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Original Research Article

Knowledge, Attitude and practice of general medical practitioners and specialty physicians regarding diseases of electrolyte imbalances

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Abstract: Disorders of fluid and electrolyte are common in public and a proper understanding of the physiological changes in body water and solute is essential. The present study was planned to study the Knowledge, Attitude and practice of general medical practitioners and specialty physicians regarding diseases of electrolyte imbalances. The study population was consisting of the 67 general medical practitioners from the rural as well as urban areas and 29 specialty medical practitioners having specialization in the subject of medicine. The study was done with the help of 15 specially prepared questionnaires validated by doing pilot study. On comparison of the knowledge, attitude and practice questionnaires scores of the general medical practitioners and specialty physicians, it was found that the specialty physicians (13.10 ± 1.73) were having more of the scores of the knowledge and attitude than that of the general medical practitioners (9.50 ± 1.64) and the difference was found to be statistically significant. (Student's t test, $p<0.001$). Therefore it was found that though the general practitioners were having the knowledge regarding the diseases of electrolyte imbalances; it was less than that of the other specialty practitioners.
Keywords: Electrolytes, Electrolytes imbalances, General medical practitioners

INTRODUCTION:

Body fluids and electrolytes play an important role in homeostasis. Homeostasis is the state of equilibrium in the internal environment of the body, naturally maintained by adaptive responses that promote healthy survival. Maintenance of the composition and volume of body fluids within narrow limits of normal is necessary to maintain homeostasis. During normal metabolism, the body produces many acids. These acids alter the internal environment of the body, including fluid and electrolyte balances, and must also be regulated to maintain homeostasis. Many diseases and their treatments have the ability to affect fluid and electrolyte balance [1-3].

Fluid and electrolyte balance is one of the key issues in maintaining homeostasis in the body, and it also plays important roles in protecting cellular function, tissue perfusion and acid-base balance. Fluid and electrolyte balance must also be maintained for the management of many clinical conditions. Electrolyte imbalances are common findings in many diseases. Imbalances in every electrolyte must be considered in a combined and associated fashion, and examinations must aim to clarify the clinical scenario for an effective and successful treatment. Most of important and prevailing electrolyte imbalances are hypo- and hyper-states of sodium, potassium, calcium, and magnesium [4-6].

Electrolytes are present in the human body. Electrolytes play an important role in many body processes, such as controlling fluid levels, acid-base balance (pH), nerve conduction, and blood clotting and muscle contraction. Potassium, sodium and calcium are all important for proper electrolyte balance. Electrolyte imbalance resulting from kidney failure, dehydration, fever, and vomiting has been suggested as one of the contributing factors toward complications observed in diabetes and other endocrine disorders [7, 8].

Electrolyte disorders are common clinical problems, especially in hospitalized patients. Since these disorders are accompanied by significant morbidity and mortality, an appropriate and rapid treatment is mandatory. Stability of the extracellular fluid, indeed, the ionic composition of the extracellular fluid surrounding our cells must be maintained within

physiologic limits by the homeostatic mechanisms of the body. For example, it is important to keep plasma sodium concentration around 140 mill equivalents per litre (mEq/L) and potassium concentration around 4 mEq/L [9].

Electrolyte gradients are controlled precisely between intra- and extracellular compartments for sustaining the normal physiological functions of the muscles and nerves. The main responsible organ for this regulation is the kidney, but other mechanisms like hormonal activities of antidiuretic hormone, aldosterone and parathyroid hormone are also involved in this process. The disorders of these systems may deteriorate the electrolyte balances and results in emergencies [6].
The present study was planned to study the Knowledge, Attitude and practice of general medical practitioners and specialty physicians regarding diseases of electrolyte imbalances.

MATERIALS AND METHODS:

The study population was consisting of the 67 general medical practitioners from the rural as well as urban areas and 29 specialty medical practitioners having specialization in the subject of medicine. The study was done with the help of specially prepared questionnaires validated by doing pilot study. A total of 15 questionnaires were formulated for the study consisting of questions about electrolytes, physiological functions and various diseases caused by these electrolytes imbalances. Approval of the local ethical committee was taken before start of the study and informed consent was taken from each of the participant. The questionnaires were distributed either by hand or through email to the participating doctors and their responses were collected after their completion. Each of the correct response were given score '1', while wrong response selection were given as score 'zero'.

RESULTS:

All the responses were collected, tabulated and analyzed. Total 85 general medical practitioners and 36 specialty physicians were contacted and sent the questionnaires, but out of these, 67 general medical practitioners and 29 specialty physicians had given their responses.

On comparison of the knowledge, attitude and practice questionnaires scores of the general medical practitioners and specialty physicians, it was found that the specialty physicians (13.10 ± 1.73) were having more of the scores of the knowledge and attitude than that of the general medical practitioners (9.50 ± 1.64) and the difference was found to be statistically significant. (Student's t test, $p<0.001$)

Therefore it was found that though the general practitioners were having the knowledge regarding the diseases of electrolyte imbalances; it was less than that of the other specialty practitioners.

Table 1: Comparison of the scores of the general medical practitioners and specialty physicians

Group	Number (n)	Mean ± SD	T value	P value
General medical practitioners	67	9.50 ± 1.64	9.8988	<0.001*
Specialty physicians	29	13.10 ± 1.73		

*p<0.001= statistically highly significant.
SD= Standard deviation.

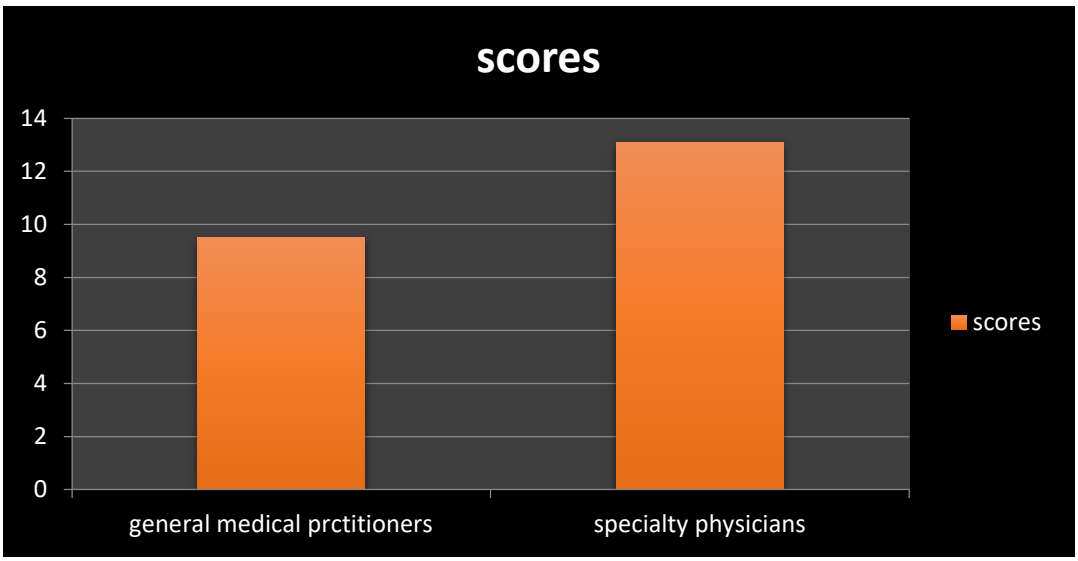

Fig 1: Comparison of the scores of the general medical practitioners and specialty physicians.

DISCUSSION:

Electrolytes are substances whose molecules dissociate, or split into ions, when placed in water. Ions are electrically charged particles. Cations are positively charged ions. Examples include sodium (Na), potassium (K), calcium (Ca_2), and magnesium (Mg_2) ions. Anions are negatively charged ions. Examples include bicarbonate (HCO_3), chloride (Cl), and phosphate (PO_4) ions. Most proteins bear a negative charge and are thus anions. The electrical charge of an ion is termed its valence. Cations and anions combine according to their valences [3, 10].

Most electrolytes enter the body through dietary intake and are excreted in the urine. Some electrolytes, such as sodium and chloride, are not stored by the body and must be consumed daily to maintain normal levels. Potassium and calcium, on the other hand, are stored in the cells and bone, respectively. When serum levels drop, ions can shift out of the storage "pool" into the blood to maintain adequate serum levels for normal functioning [5, 7, 9].

The kidney is a principally responsible organ for retention and excretion of electrolytes and fluid in healthy individuals. But, other mechanisms like hormonal interactions of antidiuretic hormone, aldosterone, and parathyroid hormone, and other factors such as physiological stress also play important roles in regulating fluid and electrolyte balance in the organism. Studies about the clinical prevalence of electrolyte imbalances often report that these disorders are frequently seen in elderly and critically ill patients, and occur in the progression of diseases such as diabetes mellitus, acute or chronic renal failures, severe cardiovascular events like myocardial infarctions, etc. To summarize, disturbances in electrolyte balances are mathematically measurable biochemical parameters in the bloodstream that determines the clinical manifestations of interactions between metabolic events such as sepsis, hormones, vascular events, medications, hydration deficiencies, and renal physiology [6, 11-14].

Hypernatremia and hyponatremia:

When natremia is too far from the normal value, the induced osmotic shift of water across the cell membrane markedly changes the cell volume. This volume decreases when hypernatremia and hyper-osmolality shift water from the cells to the extracellular compartment. In contrast, cell volume increases when hyponatremia and hypo-osmolality shift water into cells. These changes in cell volume are especially important in the central nervous system and produce seizures, coma and various other neurologic signs and symptoms [9].

Hyperkalemia and hypokalemia:

The normal ratio of around 30 of the intracellular (Ki) over the extracellular (Ke) potassium concentration is increased by hypokalemia or decreased by hyperkalemia. The resting membrane potential of -90 millivolts becomes more negative when hypokalemia increases the Ki/Ke ratio and less negative when hyperkalemia decreases this ratio. Because hyperpolarization and hypo polarization modify the excitability of nerve and muscle cells, they induce paralysis and life-threatening cardiac arrhythmias, including cardiac arrest [9].

Electrolytes are important for the following functions:

- Maintaining fluid balance.
- Contributing to acid–base regulation.
- Facilitating enzyme reactions.
- Transmitting neuromuscular reactions.

Many medical and surgical emergencies are complicated by derangement of water and electrolyte balance, the successful management of which depends upon the rapid assessment of essential clinical and laboratory data, and the prompt institution of a certain pre-arranged routine of treatment [15].

Disturbances of electrolyte balance affect primarily the volume of the extracellular fluids, while excess or loss of water will be distributed uniformly throughout the body. When the disturbances persist, or become more severe, cellular function is affected and further changes are, in consequence, superimposed on pre-existing abnormalities [15].

In the present study it was found that the general medical practitioners were not having sufficient knowledge about the physiological electrolyte balance and various diseases caused by the electrolyte imbalances.

CONCLUSION:

Therefore it was found that though the general practitioners were having the knowledge regarding the diseases of electrolyte imbalances; it was less than that of the other specialty practitioners. Therefore there is need to improve the knowledge of the general medical practitioners through continuing medical education programmes, seminars, symposiums or any other education things.

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