the data on body mass index of pre, mid and post-test of Experimental group

| Source of Variance | Degree of Freedom | Sum of Square | Mean Sum of Square | F-ratio |
|---|---|---|---|---|
| Between the Groups | K-1<br>3 – 1 = 2 | 18.333 | 9.166 | 1.955@ |
| With in Group | N – K<br>75 – 3 = 72 | 337.639 | 4.689 | |

@ Not Significant at 0.05 level Tabulated $F_{0.05\,(2,\,72)} = 3.123$

Findings of Table-29 show that there is no significant difference among the Pre, Mid and Post-test of Experimental group in Body Mass Index, because the calculated F-ratio of 1.955 is less than the tabulated F-value of 3.123 at 0.05 level of confidence for the 2/72 degrees of freedom.

Insignificant difference was found among the Pre, Mid and Post-test of Experimental group in Body Mass Index and hence Least Significant Difference (LSD) Post Hoc Test was not applied to determine the paired mean difference.

**Table 4:** Mean, standard deviation and t-ratio for the pre, mid and post- test of control and experimental groups in weight

| Test | Group | Mean | Standard Deviation | Mean Difference | Standard Error | t-ratio |
|---|---|---|---|---|---|---|
| Pre-test | Control | 38.120 | 4.947 | 0.035 | 1.466 | 0.024@ |
| | Experimental | 38.156 | 5.411 | | | |
| Mid-test | Control | 37.018 | 4.931 | 0.747 | 1.469 | 0.509@ |
| | Experimental | 37.270 | 5.443 | | | |
| Post-test | Control | 37.813 | 4.871 | 0.516 | 1.455 | 0.355@ |
| | Experimental | 38.329 | 5.402 | | | |

@ Not significant at 0.05 level  Tabulated $t_{0.05\,(48)} = 2.0106$

From the above Table-30 it is evident that there is no significant difference between the Control and Experimental groups in Pre-test, Mid-test and Post-test means of in Weight as the calculated t-value of 0.024, 0.509 and 0.355 respectively are less than the tabulated t-value of 2.0106 at 0.05 level of confidence for the 48 degrees of freedom. The mean values of weight are graphically depicted in Figure-2.

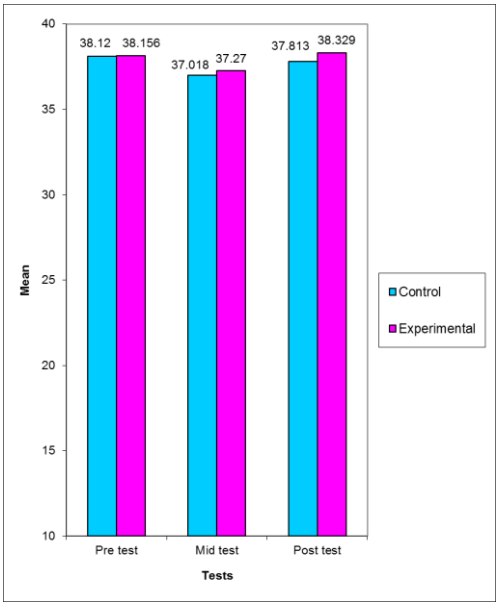


**Fig 2:** Comparison of Means among the Pre, Mid and Post-Test of Control and Experimental Groups in Weight

**Table 5:** Summary of one way analysis of variance for the data on weight of pre, mid and post-test Of control group

| Source of Variance | Degree of Freedom | Sum of Square | Mean Sum of Square | F-ratio |
|---|---|---|---|---|
| Between the Groups | K-1<br>3 – 1 = 2 | 1.224 | 0.612 | 0.025@ |
| With in Group | N – K<br>75 – 3 = 72 | 1740.473 | 24.173 | |

@ Not Significant at 0.05 level  Tabulated $F_{0.05\,(2,\,72)} = 3.123$

An examination of Table-31 reveal that there is no significant difference among the Pre, Mid and Post-test of Control group in Weight, because the calculated F-ratio of 0.025 is less than that of tabulated F-value of 3.123 at 0.05 level for the 2/72 degrees of freedom.

Insignificant difference was found among the Pre, Mid and Post-test of Control group in Body Weight and hence Least Significant Difference (LSD) Post Hoc Test was not applied to determine the paired mean difference.

**Table 6:** Summary of one way analysis of variance for the data on weight of pre, mid and post-test of Experimental group

| Source of Variance | Degree of Freedom | Sum of Square | Mean Sum of Square | F-ratio |
|---|---|---|---|---|
| Between the Groups | K-1<br>3 – 1 = 2 | 16.119 | 8.060 | 0.275@ |
| With in Group | N – K<br>75 – 3 = 72 | 2113.876 | 29.359 | |

@ Not Significant at 0.05 level  Tabulated $F_{0.05\,(2,\,72)} = 3.123$

Findings of Table-32 show that there is no significant difference among the Pre, Mid and Post-test of Experimental group on Weight, because the calculated F-ratio of 0.275 is less than the tabulated F-value of 3.123 at 0.05 level of confidence for the 2/72 degrees of freedom.

Insignificant difference was found among the Pre, Mid and Post-test of Experimental group in Body weight and hence Least Significant Difference (LSD) Post Hoc Test was not applied to determine the paired mean difference.

**Table 7:** Mean, standard deviation and t-ratio for the pre, mid and post- test of control and experimental groups in height

| Test | Group | Mean | Standard Deviation | Mean Difference | Standard Error | t-ratio |
|---|---|---|---|---|---|---|
| Pre-test | Control | 1.464 | 0.049 | 0.000 | 0.014 | 0.006@ |
| | Experimental | 1.464 | 0.046 | | | |
| Mid-test | Control | 1.484 | 0.053 | 0.003 | 0.014 | 0.229@ |
| | Experimental | 1.487 | 0.049 | | | |
| Post-test | Control | 1.505 | 0.056 | 0.011 | 0.015 | 0.739@ |
| | Experimental | 1.516 | 0.049 | | | |

@ Not significant at 0.05 level  Tabulated $t_{0.05\,(48)} = 2.0106$

From the above Table-33 it is evident that there is no significant difference in between Control and Experimental groups in Pre-test, Mid-test and Post-test of Height because the calculated t-values of 0.006, 0.229 and 0.739 less than the tabulated t-value of 2.0106 at 0.05 level of confidence for the 48 degrees of freedom. The mean values Height are graphically depicted in Figure-3.

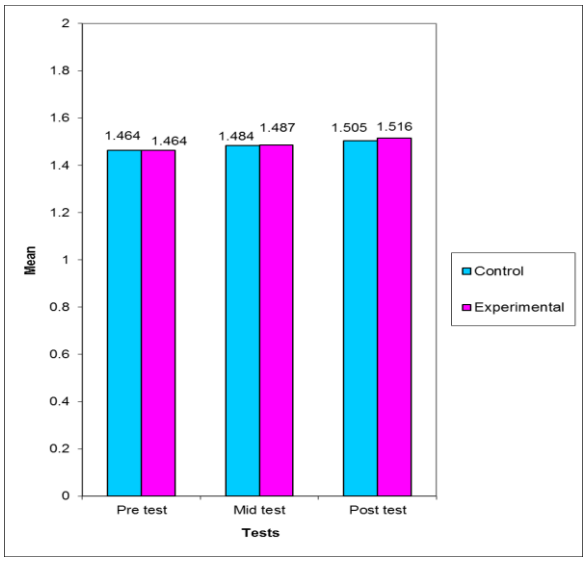


**Fig 3:** Comparison of means among the pre, mid and post-test of control and experimental groups in height

**Table 8:** Summary of one way analysis of variance for the data on height of pre, mid and post-test of control group

| Source of Variance | Degree of Freedom | Sum of Square | Mean Sum of Square | F-ratio |
|---|---|---|---|---|
| Between the Groups | K-1<br>3 – 1 = 2 | 0.021 | 0.011 | 3.785* |
| With in Group | N – K<br>75 – 3 = 72 | 0.203 | 0.003 | |

* Significant at 0.05 level  Tabulated $F_{0.05\,(2,\,72\,)} = 3.123$

Table-34 reveal that there is significant difference among the on Pre, Mid and Post-test of Control group in Height, as the obtained F-value of 3.785 is higher than the Tabulated F-value of 3.123 needed to be significant at 0.05 level for the 2/72 degrees of freedom.

The obtained F-ratio was found to be significant and hence to determine the paired mean difference Least Significant Difference (LSD) Post Hoc Test was employed. The paired mean difference is shown in Table-9

**Table 9:** paired mean difference for the data on height of pre, mid and post-test of control group

| Mean | | | Mean Difference | Critical Difference |
|---|---|---|---|---|
| Pre-test | Mid-test | Post-test | | |
| 1.464 | | 1.505 | 0.041* | 0.030 |
| 1.464 | 1.484 | | 0.020@ | 0.030 |
| | 1.484 | 1.505 | 0.021@ | 0.030 |

* Significant at 0.05 level of confidence
@ Not Significant at 0.05 level of confidence

It is evident from the Table-35 that mean difference between Pre and Post-test is 0.041, which is greater than the Critical Difference value of 0.030. Hence there is significant difference among the Pre and Post-test of Control group in Height.

The Table also show that the mean difference in between Pre and Mid-test is 0.020 and mid and Post-test is 0.021, which are less than the Critical Difference value of 0.030. Hence there is no significant mean difference in between Pre and Mid-test as well as mid and Post-test of Control group in Height. The ordered mean difference has been graphically shown in Figure-4.

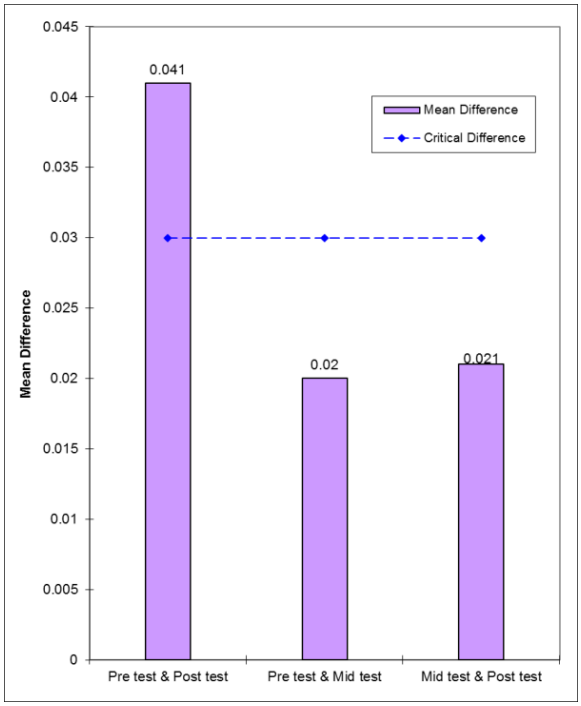


**Fig 4:** Comparison of Mean Differences among the Pre, Mid and Post-Test of Control Group in Height Along with Critical Difference

**Table 10:** Summary of one way analysis of variance for the data on height of pre, mid and post-test of experimental group

| Source of Variance | Degree of Freedom | Sum of Square | Mean Sum of Square | F-ratio |
|---|---|---|---|---|
| Between the Groups | K-1<br>3 – 1 = 2 | 0.034 | 0.017 | 7.525* |
| With in Group | N – K<br>75 – 3 = 72 | 0.165 | 0.002 | |

* Significant at 0.05 level  Tabulated $F_{0.05\ (2,\ 72)} = 3.123$

Table-36 show that there is significant difference among the on Pre, Mid and Post-test of Experimental group in Height, as the obtained F-value of 7.525 is quite higher than the Tabulated F-value of 3.123 needed to be significant at 0.05 level for the 2/72 degrees of freedom.

Since the obtained F-ratio was found to be significant, to determine the paired mean difference Least Significant Difference (LSD) Post Hoc Test was employed. The paired mean difference is shown in Table-11.

**Table 11:** paired mean difference for the data on height of pre, mid and post-test of experimental group

| Mean | | | Mean Difference | Critical Difference |
|---|---|---|---|---|
| Pre-test | Mid-test | Post-test | | |
| 1.464 | | 1.516 | 0.052* | 0.027 |
| 1.464 | 1.487 | | 0.024@ | 0.027 |
| | 1.487 | 1.516 | 0.029* | 0.027 |

* Significant at 0.05 level of confidence
@ Not Significant at 0.05 level of confidence

It is evident from the Table-37 that mean difference between Pre and Post-test is 0.052 and mid and Post-test is 0.029 which are greater than the Critical Difference value of 0.027. Hence there is significant difference among the Pre and Post-test and mid and Post-test of Experimental group in Height.

The Table also show that the mean difference in between Pre and Mid-test is 0.024 which is less than the Critical Difference value of 0.027. Hence there is no significant mean difference in between Pre and Mid-test of Experimental group in Height. The ordered mean difference has been graphically shown in Figure-5.

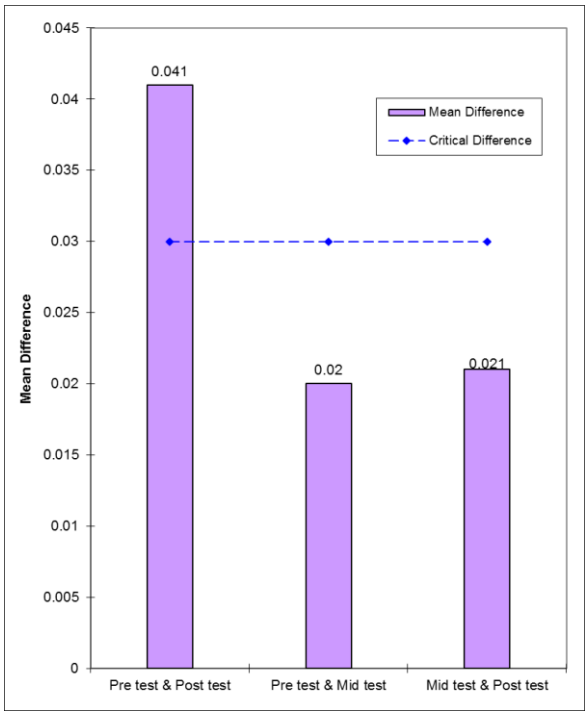


**Fig 5:** Comparison of mean differences among the pre, mid and post-test of experimental group in height along with critical difference

**Discussion on Findings**

It is also learnt from the statistical findings that there was no significant difference between the Experimental and Control group in Body Mass Index. It may be because the age group of the selected subjects was 13 to 15 years, where maximum growth and development of the body occurs due to natural phenomena, moreover in this period children keep them busy with a number of physical activities as normal growth of the body is observed and simultaneously body does not allow to accumulate the body fat beneath the skin. Hence insignificant difference between the Experimental and Control group has occurred in this study.

**Conclusions**

Within the limitations of the present study and on the basis of the findings, the following conclusions are drawn-

1. Insignificant improvement has been shown by both the Control and Experimental group in Body Mass Index after 48 weeks of swimming programme.
2. Both the Experimental and Control group have shown insignificant improvement in Body Weight after 48 weeks of Experimental programme.
3. The Experimental as well as Control group have shown significant improvement in Standing Height after 48 weeks of Experimental treatment. The Experimental group also shown significant improvement in between Mid and Post-test, whereas Control group did not shown such result in between Mid and Post-test.

**References**


1. Cecil M, Colwin. "Outline of Training Program", Swimming into the 21st Century, First Edition, (Illinois: Leisure Press, 1992.
2. Dick Hannula, NortThorton. The Swim Coaching Bible, (Champaign, IL: Human Kinetic Publishers Inc., 2001).
3. Davendra K, Kansal. Text Book of Applied Measurements Evaluation and Sports Selection, (New Delhi: DVS Publication, 1996), 234.
4. Emmett W. Hines, Fitness_Swimming, (Human Kinetics Publication, US, 1999.
5. Counsilman, James E. Competitive Swimming Manual for Coaches and Swimmers, (London: Pelham Books, 1986).
6. Counsilman, James E. The Science of Swimming, (New Delhi: S. Chand & Co. Ltd., 1989).
7. Colwin, Cecil M. "Outline of Training Program", Swimming Into the 21stCentury, First Edition, (Illinois: Leisure Press, 1992).
8. Ghosh, Chandan. Encyclopedia of Sports and Games, (New Delhi: Hinduja Foundation, Konark Publisher Pvt. Ltd., 1997).
9. Hannula, Dick, Thorton, Nort. The Swim Coaching Bible, (Champaign, IL: Human Kinetics Publishers Inc., 2001).
10. Hannula, Dick. Coaching Swimming Successfully, (Champaign IL: Human Kinetrics Inc., 2003).
11. Hines, Emmett W. Fitness Swimming, (Human Kinetics Publication, US., 1999).
12. Leonard, John. "Exercise Physiology: Proper Conditioning", Science of Coaching Swimming, (Champaign: Illinois: Leisure Press, 1992).
13. Uppal AK, Science of Aspects Training, (New Delhi: Friends Publications, 2009).
14. http://en.wikipedia.org/wiki/swimming
15. www.sciencedirect.com
16. www.search.proquest.com
17. www.inflinet.ac.in
18. www.sciencedirect.com