A STUDY TO ASSESS THE KNOWLEDGE REGARDING HYPONATREMIA AMONG NURSES WORKING IN NSICU IN SCTIMST, TRIVANDRUM 695011

PROJECT REPORT

Submitted in the partial fulfillment of the requirements

For the

DIPLOMA IN NEURONURSING

Submitted By
ATHULYA.A
Code No: 6213

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM, 695011

November 2011

CERTIFICATE FROM SUPERVISORY GUIDE

This is to certify that Miss. **ATHULY A. A** has completed the project work on "**A STUDY TO ASSESS THE KNOWLEDGE REGARDING HYPONATREMIA AND ITS MANAGEMENT AMONG NURSES WORKING IN NSICU IN SCTIMST** "under my direct supervision and guidance for the partial fulfillment for the **"DIPLOMA IN NEURONURSING** "in the University of Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum. It is also certified that no part of this report has been included in any other thesis for procuring any other degree by the candidate.

Trivandrum
November 2011

Dr. Saramma. P. P
Senior Lecturer in Nursing
SCTIMST,Trivandrum-695011

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Trivandrum
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APPROVAL SHEET

This is to certify that Miss **ATHULYA.A** bearing Roll No: 6213 has been admitted to the Diploma in Neuro Nursing in January 2011 and she has undertaken the project entitled **"A STUDY TO ASSESS THE KNOWLEDGE REGARDING HYPONATREMIA AND ITS MANAGEMENT AMONG NURSES WORKING IN NSICU IN SCTIMST** " which is approved for the Diploma in Neuro Nursing awarded by the Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, as it is found satisfactory.

Place:

Date:

Examiners

(1)_____

(2) _____

Guide

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Athulya. A

ABSTRACT

Subject: A study to assess the knowledge regarding hyponatremia and its management among nurses working in NSICU in SCTIMST, Trivandrum.

Background: Nurses in most Neuro specialties are expected to have a sufficient knowledge about hyponatremia and its management.

Objectives: 1.To assess the knowledge regarding hyponatremia and its management among nurses working in NSICU, in SCTIMST, Trivandrum.2.To find out the variation in nurses knowledge in relation to the demographic variables.

Methods: 30 Neuro Nurses were purposively selected from NSICU of Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum. Convenient sampling technique was used for selecting the sample. Total period of the study was august 2011 to October 2011. A valid questionnaire was used, in the form of multiple choices**.**

Results: Study showed that Neuro Nurses have above average level of knowledge regarding hyponatremia and its management. There is no statistically significant difference between the mean knowledge score, age, qualification and experience.

Conclusion: Based on the findings of the study 93.3% of Neuro Nurses have above average level of knowledge regarding hyponatremia and its management.

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Chapter-1
INTRODUCTION

1.1 Introduction

Hyponatremia is one of the common electrolyte imbalances that can occur in patients who undergo neurosurgeries. It causes a lot of morbidity and rarely mortality. It should be corrected with appropriate measures, or else it will worsen the condition of the patient.(Rahman Friedman,2009). As we are nurses, we must have an adequate knowledge regarding hyponatremia and its management. Nursing assessment is most important. It includes monitoring level of sensorium ,hourly urine output, weight, hemodynamic parameters, hematocrit levels, edema and daily monitoring of serum electrolyte levels. If hyponatremia is detected the physician and the nurse work collaboratively to restore normal serum sodium level and monitor the patient's response to therapies.

Hyponatremia is defined as a decrease in the serum sodium concentration to a level below 135mmol/L.It can be associated with low, normal or high tonicity. It should be further investigated and treated when the serum sodium level is less than 131mmol/L. Evaluation of hyponatremia should include a combination of physical examination findings, basic laboratory findings and invasive monitoring when available. Treatment of hyponatremia should be based on severity of symptoms. The serum sodium level should not be corrected by more than 10mmol/L/day. Cerebral salt wasting should be treated with replacement of serum sodium and intravenous fluids. Fludrocortisone may be considered in subarachnoid haemorrhage patients at risk of vasospasm. Hydrocortisone may be used to prevent natriuresis in subarachnoid haemorrhage patients. Hyponatremia in SAH patients should not be treated with fluid restriction. SIADH may be treated with urea, diuretics, lithium, demeclocycline and or fluid restriction.(Rahman Friedman,2009).

Hyponatremia is associated with negative outcomes for patients. Specifically, the mortality rates are significantly higher in hyponatremic patients across a broad range of primary disorders. So the signs and symptoms must be clearly assessed by the nurse and have a thorough knowledge regarding management and practice.

1.2 Background of the Study

Patients undergoing neurosurgery have a possibility to develop hyponatremia. It must be reported and corrected early as possible. Consequences of poor management in postoperative hyponatremic patients can be fatal. Approximately 1 million hospitalizations per year in the United States are for a principal or secondary diagnosis of hyponatremia. The annual cost of managing patients with hyponatremia has been estimated at $3.6 billion. In addition to monitory costs, hyponatremia is associated with negative outcomes for patients. Specifically, the mortality rates are significantly higher in hyponatremic patients across a broad range of primary disorders.

The prevalence of hyponatremia in the neurosurgical population has been reported as high as 50%. Because of the cerebral effects of hyponatremia, neurosurgical patients are at increased risk of complications. Such complications include severe cerebral edema, mental status changes, seizures, vasospasm and death. Unfortunately, these complications may also arise from the inappropriate treatment of hyponatremia. Correction of hyponatremia that is too slow or fast can lead to cerebral edema, seizures, osmotic demyelinating syndrome or death.

Despite the costs and complications associated with hyponatremia in the neurosurgical population, few randomized studies have been completed that describe hyponatremia when is clinically significant when serum sodium level become less than 131mmol/L. Evaluation of hyponatremia should include a combination of physical examination findings, basic laboratory studies, and

invasive monitoring when available. Treatment of hyponatremia should be based on severity of symptoms. The serum sodium level should not be corrected by more than 10mmol/L/day. Cerebral salt wasting should be treated with replacement of serum sodium and intravenous fluids. Severe hyponatremia is corrected with hypertonic saline (3% saline). The SIADH is treated using hypertonic saline. Other treatments for SIADH include diuretics and urea. Fludrocortisone may be considered in the treatment of hyponatremia in SAH patients at risk of vasospasm. Hydrocortisone may be used to prevent natriuresis in SAH patients. Hyponatremia in SAH patients at risk of vasospasm should not be treated with fluid restriction. The rate of correction of hyponatremia is determined by the severity of symptoms and rapidity of onset. Central pontine myelinolysis or osmotic demyelinating syndrome (ODS) is the most frequently cited complication in the treatment of hyponatremia. This entity was described in 1970s.ODS is most likely to occur with correction of a serum sodium level greater than 12mmol/L/day and in the setting of chronic hyponatremia (>48 hrs).Chronic hyponatremia should not be rapidly corrected. Generally, rapid correction at a rate of more than 1mmol/L/hour should be reserved for severely symptomatic and /or acute hyponatremia (<48 hrs). Severe symptoms (eg: seizures, coma) indicate cerebral edema and should trigger prompt treatments. In our setting hyponatremia is treated with oral salt, normal saline and hypertonic saline. The nurse's role is 24 hour monitoring of the patient and the proper administration of medications.

1.3 Need of the Study

Patients undergoing neurosurgery can experience hyponatremia. It is seen in many neurosurgeries especially in patients having SAH. The signs and symptoms are assessed by the nurse as well as the physician. It must be assessed by the nurse and reported to the physician and both of them work collaboratively. A nurse working in NSICU should have enough knowledge about hyponatremia and its management. Error in administration can cause detrimental patient

outcomes and increase in health care cost. So the nurse also should have adequate knowledge regarding the practice.

1.4 Statement of the Problem

A study to assess the knowledge and practice about hyponatremia in patients undergoing neurosurgery among nurses in NSICU,SCTIMST.

1.5 Objectives

The objectives of this study are,

1) To identify the knowledge of nurses regarding hyponatremia.
2) To observe the practices of nurses regarding administration of 3% saline, oral salt supplement **etc.**

1.6 Operational Definitions

Knowledge

It is the familiarity, awareness or understanding about hyponatremia, sodium balance and the complications of its imbalance and the skills in administration of 3% saline, oral supplement, gained through experience or study. And also the measurement of the requirement of the patient.

Neuro Nurses

Nurses working in NSICU except student nurses.

Hyponatremia

It is classically defined as a serum sodium level less than 135mmol/L, clinically significant has not been clearly defined. (Rahman Friedman,2009).

1.7 Methodology

This is a descriptive survey of nursing staff. The investigator first assesses the knowledge about hyponatremia among the Neuro Nurses in NSICU with a self administered questionnaire. The total duration of assessment is 10 minutes. 30 nursing staff will be selected for this study. The duration of this study is from August to October.

1.8 Delimitation

The study is limited to nursing staff working in Neurosurgical Intensive Care Unit in Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum.

1.9 Organization of the Report

The report is divided into 5 chapters. The first chapter is introduction. It includes the background of the study, the need and the significance of the study, the problem and objectives, the operational definitions of the terms included in this study, and the delimitation of the study. The chapter 2 includes the summary of related studies. Chapter 3 deals with the materials and methods of this study and chapter 4 analyses and interprets the findings, chapter 5 includes a summary of the study which includes major findings, conclusions, implications, limitations of the present study along with certain recommendations for further research. Selected references and appendices also included.

Chapter- 2
REVIEW OF LITERATURE

Introduction

Review of literature is the key step in research process which help to lay a foundation for the study. The literature review provides a background for understanding current knowledge on topic and illuminate the significance of the study. Literature review is a body of text that aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contributions to the particular topic. Literature review are secondary sources and as such do not report any new or experimental work.

2.1 Studies related to postoperative hyponatremia and subarachnoid haemorrhage

2.2 Studies related to pathogenesis of hyponatremia

2.3 Studies related to management of hyponatremia

Kelly D.F et al(1995), conducted a study in 99 patients who underwent trans sphenoidal surgery for pituitary adenomas. Their study suggested that hyponatremia, usually attributed to the SIADH ,typically occurs in a delayed fashion following surgery for pituitary adenoma. In a series of 99 consecutive patients who underwent surgery for pituitary adenoma, 9 patients developed delayed hyponatremia, 7 of whom were symptomatic. Of these 7 patients ,4 had been discharged from the hospital and required readmission on pospoperative day 7-9.In the 9 patients who developed hyponatremia, on the average, serum sodium levels began to fall on day 4 and reached a nadir on day 7.[mean sodium nadir 123mmol/l].The development of delayed hyponatremia was associated with the presence of a macroadenoma in 8 of the 9 patients. Seven of the 9 patients had serum sodium levels less than 130mmol/l and required treatment. One

patient was treated with fluid restriction alone and 6 were treated with both fluid restriction and intravenous urea therapy. Twenty-four, forty-eight hours after urea administration, serum sodium levels rose by an average of 6and 10 mmol/l respectively and at discharge levels averaged 136mmol/l.Iv administration of urea provides a rapid yet safe means of correcting symptomatic hyponatremia when fluid restriction alone is inadequate. Here the pathogenesis of delayed hyponatremia is the transient hypothalamic – pituitary disturbance, precipitated by tumor removal. The most likely mechanism is release of ADH stores from surgically manipulated neurohypophyseal cells , resulting in fluid retention and natriuresis.

Taylor S.L et al(1995), reported hyponatremia as a delayed complication of transsphenoidal resection of pituitary adenoma. Usually attributed to the syndrome of inappropriate secretion of antidiuretic hormone (SIADH), hyponatremia causes nonspecific symptoms, often after hospital discharge. To clarify the frequency, presentation and outcome of this poorly understood complication, they reviewed data base of 2297 patients who underwent transsphenoidal pituitary surgery between February 1971 and June 1993.Of 53 patients(2.3%) treated for symptomatic hyponatremia, 11 were excluded. The remaining 42 patients,11 men and 31 women aged 21-79 years, presented 4-13 days postoperatively with nausea and vomiting, headache, malaise, dizziness, confusion, anorexia and seizures. Hyponatremia was unrelated to sex, age, adenoma type, tumor size or glucocorticoid tapering. Although the clinical picture in patients is consistent with SIADH, this was not supported by the ADH levels, which were normal or low normal in the two patients in whom they were measured, suggesting the possibility that low serum sodium may not reflect SIADH. In all patients, hyponatremia resolved within 6 days; treatment consisted of salt replacement and mild fluid restriction in 37 patients and fluid restriction only in 4.Delayed hyponatremia after transsphenoidal resection of pituitary adenoma is not as rare as previously thought, nor is it necessarily associated with SIADH or with hypoadrenalism

during glucocorticoid tapering. Because of the potentially life threatening nature of this complication, patient should be informed about the symptoms of delayed hyponatremia and advised to seek immediate medical attention if they occur.

Sviri et al(1999),conducted a study in 19 patients admitted because of spontaneous subarachnoid haemorrhage to the neurosurgery department at Rambam Medical Centre in Haifa, Israel. All patients were admitted within 48 hours after the onset of SAH. There were 7 men and 12 women. The mean age was 49, with a range of 22-69 years. Neurological status was assessed every 6 hours, and level of consciousness was scored according to the Hunt and HESS classification. Conscious and neurologically stable patients were managed with bed rest, intravenous 0.9% saline and continuous drip of nimodipine at a rate of 2 mg/hour. Fluid management aimed at the maintenance of normovolemic normal blood pressure. Comatose patients were sedated and ventilated. All patients underwent CT scan on admission. Intensity of SAH was determined according to amount and location of blood on the initial CT scan. Transcranial Doppler and blood tests were performed in all patients.13 patients had transcranial Doppler evidence of cerebral vasospasm(cvs). In 7 patients, cvs was non-symptomatic and limited to the anterior circulation vessels, whereas cvs was symptomatic and involved both anterior and posterior vessels in 6 patients. None of the patients without cvs or with nonsymptomatic cvs presented with delayed neurological deterioration or brain infarction. On the contrary, delayed neurological deterioration occurred in all 6 patients of the severe cvs group. In 5 of these, follow up CT scan showed brain infarction. As a group SAH patients had initial Brain Natriuretic Peptide(BNP) levels significantly than those found in the control group. In patients with symptomatic vasospasm, BNP plasma levels showed a continuous elevation between the first and third periods. All types of natriuretic peptide have been demonstrated to be very potent vasodilators. Both the Atrial Natriuretic Peptide and Brain Natriuretic Peptide have been proposed as a plausible origin for the occurrence of the cerebral salt wasting syndrome.BNP plasma levels, is contrast, were found to be consistently elevated

in patients with aneurismal sub-arachnoid haemorrhage. The present findings suggest that secretion of BNP after spontaneous SAH may exacerbate blood flow reduction due to arterial vasospasm.

Kristof R.A et al(2009), conducted a study in 57 patients who underwent transsphenoidal adenoidectomy and were monitored preoperatively and postoperatively. They studied the incidence, spectrum of clinical manifestations and risk factors for water and electrolyte disturbances following surgery for pituitary adenoma. The patients were monitored daily for body weight, balance of fluids, serum electrolytes, plasma osmolality, plasma ADH levels, urinary sodium excretion, urinary osmolality and subjective sensation of thirst. Postoperative water and electrolyte disturbances occurred in 75.4% of the patients, in 21% as isolated hyponatremia and in 15.7% as combined Diabetes Insipidus (DI)-hyponatremia. Of all the patients with hyponatremia, 42.8% were treated by transient fluid intake restriction due to serum sodium <130mmol/L with or without symptomatology. Transient acute renal failure occurred in one of these patients. Generally electrolyte disturbances were linked to the intraoperative manipulation of the neurohypophysis. Increased thirst correlated significantly with DI and decreased thirst with the hyponatremic episode in patients with combined DI hyponatremia. Electrolyte free water clearance and sodium excretion were not correlated with DI and hyponatremia.

Kurokawa Y et al(1996), conducted a study among 31 patients with aneurysmal sub-arachnoid haemorrhage by daily measurement of water and urine balance, coupled with the serum measurements of sodium, atrial natriuretic peptides, antidiuretic hormones and plasma rennin activity. These tests are only available in specialized centers and are, therefore, not of use to the practicing physician. However, this study demonstrates well the preponderant natriuretic etiology of hyponatremia in this patient population. In the more mundane setting of daily practice, these patients can be followed and their water and electrolyte status assessed quite accurately by strict measurement of intake and output, including

sensible and insensible losses, together with daily weights and periodic(at least daily) urinary sodium measurements. When carefully adjusting the intake to match the output, plus the insensible losses, a water/electrolyte balance is easily achieved, and the risk of dehydration exacerbating or contributing to ischemic deficits from vasospasm, as outlined in this article can be averted. Most of these patients were not overhydrated, but rather normal or even dehydrated. Weighing the patient daily is a simple way of measuring the hydration, and all one has to remember is that a dehydrated patient has a sodium deficit. In addition a patient who has a urinary sodium osmolarity output in excess of the input is heading towards a sodium deficit from increased losses. This article should help dispel the pervasive myth that SIADH is a common cause of hyponatremia in neurosurgery. This myth is not only false, but potentially dangerous when it results in the initiation of therapeutic dehydration in the face of exaggerated urine sodium losses and resultant dehydration.

Sviri G.E,Shik V, Raz B and Soustiel J.F(2003), conducted a study among 38 patients with spontaneous SAH to evaluate the relationship between BNP plasma concentration during the first 12 days following SAH and the development of cerebral vasospasm. The authors propose a hypothesis for the role played by natriuretic peptides in the pathophysiology of cerebral vasospasm(cvs) based on the present findings and review of literature.BNP plasma levels were assessed at four different time periods following SAH. The clinical data were collected prospectively. Neurological status was assessed every 6 hours, and the severity of neurological impairment on admission was assessed by the Hunt and Hess grading system prior to intubation and sedation.TCD evidence of CVS was found in 26 patients, 14 patients had delayed ischemic neurological deficits(DIND).Initial BNP plasma concentrations were significantly more elevated in patients who eventually did not develop DIND. In patients without cerebral vasospasm the BNP plasma concentration decreased between days 1-3 to day 10-12.A similar trend in BNP concentration was found in patients with severe SAH. These results suggest that BNP secretion in SAH patients is closely

related to the bleeding intensity and vasospasm severity as well as to development of DIND with a progressive and marked increase during the clinical course in patients who eventually develop cerebral ischemia.BNP might play a role in the pathophysiology of CVS through its systemic effects on blood pressure and plasma volume and leading to an aggravation of brain ischemia secondary to vasospasm.

McGirt M.J et al(2004), conducted a study among 40 patients to evaluate the temporal relationship between serum BNP elevation, hyponatremia and the onset of delayed ischemic neurological deficits and to determine whether serum BNP levels correlated with the 2 week outcome after SAH.40 consecutive patients admitted with aneurismal SAH were enrolled. The patients clinical condition at admission was graded according to Hunt and Hess classification. Diagnostic cerebral angiography was performed during the first 24 hours after admission. All patients underwent craniotomy and aneurysm clipping within 48 hours of SAH. Serum sodium and BNP samples were obtained at the time of hospital admission and were repeated every 12 hours for 12 consecutive days. All patients underwent transcranial Doppler evaluation 5 times per week.16 patients experienced hyponatremia after SAH. Only 6 patients experiencing a minimal increase in admission serum BNP levels experienced hyponatremia.10 patients experiencing a large increase in BNP. This study confirms that an elevated serum BNP level is associated with both hyponatremia and Delayed Ischaemic Neurological Deficits after aneurysmal SAH. Increasing serum BNP levels independently were associated with hyponatremia. Increasing BNP levels may exacerbate blood flow reduction because of cerebral vasospasm and may serve as a marker to guide the aggressiveness of diagnostic and therapeutic management, especially in patients with low GCS scores who are difficult to assess clinically.

Qureshi A.I et al(2002), conducted a study among 298 patients to determine the prognostic significance of serum sodium concentration abnormalities. Patients included in this study were recruited from all patients with SAH who were

admitted to 54 North American neurosurgical centers. Patients with all grades of neurological conditions were eligible. Baseline factors that were recorded at the time of admission included GCS scores, blood pressure, laboratory hematocrit values, leukocyte counts, serum creatinine, sodium and glucose levels. The location and size of the ruptured aneurysms were determined from a review of conventional angiograms. In the total patients 58 developed hyponatremia and 88 developed hyponatremia within the first 9 days after SAH. Hyponatremia was further categorized as early onset for 37 patients and late onset for 21 patients. Hyponatremia was further categorized as early onset for 58 patients and late onset for 30 patients. Patients with hyponatremia were older than patients with normal sodium concentrations. They observed that a high proportion of patients develop hypernatremia or hyponatremia after aneurysmal SAH. Hypernatremia was associated with poor outcomes, independent of other factors including age and initial GCS score, both of which have been demonstrated to predict outcomes. A direct correlation was observed between the highest sodium values recorded and outcomes at 3 months. They performed a separate analysis for symptomatic vasospasm, to assess whether the poor outcomes among patients with serum sodium abnormalities might be related to an increased risk for symptomatic vasospasm, as suggested by some previous studies. NO relationship was observed between hypernatremia and the risk of symptomatic vasospasm in our analysis. Hyponatremia was not associated with either symptomatic vasospasm or 3 month outcomes. They observed that hypernatremia was associated with poor outcomes at 3 month. It remains to be determined whether hypernatremia directly contributes to outcomes or is a manifestation of severe brain injury. They did not observe an association between hyponatremia and either symptomatic vasospasm or poor outcomes.

Moro N et al(2003), conducted a study among 28 SAH patients to examine the effects of hydrocortisone, which promotes sodium retention, in SAH patients.28 SAH patients were analyzed. These patients underwent direct surgery within 48 hours after onset. Patients who received endovascular surgery and patients with

intracerebral hematoma were excluded. After the direct surgery, the patients were stratified by age and Hunt and Kosnik grades and were randomly assigned to two groups by an independent controller. Group 1 patients treated without hydrocortisone and group 2 patients treated with hydrocortisone from the day after direct surgery until day 10.After day 10, the dose was gradually reduced, and the administration was ended on day 14.Serum sodium and potassium levels, plasma osmotic pressure, serum protein levels, and serum glucose levels were measured at 24 hour interval. The daily urine volume, sodium and potassium excretions, and osmotic pressure were also determined for urine samples stored every 24 hours. Outcome was evaluated with the GCS scale at 6 months after onset. All patients were encouraged to ingest fluid and foods orally. Water balance were calculated every 8 hours from the difference between the total amount of water intake and water losses, and water replacement was performed according to the balance. Hypervolemia was induced immediately after surgery, and administration of plasma expander begun 3 days after onset until day 14.The goal of the hypervolemia was to maintain the CVP between 8 and 12cm of water by additional water supplementation. Sodium balance was calculated every 24 hours from the difference between the total amount of sodium intake and sodium excretion. The goal of the sodium replacement was to maintain the serum sodium level >140 mEq/L. Hyperosmolar fluids and blood products were not used. The study shows that hydrocortisone can inhibit hyponatremia and hypovolemia efficiently. In group 2 sodium excretion and intake remained at 700 mEq/d, and the serum sodium level and osmotic pressure were maintained at >140mEq/L and 288 mOsm/kg, respectively. Hydrocortisone can clearly attenuate excessive natriuresis in patients with SAH. This prevents hyponatremia and reduces osmotic diuresis, resulting in a decrease in the requirement of sodium and water replacement for hypervolemic therapy.

Sivakumar v et al(1994), conducted a prospective study among 21 patients with hyponatremia and natriuresis regarding the management of hyponatremia and natriuresis. The inclusion criteria are patients having serum sodium<130 mEq/L,

urine spot sodium>20mEq/L, serum osmolality<270 mOsm/kg, urine osmolality > serum osmolality, and normal adrenal, thyroid, renal, and liver functions. Once a patient entered the study, total blood volume, CVP and hematocrit were determined. In addition patients were monitored twice daily for serum sodium, serum potassium, urine specific gravity, and total intake of fluid measurement and output. Patients were treated with isotonic saline and oral salt. Patients who were capable of oral intake or who were receiving nasogastric feedings were administered fluids and salt by the enteral route; and the rest were managed with intravenous therapy. In the present study patients with hyponatremia and natriuresis were found to be hypovolemic and a significant number were found to be anemic. With a management protocol that was chiefly aimed at fluid replacement rather than fluid restriction, the hyponatremia was corrected in all patients. The results in their study indicate that the management of these patients should be dictated by the status of their extracellular volume and their hematocrit. Although blood volume is one of the ideal investigations to determine the status of the extracellular fluid volume, it may not be feasible in all patients. The placement of central venous catheters is easily accomplished, and the CVP can be determined by using a simple saline manometer. The CVP has been shown to closely reflect the changes in the total blood volume of the patients who are not very ill and have a normal cardiac and pulmonary function. However, it may not be a very reliable indicator of the blood volume in critically ill patients. In their study they found that a good correlation exists between the blood volume and CVP, and they would advocate the use of CVP measurements to guide the management of hyponatremia in patients who are otherwise healthy and have a normal cardiac function. They concluded as hyponatremia with natriuresis in neurosurgical patients is usually associated with hypovolemia, with or without anemia. Management of these patients will depend on their volume status and hematocrit and most often will include fluid replacement, with or without a blood transfusion, rather than fluid restriction.

Chapter-3
METHODOLOGY

3.1 Introduction

This chapter deals with the research approach, setting, the sample and sampling technique, development of tool , description of tool ,pilot study , data collection procedure and plan for analysis.

3.2 Research Approach

Descriptive study approach is used.

The objective of the study is: -

To identify knowledge of nurse's about hyponatremia and its management.

Find the relationship between knowledge about hyponatremia and its management and selected variables.

3.3 Settings

The study is conducted in Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram; an institute of national importance established by an Act of the Indian Parliament. It is an autonomous institute under the administrative control of the Department of Sciences and Technology, Government of India. In Sree Chitra Tirunal Institute for Medical Sciences and Technology; All Health care workers are selected on the basis of written exam and interview.

3.4 Sample and Sampling technique

The sample was selected from the nurse's in Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram. The size of the sample was thirty. The purposive sampling technique was used to collect the samples.

The sample was selected from the staff nurses in the NSICU & Diploma in Neuro Nursing students. The duration of the study period was from August 2011 to October 2011.

3.5 Inclusion Criteria

Staff nurse's working in Neurosurgery Intensive Care Unit in Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram.

3.6 Exclusion Criteria

Staff nurse's working other than NSICU.

3.7 Development of tool

An extensive study and review of literature helped in preparation of the tool. A self prepared validated tool is used as the tool for this study .

3.8 Description of the tool

Part I :- This part contains items such as demographic data which include age, sex, professional qualification, additional qualification, total years of experience.
Patr ii :- Questionnaire about the knowledge of nurse's about hyponatremia and its management.

3.9 Pilot study

Pilot study was done on October 2011. Five students were taken for the pilot study. The pilot study was conducted to find out the feasibility and practicability of the tool, methodology and the questionnaire used for this study. After pilot study no modification done in questionnaire.

3.10 Data Collection

The data was collected from the staff nurses in the neurosurgery intensive care unit of Sree Chitra Tirunal Institute for Medical Sciences and Technology, The period of data collection was from August 2011 to October 2011. The assessment of staff done while they are in NSICU.

3.11 Plan for analysis

The investigator developed a plan of analysis after pilot study. The data were coded, entered in excel sheet and analyzed using Epi info Version

3.12 Summary

This chapter presented the research approach used for the study, setting of the study, sample and sampling techniques, development of data collection tool, description of the tool, pilot study, data collection procedure, and plan for data analysis.

Chapter - 4

ANALYSIS AND INTERPRETATION OF DATA

4.1 Introduction

This chapter presents the analysis and interpretation of the data collected from 30 nursing staff working in NSICU at Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum.

Analysis are process of organizing and synthesizing data in such a way research questions can be answered. The questionnaire was based on the knowledge assessment regarding hyponatremia and its management. Interpretation refers to the process of making sense of the results and examining the implications of the findings within a broader context.

The data was coded and entered in Microsoft Excel Sheet and were analysed using epi info version.

The findings of the study were arranged and analysed under the following section.

4.2 Distribution of samples according to socio demographic data

4.3 Distribution of samples according to knowledge score

4.4 Comparison of mean, standard deviation and P value

4.2 Distribution of samples according to sociodemographic data

(1) Distribution of samples according to age

The age of the sample ranges from 23-45 with a mean age of 30.7, median of 28.5 and mode of 27.

Table 4.1 Distribution of samples according to age category

No=30

Age	Frequency	Percentage
<30 yrs	15	50%
30-39 yrs	11	36.70%
40-49	4	13.30%
Total	30	100%

Age categories were made based on the age distribution of samples so as to have a minimum number under each class. The data given in table 4.1 shows that majority of samples belong to the younger age category(<30 years)

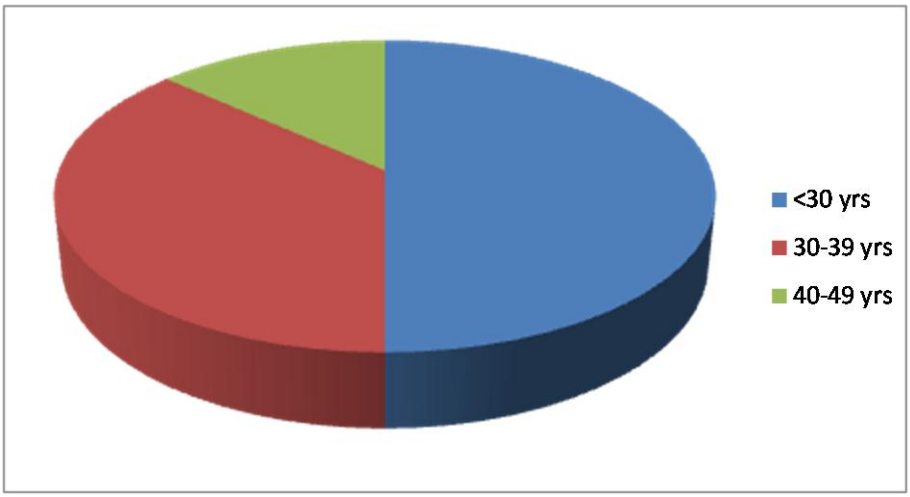

Fig 4.1 The pie diagram showing the distribution of samples according to age category.

(2) Distribution of samples according to sex

There were 28 females and 2 males.

Table 4.2 Distribution of samples according to sex category

Sex	Frequency	Percentage
Male	2	6.70%
Female	28	93.30%
Total	30	100%

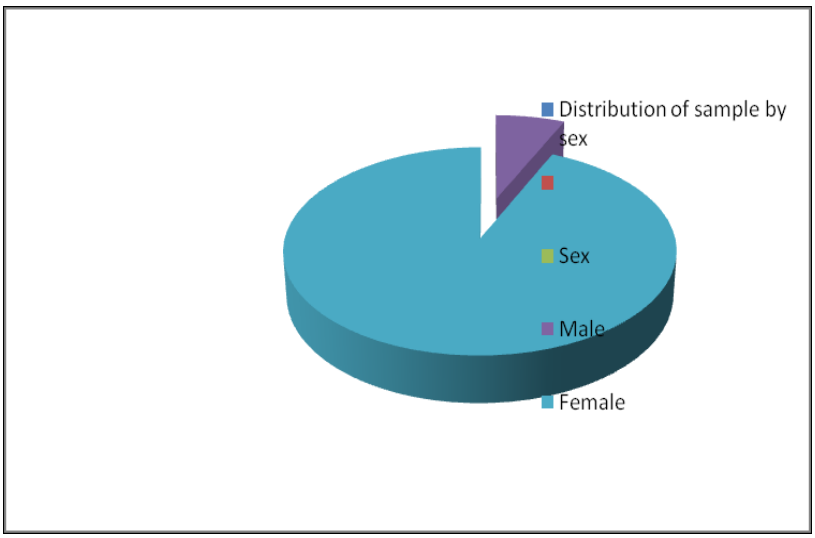

Fig 4.2 The pie diagram showing the distribution of samples according to sex.

(3) Distribution of samples according to years of experience.

Experience of nursing staff ranged from 1-20 years.

Table 4.3 Distribution of samples according to years of experience.

Experience in years	Frequency	Percentage
<5 yrs	12	40%
5-10 yrs	10	33.30%
10-15 yrs	6	20%
>15 yrs	2	6.70%
Total	30	100

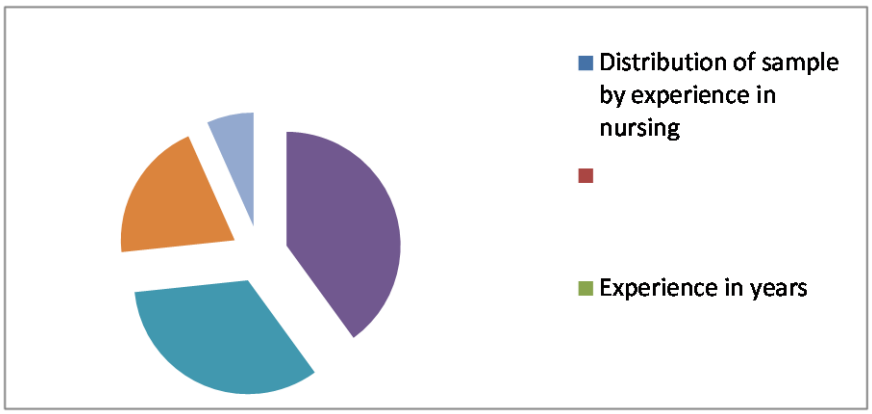

Fig 4.3 The pie diagram showing the distribution of samples according to experience in nursing.

(4) Distribution of samples according to ICU experience

Experience	Frequency	Percentage
<5 yrs	23	76.70%
5-10 yrs	7	23.30%
Total	30	100%

ICU experience of nursing staff ranged from 0.5-8 years.

Table 4.4 Distribution of samples according to ICU experience

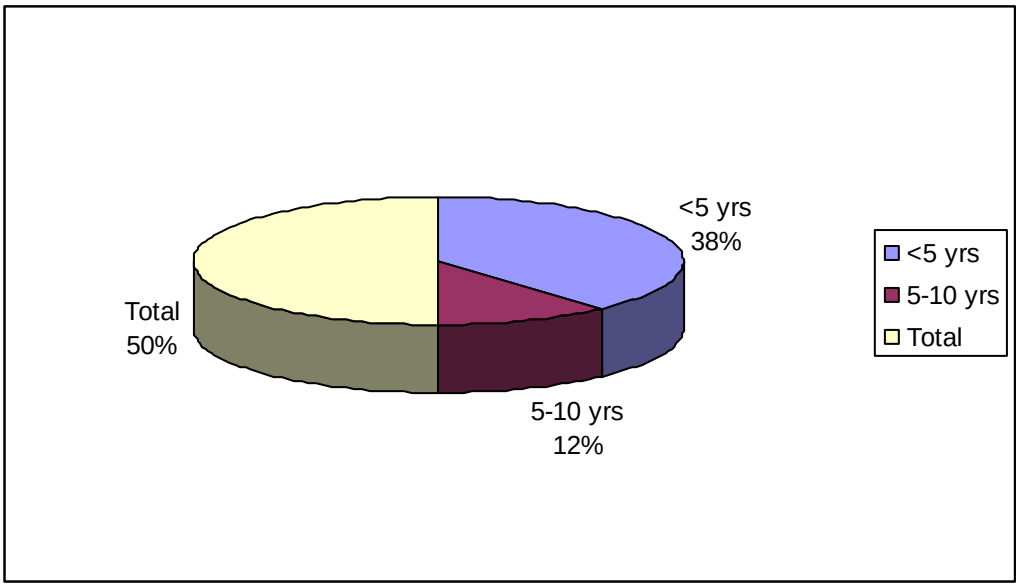

Fig 4.4 The pie diagram showing distribution of samples according to ICU experience.

(5)Distribution of samples according to qualification

Table 4.5 Distribution of samples according to qualification.

Qualification	Frequency	Percentage
GNM	21	70%
Bsc	8	26.70%
Msc	1	3.30%
Total	30	100%

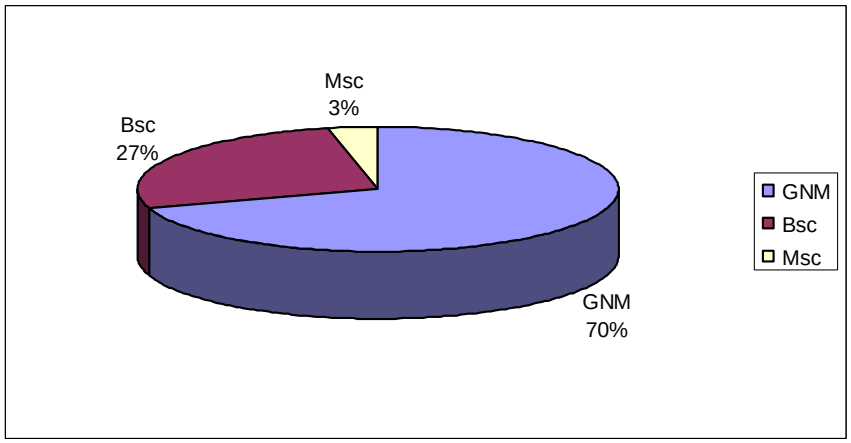

Fig 4.5 The pie diagram showing distribution of samples according to qualification.

4.3 Distribution of samples according to knowledge score.

1. Distribution of samples according to percentage of knowledge score regarding hyponatremia and its management.

There were 11 questions in the knowledge test regarding hyponatremia and its management with the maximum score of 11.Total knowledge score obtained ranged from 8-11 with a mean of 9.7.This shows that 93.3% of them have above average level of knowledge.

Table 4.6 Distribution of samples according to percentage of knowledge score

Knowledge score	Frequency	Percentage
8 t0 9	13	43.30%
10 to 11	17	56.70%
Total	30	100%

2. Percentage of score in the area of knowledge about hyponatremia and its management.

The data given in table 4.7 is the percentage of samples obtained in each item of the knowledge test on hyponatremia and its management. The knowledge percentage of nurses in each questions are given below.

Table 4.7 Distribution of percentage of score in the area of knowledge about hyponatremia and its management.

Area of knowledge	Frequency	Percentage
Q1	26	86.70%
Q2	28	93.30%
Q3	22	73.30%
Q4	27	90%
Q5	27	90%
Q6	24	80%
Q7	28	93.30%
Q8	26	86.70%
Q9	23	76.70%
Q10	30	100%
Q11	26	86.70%

The key consideration in determining when hyponatremia should be further investigated and treated is 86.7%, most safe iv fluid to treat hyponatremia is 93.3%, specific gravity of urine in hyponatremia is 73.3%, the fluid used to correct severe hyponatremia is 90%, the concentration of 3% saline is 90%, the serum sodium level should not be corrected more than is 80%, the fluid used in hypervolemic hyponatremia is 93.3%, the complication of chronic hyponatremia is 86.7%, the dose of oral salt to treat hyponatremia is 76.7%, complication followed by rapid correction of hyponatremia is 100%, calculation of amount of 3% saline to be infused in a patient is 86.7%.

4.4 Comparison of mean, standard deviation and P value

1. According to age

Table 4.8 Mean knowledge score according to age group

There is no statistically significant difference in mean knowledge score among younger and older age group, all are at same range.

Age	Mean	Standard deviation	P value
<28.5 years	9.73	1.03	0.72
>28.5 years	9.60	0.99	

2. According to total years of experience

Table 4.9 Mean knowledge score according to total years of experience

Experience in years	Mean	Standard deviation	P value
<5 years	9.69	1.01	0.90
>5 years	9.64	1.01	

3. According to experience in ICU

Table 4.10 mean knowledge score according to experience in ICU

ICU experience	Mean	Standard deviation	P value
<2 years	9.79	0.89	0.55
>2 years	9.56	1.09	

There is no statistically significant difference in mean knowledge score according to total years of experience.

4.5 Summary

This chapter contains distribution of samples according to demographic data, selected variables and the association between mean knowledge score and selected variables.

Chapter - 5

SUMMARY, CONCLUSION, LIMITATION, DISCUSSION AND RECOMMENDATION

5.1 Introduction

This chapter gives a brief account of the present study including conclusions drawn from findings and possible application of the results. Recommendations for further research and suggestion for improving the present study are also presented

5.2 Summary

This study was undertaken to assess the knowledge about hyponatremia and its management among nurses, working in NSICU of Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum. The review of related research literature helped the investigator each topic undertaken as well as to develop tools, methodology of the study and for analysis. The prepared tool was given to experts for content validity. The pilot study findings revealed that the study was feasible and practicable. Purposive sampling techniques were used for the study. A validated questionnaire was used for collecting data from 30 samples. Questionnaire contains two parts, first part consists of socio demographic data and second part consists of 11 questions regarding hyponatremia and its management. The data collection done in the month of September 2011 to October 2011, analysed and interpreted by using descriptive and inferential statistics.

5.3 Objectives of the study

1. To assess the knowledge regarding hyponatremia and its management among nurses in NSICU in SCTIMST, Trivandrum.
2. To find out the nurses knowledge in relation to the sociodemographic variables.

5.4 Limitation

The study was limited to nurses working in NSICU in SCTIMST, Trivandrum.

5.5 Major findings of the study

This study showed that 93.3% of Neuro Nurses have above average knowledge level. There was no statistically significant difference between the mean knowledge score and age, experience and qualification

5.6 Recommendations

Keeping in mind the findings and limitations of the study, the following recommendations were made for future research.

Similar study would be reported in other intensive care units and wards of this institute.

Similar study can be reported by increasing the size of the sample.

5.7 Discussion

The findings of the study were discussed with reference to the objectives and with the findings from other studies. The objective of the study were, to assess the knowledge about hyponatremia and its management among nurses in NSICU in SCTIMST, Trivandrum and to assess the relationship between knowledge and selected variables.

In this study 11 items survey includes specific questions from management and interpretation of hyponatremia. A total 30 nursing staff responded to the survey. Study showed that 93.3% of nurses in NSICU have above average knowledge level.

5.8 Conclusion

A descriptive study was undertaken to assess the knowledge of neuronurses in NSICU in SCTIMST, Trivandrum regarding hyponatremia and its management. The study was conducted in a relatively small sample of 30 nurses. This study clearly portrays that majority of the nurses have above average total knowledge.

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KNOWLEDGE ASSESSMENT OF NURSES WORKING IN NSICU REGARDING HYPONATREMIA AND MANAGEMENT IN SCTIMST,TVM.

1 Sociodemographic data

1)Age:
2)Sex:
3)Qualification:
4)Additional qualification if any:
5)Total years of experience:

11 Knowledge test.

Note: Select the best answer and place a tick mark in the space provided.

1) Hyponatremia should be further investigated and treated when serum sodium level is less than

[ ]A.120mmol/L
[ ]B.125mmol/L
[ ]C.131mmol/L
[ ]D.135mmol/L

2) The most safe iv fluid to treat hypovolemic hyponatremia is

[ ]A.5% Dextrose
[ ]B.5% Dextrose+0.45 Nacl
[ ]C.0.9% Nacl
[ ]D.3% Nacl

3) Specific gravity of urine in hyponatremia will be

[ ]A.Increased

[ ]B.Decreased

[ ]C.Normal

[ ]DAll the above

4) The fluid used to correct severe hyponatremia is

[ ]A.0.9% Nacl

[ ]B.3% Nacl

[ ]C.RL

[ ]D.5% Nacl

5) The concentration of sodium in 3% saline

[ ]A.77 mmol/L

[ ]B.154 mmol/L

[ ]C.513 mmol/L

[ ]D.420 mmol/L

6) The serum sodium level should not be corrected more than

[ ]A.8 mmol/L/day

[ ]B.10 mmol/L/day

[ ]C.12 mmol/L/day

[ ]D.15 mmol/L/day

7) The fluid used in hypervolemic hyponatremia is

[ ]A.0.45 NS

[ ]B.3% NS

[ ]C.RL

[ ]D.Normal Saline(0.9%)

8) The complication of chronic hyponatremia is

[ ]A.Convulsions

[ ]B.Bradycardia

[ ]C.Confusion

[ ]D.Hyponatremic encephalopathy

9) The dose of oral salt to correct hyponatremia in our setting is

[ ]A.2gm tds

[ ]B.3gm tds

[ ]C.4gm tds

[ ]D.5gm tds

10) The complication followed by rapid correction of hyponatremia

[ ]A.Myopathy

[ ]B.Seizures

[ ]C.Central pontine myelinolysis

[ ]D.Hyponatremic encephalopathy

11) Mr:X,59 yrs underwent meningioma excision and on the third postoperative day he developed hyponatremia with a serum sodium level of 120mEq/l. Calculate the amount of 3% saline to be infused in 24 hr(ml/hr).Desired Na+ level is 130mmol/l..Body weight is 60kg.

[ ] A.20ml/hr
[ ] B.29ml/hr
[ ] C.32ml/hr
[ ] D.40ml/hr

[Rate of infusion=Na+ requirement x 1000\Infusate Na+ x time(hrs)]

Na+ requirement=Total body water[weight in kg x percentage of water(0.6)] x (desired Na+ - serum Na+), Infusate Na+ in 3% saline = 513mmol/L.