CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS
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SUMMARY

Our scientists have penetrated the heart of an atom and even they have successfully landed on the Mars, but they are unable to find out the scientific facts behind yoga. Scientific facts related to yoga are the bases for curing malfunctions of our body systems. This classic yoga, commonly known as the eight-fold path (Ashtanga Yoga), covers both the yoga ideology and technology. The eight steps are *yama* (conditioned yoga behaviours, both personal and social), *niyama* (attitude sublimated to yoga norms), *asana* (discipline of the physical body), *pranayama* (control over bio-energy through respiratory action), *pratyahara* (withdrawal of the senses inwards through abstraction), *dharana* (concentration), *Dhyana* (meditation) and *samadhi* (consciousness absolute or transconsciousness).

The third limb of Ashtanga Yoga is asana or posture. A steady and pleasant posture produces mental equilibrium and prevents fickleness of mind. Asanas are influencing on the endocrine glands thereby they control the hyper or hypo secretion of human hormones (Lysebeth, 1993). A group of selected asanas
may positively be effective in regulating the psychosomatic activity through controlling of the endocrine glands (Yogeshwar, 1982).

Both invertebrates and vertebrates have specialized tissues that secrete regulatory molecules into the blood and act on target cells within the same organism. These tissues constitute various endocrine glands. The messenger molecules they secrete are called hormones. The amount of hormone produced by an endocrine gland is generally very small, its concentration in the blood remains very low and is liberated towards target cells. The target cells however are extraordinarily sensitive to the hormone. The endocrine glands include the hypophysis or pituitary, the epiphysis cerebri or pineal, the thyroid, the parathyroid, the thymus, the islet part of the pancreas, the adrenals and the excretory part of the sex glands (testes and ovaries).

The adrenal glands, which lie at the superior poles of the two kidneys, are each composed of two distinct parts, the adrenal medulla and adrenal cortex. The adrenal medulla secretes, the hormones, epinephrine and nore-epinephrine. The adrenal cortex secretes an entirely different group of hormones called corticosteroids that include mineralocorticoid and glucocorticoid.
The mineralocorticoids have gained this name because they especially affect the electrolytes of the extracellular fluids – Sodium and Potassium in particular. The glucocorticoids have gained this name because they exhibit an important effect in increasing blood glucose concentration. Aldosterone, the principal mineralocorticoid, stimulates reabsorption of Na⁺ in the collecting tubules of the kidney. When Na⁺ is reabsorbed from tubular fluid, electrical neutrality must be maintained by the secretion of K⁺ or H⁺ or by concomitant reabsorption of an anion cl⁻. Cortisol, the principle glucocorticoid, mediates adaptive responses to stress and fasting. Cortisol also increases glycogen synthesis and accumulation in the liver. The catabolic effects of high concentrations of cortisol are evident on muscle where there is loss of muscle mass and development of weakness. In response to severe stress, adrenal production of cortisol may rise as much as 10-fold (West, 1981). Aldosterone regulates water balance by causing sodium reabsorption that causes water to be drawn passively into the capillaries. Thus, how aldosterone is controlled during exercise is an important concern of those involved in endurance sports and sports in which water loss is excessive, for instance, football players playing in hot climate (Noble, 1986).

Cortisol has a multitude of other activities, including the induction of several enzymes, promotion of fat deposition in faciocervicotrunical areas, promotion of uric acid excretion, promotion of appetite, reduction of circulating oesinophils and maintenance of muscular work capacity (William, 1981).
A basketball player must perform a variety of tasks in a game. Some of the movements involve primarily relative power, anaerobic-aerobic endurance, and aerobic endurance but are continuous and repetitive. The purpose of the study was to find out the influence of asanas on adrenal cortex prior and after competition. Exercise Physiologists opine that the normal adrenal cortex hormonal levels are altered through severe exercise (Keele and Neil, 1962) and the specialists in yoga feel that the abnormal secretions of endocrine glands are corrected by the asanas (Yogeshwar, 1982). Hence, the investigator was desirous to find out the influence of asanas on the adrenal cortex hormones in basketball players.

Twenty-four trained intercollegiate basketball players were selected at random from the colleges affiliated to Madurai Kamaraj University, Madurai. From the selected twenty-four players, twelve players were randomly assigned as subjects for control group and the other twelve players for experimental group.

All the subjects were initially tested at different conditions such during rest, just five minutes prior to competition and immediately after competition, before and after the experimentation. The variables namely plasma cortisol, plasma sodium and plasma potassium were tested. The age of the selected subjects ranged from eighteen to twenty five years. The experimental group underwent twelve weeks practice of selected asanas where as the control group did not undergo any type of training. The asanas namely savasana, sarvangasana,
matsyasana, halasana, bhujangasana, dhanurasana and shalabhasana were given in the practice schedule (Kuvalayananda, 1925).

This study comes under 2 (groups) × 2 (treatment) × 3 (competition) factorial design. The data pertaining to the variables in the study was examined by Factorial Analysis of Variance with repeated measures on the last two factors (ANOVA). If the main effects were found significant, Scheffe’s test was applied as a post-hoc test. If the interaction were found significant, simple effect test was applied. If the F-ratio for simple effect was found significant, Scheffe’s test was used as post-hoc test (Broota, 1992).

CONCLUSIONS

From the analysis of the data, the following conclusions were drawn.

1. The practice of selected asanas for twelve weeks did not significantly increase the secretion of plasma cortisol during rest, just five minutes prior to competition and immediately after competition among trained basketball players.

2. There was significant increase in the secretion of plasma cortisol just five minutes prior to competition.
3. There was also a significant increase in the secretion of plasma cortisol immediately after competition.

4. The practice of selected asanas for twelve weeks did not significantly increase the secretion of plasma sodium concentration during rest, just five minutes prior to competition and immediately after competition among trained basketball players.

5. The plasma sodium concentration just five minutes prior to competition was significantly lesser than the plasma sodium concentration during rest.

6. The plasma sodium concentration was significantly higher immediately after competition than during rest and just five minutes prior to competition.

7. The practice of selected asanas for twelve weeks did not significantly increase the secretion of plasma potassium concentration during rest, just five minutes prior to competition and immediately after competition among trained basketball players.

8. The plasma potassium concentration just five minutes prior to competition was significantly lesser than the plasma potassium concentration during rest.
9. The plasma potassium concentration was significantly higher immediately after competition than during rest and just five minutes prior to competition.

RECOMMENDATIONS

1. The endurance athletes are used to ingest water before competition. This reduces the extra-cellular minerals (sodium and potassium) just five minutes prior to the competition. Thus, it is recommended to consume some sort of mineral supplements along with it so that mineral balance at the extra-cellular level may not be reduced.

2. The extra-cellular mineral concentration (especially sodium and potassium) immediately after the competition is being increased due to decrease in extra-cellular blood volume. Hence, endurance athletes should compensate their water loss during the course of competition.

3. The present study was directed towards basketball players. A similarly study may be conducted on players from other games, sprinters, middle distance and endurance runners.
4. A similarly study may be conducted by increasing the number of weeks for practicing asanas.

5. A similar study may be conducted on females as subjects.

6. A similar study may be conducted with a group of asanas other than those practiced in this study.