



INFLUENCE OF VYAYAMA ON SERUM ELECTROLYTES

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ABSTRACT

In this study found that there was a strong effect of Vyayama on electrolytes in blood serum. For this study sixty healthy individuals selected randomly. Then on the starting day of Vyayama 3 ml venous blood was taken for the assessment of serum investigations. In Serum investigations Ca^{++} , Na^+ , Cl^- , and K^+ were analyzed. On the same day Vyayama was provided up to appearance of Ardhasaktalakshana on treadmill. Individuals who had taken 20 minutes for appearance of Ardhasaktalakshana were included in group-1 and individuals who had taken 15 minutes for appearance of Ardhasaktalakshana were included in group-2. Each individual did course of Vyayama for one month. Serum investigations were repeated after one month course of Vyayama.

On the basis of analysis, it was seen that Vyayama procedure causes significant decreased in serum Ca^{++} , Na^+ , Cl^- , and K^+ within normal limit.

Keywords: Vyayama, electrolytes,

INTRODUCTION

Ayurveda is an art and science of life. It was originated at the same time when life was originated. Due to complexity and difficulty, the followers are not able to understand the concepts of Ayurveda, which in turn lead to the difficulty in clinical practice. Despite the presence of such inadequate interpretation, Ayurveda hold pressure over the modern medicine, in many ways purely because of its methodical but carefully designed, harmless but holistic approach to the patient.

The objects of Ayurveda are two folded, viz. maintenance of positive health and the treatment of patients suffering from diseases. But giving emphasis to prevention is better than cure. So, Ayurveda gives importance for improvement and maintaining of healthy life. For this purpose, in Ayurveda so many rules and regulations is given such as daily regimen, seasonal regimen etc. for healthy and prolong life. Vyayama¹ is one among these and given importance that one should take Vyayama up to appearance of Ardhasaktalakshana². Vyayama has effect on maintain homeostatic mechanisms of the body; generate any adverse effects; if applied to normal individuals at physiological level is a unique task. At this point, to put down the need for this study, sincerely, this effort is to find out effect of Vyayama on human body especially at blood serum electrolytes level.

Research Methodology

Considering the limited sources and feasibility, this work is pointed towards the aim of evaluating the effect of Vyayama on serum electrolytes alone in an honest way.

Objectives of study

- To assess the influence of Vyayama on serum electrolytes.
- To analyze and interpret the study results to formulate useful guidelines.

Materials

- Stopwatch
- Treadmill

Source of Data

Normal and healthy individuals were collected randomly.

Inclusion Criteria

- Normal individuals
- Both sexes
- Age between 20 to 40Years

Exclusion Criteria

- Individuals with history of any systemic and mental disorders
- Individuals taking internal medication
- Pregnant and lactating women

Research design

Sixty healthy individuals, fulfilling the inclusion criteria were selected randomly after initial screening tests and diagnostic procedures for the intended scheme of study. Next day 3ml of venous blood was taken for the assessment of serum electrolytes analyzed (before trial) for study.

On the same day Vyayama was started in the early morning at 6 A.M. Vyayama was done up to appearance of Ardhasaktalakshana on treadmill. The period of Ardhasaktalakshana was determined by taking the mean time of Vyayama among the individuals for 5 days under supervision. Individuals who had taken 20 minutes for appearance of Ardhasaktalakshana were included in group - 1 and individuals who had taken 15 minutes for appearance of Ardhasaktalakshana were included in group - 2. In each group sample size were taken as 30.

Each individual did course of Vyayama for one month. Serum electrolytes investigations were repeated after trial (AT).

The study results were subjected to statistical evaluation for analysis and interpretation, at last made conclusions.

Procedure to perform Vyayama

The practice followed the sequence are

1. Individuals were called early in the morning at 6 O' clock.
2. Every morning before performing Vyayama the blood pressure, pulse rate and respiratory rate were noted.
3. They were asked to perform Vyayama in a well-ventilated room with loose fitted dress and minimal clothing.
4. I- group individuals were asked to walk on the treadmill at a speed of 4 Km/hr for 3 minutes. Then Jogging mode (6 km/hr) was given for next 2 minutes followed by running mode (9km/hr) for next 10 min. After this they were again asked to do Vyayama for 2 minutes on jogging mode (6 km/hr) and finally to walk (3km/hr) for 3 minutes.
5. II- group individuals were asked to walk on the treadmill at a speed of 3 Km/hr for 3 minutes, and then Jogging mode (7 km/hr) was given for next 9 minutes followed by walking mode (3km/hr) for next 3 min.
6. During the above procedure the individuals were constantly monitored for pulse rate on the display of the treadmill.
7. When the pulse rate exceeds a certain limit the Vyayama was stopped immediately.
8. At the end of the Vyayama the individuals were asked to take rest for 5 minutes in sitting position.
9. Each individual had done this Vyayama for one month.

Observation & analysis

Affect on Calcium ions (Ca^{++})(mg/100ml)

Criteria	MEAN	S.D.	T	P
BT	9.633	0.754	7.208	< 0.001
AT	8.95	0.49		

Table: Showing affect on Calcium ions (Ca^{++})(mg/100ml)

The mean Ca^{++} level before trial was 9.633 with S.D. 0.754, after trial it was reduced to 8.95 with S.D. 0.49. This difference

observed was statistically highly significant ($P < 0.001$)

Affect on Sodium ions (Na^+)(mEq/L)

Criteria	Mean	S.D	T	p
BT	137.87	0.83	23.075	< 0.001
AT	135.68	0.89		

Table: Showing affect on Sodium ions (Na^+)(mEq/L)

The mean Na^+ level before trial was 137.87 with S.D. 0.83, after trial it was reduced to 135.68 with S.D. 0.89. This difference

observed was statistically highly significant ($P < 0.001$).

Affect on Chlorides ions (Cl^-)(mEq/L)

Criteria	MEAN	S.D.	T	p
BT	101.57	2.79	35.604	< 0.001
AT	90.93	1.69		

Table: Showing affect on Chlorides ions (Cl^-)(mEq/L)

The mean chloride (Cl^-) level before trial was 101.57 with S.D. 2.79, after trial it was reduced to 90.93 with S.D. 1.69. This

difference observed was statistically highly significant ($P < 0.001$).

Affect on Potassium ions (K^+) (mEq/L)

Criteria	MEAN	S.D.	T	p
BT	4.743	0.574	10.051	< 0.001
AT	3.970	0.374		

Table: Showing affect on Potassium ions (K^+) (mEq/L)

The mean K^+ level before trial was 4.743 with S.D. 0.574, after trial it was reduced to 3.970 with S.D. 0.374. This difference observed was statistically highly significant ($P < 0.001$).

Discussion:

Affect on serum Calcium ions (Ca^{++})(mg/dl)
The mean Ca^{++} level before trial was 9.633, after trial it was reduced to 8.95. This difference observed was statistically highly significant ($t = 0.754$, $P < 0.001$).

This shows that due to effect of Vyayama, calcium level in serum is decreasing in physiological limit.

(I) Parathyroid hormone (PTH), which is the major regulator of calcium metabolism, maintains the calcium-ion concentration of the extracellular fluids.

PTH secretion is influenced by the initial bone mineral contents. It also influenced by age, gender, physical activity, other

hormonal and metabolic factors such as growth hormone, catecholamine (epinephrine and nor-epinephrine), lactic acid and calcium concentrations.

When people do exercise, catecholamines are secreted from sympathetic nerves and adrenal medulla. So parathyroid hormone secretion is stimulated by epinephrine and nor-epinephrine secretion. The principal target organs for PTH are the kidney and the skeleton.

PTH has biphasic affects on bone: continuous increase in concentration is catabolic, whereas intermittent increase in concentration is anabolic.

Catabolic effect:

The catabolic effects of PTH result from pathological conditions in which one or more parathyroid glands secrete too much hormone continuously at a sustained level. Such continuous secretion of PTH (as occurs in chronic renal disease and primary hyperparathyroidism) can lead to bone destruction.

Anabolic effect:

Regular physical exercise increases PTH secretion intermittently. It exerts its anabolic effects at four steps of bone formation i.e. 1) stimulating the proliferation of osteoprogenitor cells (bone stem cells) 2) promoting the differentiation of preosteoblasts to osteoblasts and 3) inhibiting osteoblast apoptosis 4) stimulate osteoclast activity intermittently. In this way PTH is involved in bone remodeling³.

For this process, Ca^{++} ions are taking from extracellular fluid. So, decrease in serum Ca^{++} ions occurs due to the affect of Vyayama.

(II) Growth hormone secretion increasing due to physical activity. Growth hormone strongly stimulates the osteoblast. Due to stimulation of growth hormone osteoblast in the bone periosteum and in same bone cavities deposit new bone on the surfaces of older bone. Simultaneously, osteoclasts in the bone remove old bone⁴. So, due to physical activity remodeling activity and the thickness of bone is increasing.

Physical exercise has frequently been shown to induce bone mass gain, especially in load bearing bone sites. Exercise may thus be an important factor in preventing osteoporosis.

Affect on Sodium ions (Na^+)(mEq/L)

The mean Na^+ level before trial was 137.87, after trial it was reduced to 135.68. This difference observed was statistically highly significant ($t = 23.075$, $P < 0.001$)

Affect on Chlorides ions (Cl^-)(mEq/L)

The mean chloride (Cl^-) level before trial was 101.57 after trial it was reduced to 90.93. This difference observed was statistically highly significant ($t = 35.604$, $P < 0.001$).

Affect on Potassium ions (K^+)(mEq/L)

The mean K^+ level before trial was 4.743, after trial it was reduced to 3.970. This

difference observed was statistically highly significant ($t = 10.051$, $P < 0.001$).

During Vyayama body temperature increases and sweating occurs. Sweat contains a large amount of sodium chloride. During regular exercise sweat glands become acclimatized, so that the amount of Na^+ and Cl^- lost in sweat remains in a normal range. The sweat glands acclimatization result mainly due to increased aldosterone secretion by the adrenal cortex. The aldosterone has a direct effect on sweat glands, increasing absorption of Na^+ and Cl^- from the sweat before sweat itself issue forth from sweat gland tubules into the surface of skin.

Decrease in K^+ concentration in serum results partly from the increase of secretion of aldosterone during heat acclimatization, which increase the loss of potassium in the urine as well as sweat⁵. Electrolytes maintain homeostasis by balancing pH value, acid-base equilibrium, nerve stimulation, muscle stimulation, enzyme secretion, hormone secretion etc. when present in proper amount. Vyayama can maintain this. Due to this, rejuvenation effect is happening in the body.

Conclusion

The present study entitled “*influence of Vyayama on serum electrolytes*” has been divided into: introduction, research methodology, observation & analysis, discussion and & conclusion.

The objectives of this study were to assess effect of Vyayama on serum electrolytes, with the focus to analyze and interpret the study results to formulate useful guidelines.

The research Methodology was:

Sixty healthy individuals selected randomly for the study. Then on the starting day of Vyayama 3ml venous blood was taken for the assessment of serum electrolytes like Ca^{++} , Na^+ , Cl^- and K^+ investigations.

On the same day Vyayama was provided up to appearance of Ardhasaktalakshana on treadmill. Individuals who had taken 20 minutes for appearance of Ardhasaktalakshana were included in group - 1 and individuals who had taken 15 minutes for appearance of Ardhasaktalakshana were included in group - 2. In each group Sample size were taken as 30. Each individual did course of Vyayama for one month. Investigations were repeated after one month course of ArdhasaktiVyayama.

In observation and analysis part, above results were observed. Paired t-test for quantitative parameters were used for further statistical analysis.

In discussion part, discussed about effect of Vyayama on electrolytes.

In final part, on the discussion basis all the important findings are mentioned under conclusion section. These are:

- Ca^{++} ions concentration in serum decreases within normal limit
- Na^{+} ions concentration in serum decreases within normal limit

- Cl^{-} ions concentration in serum decreases within normal limit
- K^{+} ions concentration in serum decreases within normal limit

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