

Review of related literature

The researcher of this study has done extensive review to find out the related literature in various libraries as well as he has gone through various databases. The relevant studies found him are enumerated below.

Karambelkar *et al.* (1982) have made sixteen observations on those adult male who were well established in different type of Pranayamas over a period of one year. They have conducted this study with two experiments. In experiment no. 1, normal breathing was recorded; expired air was collected in the Douglas bag for 10 min. same experiment was repeated with Bhastrika Pranayama with internal retention (Antar Kumbhaka) instead of normal breathing. In experiment no.2, normal breathing was compared with Bhastrika Pranayama, with external retention of breath (Bahya Kumbhaka). The study concluded that Bhastrika Pranayama with Bahya Kumbhaka (Patanjali type) and Antar Kumbhaka (Gheranda type) increase oxygen consumption and carbon dioxide tolerance.

Lolage and Bera (2002) trained forty (n=40) male college Kho Kho players aged from 20 to 30 years from Pravra college of physical education. Their cardiovascular efficiency was assessed by administering three test viz., Harvard step test ($r=0.63$ $p<0.01$), 8 minute run test ($r=0.60$, $p<0.01$) and 1600m run test. They divided the population in 2 groups the experimental group of it underwent training of Pranayama (Viz., Anulom-Vilom, Ujjayi, Suryabhedana and Bhastrika) in two sessions of 45 minutes each day, morning and evening for 6 days a week, for a total period of 3 months. The subjects of control group did not participate in the above interesting activities separately during experimental period. The result of

ANCOVA revealed that Treatment effect of pranayama on three tests of cardiovascular efficiency were not affected Harvard step tests could measure C.V. efficiency with insufficient reliability ($r=0.30$, $p> 0.05$), whereas the other tests i.e. 8 minute run test and 1600 M run test could measure this variables with acceptable reliability ($r=0.82$, $p<0.01$, $r=0.08$, $p< 0.03$). In the nut cell the selected Pranayama were found useful in improving cardiovascular endurance of Kho Kho players.

Danucalov, Simoes, Kozasa and Leite (2008) investigated the changes in cardio respiratory and metabolic intensity brought about by the practice of pranayamas (breathing exercise of yoga) and meditation during the same hatha-yoga session. Nine yoga instructors-five females and four males, (mean age of 44 ± 1), 6 of them were subjected to analysis of the gases expired during three distinct periods of 30 min: ie rest, respiratory exercise and meditative practice. A metabolic open circuit computerized system was applied (VO₂ Max Med Graphics-USA). The oxygen uptake (VO₂) and the carbon dioxide output (VCO₂) were statistically different ($P < \text{or} = 0.05$) during meditation and pranayama practices, when compared with rest. The heart rate also suffered reductions when results at rest were compared with those during meditation. A smaller proportion of lipids were metabolized during meditation practice compared with rest. The results suggested that the meditation used in this study reduces the metabolic rate, whereas the specific pranayama technique in this increases it, when compared with the rest state.

Naveen et al., (1997) assessed the effects of uninostril breathing on the performance in verbal and spatial memory tests. School children ($n=108$; whose ages ranged from 10 to 17 years) were randomly assigned

to four groups. Each group practiced a specific yoga breathing technique: (i) right nostril breathing, (ii) left nostril breathing, (iii) alternate nostril breathing or (iv) breath awareness without manipulation of nostrils. These techniques were practiced for 10 days. An age-matched control group of 27 were similarly assessed. All 4 trained groups showed a significant increase in spatial test scores at retest, but the control group showed no change. Average increase in spatial memory scores for the trained groups was 84%. It appears here that yoga breathing increases spatial rather than verbal scores, without a lateralized effect.

Harinath et al., (2004) evaluated effects of Hatha yoga and Omkar meditation on cardio respiratory performance, psychological profile and melatonin secretion. Thirty healthy men in the age group of 25-35 years volunteered for the study. They were randomly divided in two groups of 15 each. Group 1 subjects served as controls and performed body flexibility exercise for 40 minutes and slow running for 20 minutes during morning hours and played games for 60 minutes during evening hours daily for 3 months. Group 2 subjects practiced selected yogic asanas (postures) for 45 minutes and pranayama for 15 minutes during the morning, whereas during the evening hours these subjects performed preparatory yogic postures for 15 minutes, pranayama for 15 minutes and meditation for 30 minutes daily, for 3 months. Orthostatic tolerance, heart rate, blood pressure, respiratory rate, dynamic lung function (such as forced volume percentage, peak expiratory flow rate and maximum voluntary ventilation) and psychological profile were measured before and after 3 months of yogic practices. Serial blood samples were drawn at various time intervals to study effects of these yogic practices and Omkar meditation on

melatonin levels. The results noticed in this study were yogic practices for 3 months resulted in an improvement in cardio respiratory performance and psychological profile. The plasma melatonin also showed an increase after three months of yogic practices. The systolic blood pressure, diastolic blood pressure, mean arterial pressure and orthostatic tolerance did not show any significant correlation with plasma melatonin. However, the maximum night time melatonin levels in yoga group showed a significant correlation ($r=0.71$, $p<0.05$) with well-being score. Conclusion: these observations suggest that yogic practices can be used as psychologist stimuli to increase endogenous secretion of melatonin, which in turn, might be responsible for improved sense of well-being.