Chapter – II

REVIEW OF RELATED LITERATURE

The relevant studies gleaned from various sources which the research scholar has come across are cited below:

Bhole and Karambelkar\(^1\) studied the “effect of Yoga training on vital capacity and breath holding time”, measuring vital capacity in ml. and breath holding time in seconds respectively in 147 and 139 males respectively, between the age group of 18 – 50 years, before and after 3 weeks training programme in 20 Asanas, two breathing practice and 3 Kriyas at nine Yoga camp held during the year 1959-69. An average increase of 15 seconds in the breath holding time and 157 ml. in vital capacity were observed after training periods.

Another study was conducted on breath holding (internal and external) and vital capacity, the results indicated a consistent improvement both in breath holding and vital capacity as a result of yogic training.

A study on physical fitness as influenced by yogic training indicated that school children and adults undergoing long and short term yoga training showed improvement in physical fitness index.

Wanger and Bagchi\textsuperscript{2} measured finger temperature and finger pulse volume before and after Kapalbhati, Ujjayi and Bhasrika Pranayama and reported that:

(i) Average finger temperature decreases in Ujjayi and Bhasrika only.

(ii) It showed increases in Kapalbhati.

(iii) The heart rate showed elevation of two beats per minute during Bhasrika and 4 beats during Kapalbhati.

(iv) In non-yogic hyperventilation the elevation was much greater, amounting to increase of 28-32 beats per minute.

(v) In the same subjects systolic blood pressure increased by 6 mm. of hg. during Bhasrika and 12 mm of hg. during Kapalbhati and decreased slightly during Ujjayi.

Khodaskar\textsuperscript{3} conducted a comparative study of effects of Yogic and non-yogic exercises on selected physiological variables of Kabaddi players. This study was conducted on 75 male Kabaddi players of age group 18 – 25 years of local physical education training college. The subjects were divided into three groups, (a) Experimental yogic exercise group, (b) Non-yogic exercises group and (c) Control group, yogic and non-yogic training.


programme was given respectively to group A and group B for six weeks for 30 minutes daily except Sundays. All these three groups were being involved in the common physical education programme of the college in addition to the experimental exercises regularly.

The result showed that the training based on some yogic exercises had more positive effects compared to non-yogic exercises on the selected physiological variables.

Lolage and Bera\textsuperscript{4} conducted a research study on effect of Pranayama on cardio-respiratory endurance of Kho-Kho players. This experiment included 40 male college level Kho-Kho players. The subjects were randomly assigned into two equal groups and their cardio-vascular efficiency was assessed by administering three tests viz. Harvard Step Test, 8 minute Run Test and 1600 M run Test. The experimental group underwent training on Pranayama in two sessions of 45 minutes each day and 6 days in a week for a total period of 3 months. Control group did not participate in the above programme. As pre-post test data showed a larger variability, the result of ANCOVA revealed:

(i) Treatment effects of Pranayama on three tests of cardiovascular efficiency were not same.

(ii) Harvard Step Test could measure cardiovascular efficiency with insufficient reliability ($r=0.30$, $p>0.05$) whereas other two tests i.e. 8 minutes Run Test and 1600 M Run Test could measure these variables with acceptable reliability ($r = 0.82$, $p<0.01$; $r = 0.80$, $p<0.01$).

(iii) Selected Pranayamas were found useful in improving cardiovascular endurance of Kho-Kho players.

The retention of breath over a shorter and longer period is called breath holding. It was assumed that breath holding capacity affect the performance of Kabaddi Players in playing the game. With such idea the researcher undertook the study with the purpose to find out the aerobic capacity, anaerobic capacity, breath holding capacity of Kabaddi players.

Moses\(^5\) conducted a study to investigate the effect of yoga on flexibility, vital capacity and breath holding time, and found significant improvement in all these factors.

The result showed that the training based on some yogic exercises had more positive effects compared to non-yogic exercises on the selected physiological variables.

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Santra and associates conducted a study on the effect of selected Yogic practices on Asthma. Ten adult chronic asthmatic patients of age ranging between 30 to 55 years were selected as subjects. The programme of selected yogic practices was planned and administered for a period of one year in three phases. The first phase consisted of a total of thirteen Asanas of which five were old and eight were new in the third phase there were altogether twenty one yogic practices and it was administered for six months.

After completion of the training programme, it was found that the number of Asthmatic attack was noticeably reduced for all the subjects. In case of attack the intensity was mild and the subjects rarely needed any oral medicine.

Ganguly, Gharote and Jolly with a view to see the immediate effect of Kapalbhati on cardio-respiratory endurance and observed a significant improvement in the cardiovascular endurance after performing one minute of Kapalbhati as compared to hyperventilation of similar duration.

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Karambelkar Deshpande and Bhole\textsuperscript{8} conducted an experiment in respect of 11 rounds of Ujjayi and Bhastrika Prayanama with Bahya Kumbhaka and gaseous exchange and minute ventilation. It was found that a significant improvement in minute ventilation during Bhastrika and increase in oxygen consumption and CO\textsubscript{2} output compared to Ujjayi seem to be due to Kapalbhati while decrease in Ujjayi seems to be because of very low rate of breathing in a relaxed manner.

Thakur\textsuperscript{9} studied to see the effect of Kapalbhati on cardio respiratory variables. He found that there was significant increase in vital capacity (f = 26.82 against required value of 4.08), resting pulse rate (f = 45.23 against required value of 4.08), where as blood pressure and air flow rate showed significant change by practice of Kapalbhati Kriya.

Bhole and Karambelkar\textsuperscript{10} conducted a study on asthma patients. The patients stayed in hospital for a total period of eight weeks served as control period. When only simple asanas were taught to the patients. Medicines were used to overcome the attack of asthma whenever occasion arose. During the next four weeks which served as treatment or experimental period, various yoga practices were taught to them general as well as those

\textsuperscript{8} P.V. Karambelkar, R.R. Deshpande and M.V. Bhole, “Some Respiratory Studies in Ujjayi and Bhastrika Pranayama with Bahya Kumbhaka”, \textit{Yoga Mimansa} 22 : 3.


supposed to be specially useful for asthma patients. They found that the breath holding capacity increased by 15 second in 35 asthmatics, after one mouth of yogic treatment programme.

Reddy, et.al.,\textsuperscript{11} carried out study with twelve subjects equally distributed into two groups of yoga practitioners, where in group I was comprised of the practitioners with less than six months of practice. This study demonstrated that the practice of Rechaka Puraka for thirty minutes, had resulted in lower increase in oxygen consumption heart rate blood locate in group I, when compared to group II. This showed that the practice of Rechaka-Puraka for longer period is beneficial for increasing productivity.

Bhole\textsuperscript{12} has mentioned that Pranayama plays an important role in the development of the respiratory system, and out of many automatic functions in the body, was only the respiratory activity.

Kuvalayananda\textsuperscript{13} conducted an experiment to examine the effects of prolonged Pranayamic exercise on urine excretion using Bhastrika Pranayama. The observations indicated that prolonged pranayamic exercises (Bhastrika) does not lead to an increase in urine acidity.


Bhole and Karambelkar\(^{14}\) measured vital capacity in two groups at 24 males, and trained them for three weeks. The result should be significant increase in vital capacity after Yogic Training in the experimental group when compared to control group.

Gunsaria\(^{15}\) conducted a study on 30 male students of Kendriya Vidyalaya with a purpose to assess the effect of yogic practice for a period of six weeks on the body composition. In order to study the effect of selected yogasan practice on body composition, T-test was applied. It was concluded that there was no significant effect of yoga practice on body composition.

Varun\(^{16}\) conducted a study on thirty girls of B.P.E. 1\(^{st}\) year from LNIPE, Gwalior with a purpose to compare the two variables of Pranayama i.e. Anulom Vilom and Bhastrika, on effect on cardio-respiratory endurance. In order to study the comparison of two variables of Pranayama i.e. Anulom-Vilom and Bhastrika and their effect on cardio-respiratory endurance; analysis of covariance was applied and 0.05 level of significance was chosen to test the hypothesis. It was concluded that there was no significance in any of the factors between the Anulom – Vilom and


Bhastrika Pranayama. The table value required for significance was 3.35 at 0.05 level of confidence with 9 dF and all the factors were below the table value.

Patro\textsuperscript{17} conducted a study on twenty students of Yoga group from LNIPE, Gwalior with a purpose to investigate the effect of Jal Kapalbhati on selected respiratory variables. The data was obtained from each group comprising of one experimental and one control group. The initial and final test scores of each group were statistically treated adopting standard statistical procedures. The subjects were selected at randomly. The difference between the initial means of the group at the pre-test had to be taken into account during the analysis of the post-test, difference between the means by the process of application of paired t-test. The statistical analysis was tested for significance at 0.05 level. It was concluded that the Jal Kapalbhati Kriya caused significant changes over the respiratory variables namely positive breath holding time and negative breath holding time. The Jal Kapalbhati Kriya did not cause significant changes in vital capacity and resting respiratory rate.

Singh\(^\text{18}\) conducted a study on 25 male students of LNIPE, Gwalior with a purpose to assess the effect of Yogic exercises for a period of six weeks practice on low back pain. The ratio was computed to test and significance of the difference between the initial and final means of the same groups' responses low back flexibility. It is concluded that the Yogasanas reduced low back pain. The decrease of the pain proved that the obtained results were mainly on account of the effect of yoga. There was a significant increase in the back flexibility. Several cases took more time for cure.

Abraham\(^\text{19}\) conducted a study on 48 girls of B.P.E. 2\(^{\text{nd}}\) and 3\(^{\text{rd}}\) year students of LNIPE, Gwalior with a purpose to investigate the comparative effects of Suryabhedna, Kapalbhati and their combination on cardio-respiratory endurance and selected physiological variables. In order to study the comparative effects of Suryabhedna, Kapalbhati and their combination, analysis of co-variance was applied at 0.05 level of significance. It was concluded that eight weeks of training in Kapalbhati, Suryabhedna, their combination is not bringing any significant changes in the various cardio-respiratory variables of experimental and control groups. However, there was increase in mean value present in all experimental groups but they were not statistically significant.


\(^{19}\) Sanju M. Abraham, “The Comparative Effect of Kapalbhati Suryabhedna, their Combination on Cardio-Respiratory Endurance and Selected Physiological Variables” (Unpublished Master’s Thesis, LNIPE, 2000).
Singh\textsuperscript{20} conducted a study on 48 boys from Ninth Standard of Kendriya Vidyalaya, Gwalior with a purpose to investigate whether the practice of Pranayama develop accuracy in air rifle shooting. 20 compare experimental control groups on accuracy in air rifle shooting the ‘t’ test was applied. The level of significance selected was 0.05. The performances in air rifle shooting can be improved by Pranayamic training. Evidence has been found to indicate statistically significant differences in air rifle shooting at 0.05 level of confidence. Breath of an individual and concentration and attention is having relationship with each other. Concentration and attention can be developed through yogic practices.

Prakash\textsuperscript{21} conducted a study on 60 girls studying in X\textdegree class of Scindia Kanya Vidhyalaya, Gwalior with a purpose to assess the effect of free hand gymnastic exercises of yogic asanas on flexibility of girls students in the age group of 16 to 18 years. The data was statistically analysed using mean difference method (t-ratio). The level of significance chosen was 0.05. It was concluded that free hand gymnastic exercise and yogic asanas training programmes are effective in improving flexibility of the shoulder and trunk. Yogic asanas training programme was found to be more effective as compared to the free hand gymnastic exercise programme in developing the flexibility. No significant improvement in the case of control group may be a reflection of inactivity.


Dharmender\textsuperscript{22} conducted a study on 30 students from Yoga match practice and yoga specialisation group from Lakshmibai National Institute of Physical Education, Gwalior with a purpose to investigate the comparative effect of Kapalbhati and Anulom-Vilom on selected respiratory variables. In order to study the comparative effect of Kapalbhati and Anulom-Vilom on selected respiratory variables, analysis of covariance was applied at significance level of 0.05. Further, to see the significance difference between group means and least significant difference post hoc test of significance was applied. It was concluded that both treatment i.e. Kapalbhati Kriya and Anulom-Vilom Pranayam have significant effect on all the selected Physiological variable. Kapalbhati Kriya practice has significant contributing changes over the resting respiratory rate and air flow rate, and Anulom-Vilom Pranayama practice have significant changes over the vital capacity, negative breath holding time and positive breath holding time.

Singh\textsuperscript{23} conducted a study on 30 male students of Kiddy’s Corner School, Gwalior with a purpose to determine the effects of Suryabhedana Pranayama, on selected physiological variables. In order to study the effect of Suryabhedana Pranayama on selected physiological variables, the analysis of covariance statistical technique was employed to analyse the raw

\textsuperscript{22} Dharmender, “Comparative Effect of Kapalbhati and Anulom-Vilom on Selected Respiratory Variables” (Unpublished Master’s Thesis, LIPE, 2001).

data and 0.05 level of significance was chosen to test the hypothesis. It was concluded that among selected physiological variables only maximum breath holding capacity exhibited significance. Physiological variables such as resting pulse rate, vital capacity, resting respiratory rate and cardiovascular efficiency did not show the significant changes.

Dabas\textsuperscript{24} conducted a study on 25 female students of Lakshmibai National Institute of Physical Education, Gwalior with a purpose to find out the relationship of Breath Holding Capacity to selected pulmonary functions. To establish the relationship between breath holding capacity and selected pulmonary functions, the product moment correlation technique was employed. The level of significance was fixed at 0.05. It was concluded that there is significant relationship of breath holding capacities (i.e. Both positive and negative breath holding capacities) to vital capacity and forced ventilatory capacity. There is no significant relationship of breath holding capacities (i.e. both Positive and negative breath holding capacities) to the resting respiratory rate.

Sharma\textsuperscript{25} conducted a study on selected physiological variables on inter-college Level Judokas with a purpose to find out the effect of Bhasrika Prayanama on Cardio-Respiratory Endurance. The variable selected for the study were vital capacity, peak-flow rate, maximum breath


holding time (positive and negative) and Resting pulse rate. In order to
study the effect of Bhatrika Pranayam on cardio-respiratory endurance ‘t’
test was used. On the basis of results, following conclusions were drawn:

(a) Bhatrika Pranayama practice has significantly contributed to
cardio-respiratory functions, mainly pulmonary rate, vital
capacity, breath holding time, peak flow rate, and cardio-
vascular efficiency.

(b) On the basis of the study, it may also be concluded that
Bhatrika Pranayam could be used for training judokas for
improving cardio-respiratory efficiency.

Gopal\textsuperscript{26} conducted a pulmonary study on 14 Yoga trained and
untrained persons and found a significant increase in tidal volume and vital
capacity in trained subjects. Maximum breathing capacity, breath holding
time and forced expiratory volume did not show any significant differences.

Sisodia\textsuperscript{27} conducted a study on 60 Judokas studying at Lakshmibai
national Institute of Physical Education, Gwalior with a purpose to find out
effect of Transcendental meditation on selected physiological variables and
co-ordinative abilities in Judo. To determine whether the experimental
treatment was effective in bringing about a significant change in various
coo-ordinative abilities and physiological variables of the experimental group

\textsuperscript{26} K.S. Gopal, Hathayogic Studies, “Paper Read at the First National Seminar on Yoga”
Organised by Sports Department, Union Territory of Chandigarh, 1972.

\textsuperscript{27} Anurodh Singh Sisodia, “Effect of Transcendental Meditation on Selected
Physiological Variables and Co-ordinative Abilities in Judo” (Unpublished Ph.D. Thesis, LNIPE,
2000).
in contrast to the control group, an analysis of covariance technique was employed. To determine whether some significant difference between the initial and final scores of the experimental and control group existed paired ‘t’ test was administered. In case of anaerobic power performance, transcendental meditation did not improve performance significantly in comparison to the non meditators. In case of vital capacity transcendental meditation has not shown significant improvement among experimental group as compared to the control group. With regard to resting respiratory rate, transcendental meditation was found to be ineffective in improving performance as compared to the control group. The transcendental meditation was found much effective in improving resting heart rate performance among experimental group as compared to the control group. In case of total body fat percentage, transcendental meditation had shown insignificant change in comparison to non-meditators. With regard to lean body weight, transcendental meditation was found to be ineffective for experimental group as compared to control group. In case of reaction ability transcendental meditation has shown significant change in comparison to control group. In case of orientation ability performance, transcendental meditation did not improve performance significantly in comparison to the control group. The transcendental meditation was found effective in enhancing differentiation ability performance as compared to non-meditators. The balance ability improved significantly as compared to control group. In case of rhythmic ability performance, transcendental
meditation had improved performance significantly in comparison to the non-meditators.

Thorenz\textsuperscript{28} conducted a study to test the hypothesis that abbreviated relaxation training and practice leads to chronic physiological changes. These changes included decreased resting muscle potentials (MAPs), decreased resting oxygen consumption, increased forearm blood flow, decreased resting heart rate and decreased resting arterial blood pressure. In this investigation 103 volunteer subjects were screened for EMG activity and 40 subjects with the highest EMG scores, were chosen and divided into two groups experimental and control.

The experimental group underwent 6 weeks of abbreviated relaxation training and practice (2 times/week, 30 minutes per session) using the method of Jacobson as modified by Wolpe and Lazarus, while the control continued with their normal schedule. The findings suggested that under the experimental conditions of this investigation, abbreviated relaxation training and practice over a period of 6 weeks is not effective in bringing about chronic physiological changes characteristics of the relaxation response.

Thomas\textsuperscript{29} conducted a study to evaluate the effectiveness of six week of endurance training progressive relaxation, meditation on the physiological response to stress. Thirty Seven health female subjects were randomly assigned to one of four treatment groups:

1. Control : No specific training
2. Exercise : 20 minutes / day, 3 days / week
3. Meditation : 20 minutes / day, 3 days / week
4. Combination : Exercise plus meditation.

From the results it would appear that the two groups trained in progressive relaxation meditation showed a greater effect on heart rates and blood pressure than the exercise group.

Koley\textsuperscript{30} conducted a study on 20 male sprinters of Lakshmibai National Institute of Physical Education, Gwalior with a purpose to find out the relationship of coordination ability to sprinting performance in sprints events of track and field. The relationship of coordinative abilities to sprinting performance in sprints were established by using products moment correlation. It was concluded that in the case of reaction ability, balance ability, rhythmic ability, orientation ability, hypothesis accepted as they show significant relationship. In the case of differentiation ability, there was no significant relationship, hence the hypothesis was rejected.


Jinsy\textsuperscript{31} conducted a study on twenty male hockey players of Lakshmibai National Institute of Physical Education, Gwalior with a purpose to determine the relationship of selected coordinative abilities to shooting performance in hockey. The formula of product moment correlation was applied. It was concluded that the analysis of the data revealed that there is no significant relationship of coordinative abilities to shooting performance in hockey. This study also shows that shooting ability not only depends upon coordination alone as many other factors may effect on it.

Gautam\textsuperscript{32} conducted a study on twenty five female Basketball players of Lakshmibai National Institute of Physical Education, Gwalior, with a purpose to determine the relationship of coordinative abilities to shooting performance in Basketball. The formula of product moment correlation was applied. The analysis of the data revealed that there was no significant relationship of coordinative abilities to shooting performance in Basketball.

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Senan\textsuperscript{33} conducted a study on ninety undergraduate male students from Lakshmibai National institute of Physical Education, Gwalior with a purpose to compare the coordinative abilities of Bachelor of Physical Education students of LNIPE, Gwalior. Analysis of variance (F-ratio) was applied, which was followed by LSD post-hoc comparison test to determine the significance between paired means. It was concluded that orientation ability of first year and third year B.P.E. students were better than second year B.P.E. students and in differentiation ability and reaction ability, second year students were better than the other two groups. All three groups had almost the same level of balancing ability. In orientation ability, first years performed significantly better than second year and there was no significant difference between first year and third year also. In case of differentiation ability and reaction ability, second years performed significantly better than first year and third year, and there was no significant difference between first year and third year also. In case of balance ability between the groups, there was no significant difference.

\textsuperscript{33} Shine C. Senan, “Comparative Study of Correlative Ability of Bachelor of Physical Education Students” (Unpublished master’s Thesis, LNIPE, 1994).