Profile of Patients Admitted to ICU with Heat Related Illnesses - A Clinical Study

Rajiv Lakhotia[1], Somnath Longani[1], Jaishree Bogra[2], Archana Aggarwal[3]

ABSTRACT

Introduction: Heat-related illness (HRI) is a spectrum of disorders ranging from minor heat cramps, heat exhaustion to life-threatening heat stroke. This study was performed to assess the profile of patients admitted to ICU with features of heat related illness.

Material and Methods: This retrospective study included 40 patients with heat related illnesses. In patients co-existing illness, current medications, admission vitals and Glasgow coma scale (GCS) score were recorded. Acute Physiology and Chronic Health Evaluation II (APACHE II) and Sequential Organ Failure Assessment (SOFA) scores were also recorded. Analysis of cerebrospinal fluid was performed. In few cases, echocardiography and neuroimaging was also done wherever indicated. Length of stay (LOS) in ICU, number of days on ventilator, GCS on discharge and SOFA score were recorded.

Results: Out of 40 patients, 22 were males and 18 were females. Mean age of males were 45 ± 2.4 years and of females was 41±2.1 years. The difference was non - significant (P > 0.05). 15 patients had history of hypertension, 10 had type II D.M, 4 had coronary artery disease (CAD), 3 had Parkinson's disease, 2 had dementia, 2 had hypothyroidism, 1 had seizure and 1 had rheumatoid arthritis. 10 patients had history of oral hypogycaemics, ace inhibitors (12), anti- parkinsons (3), beta blocker (8), immunosuppressant (16), anti convulsant (17) and anticholinergic (5). Mean temperature in patients was 102.2± 2.5 degree C, heart rate was 110.2± 12.4 beats/ min, MAP was 84.2± 22.1 mm/Hg, GCS was 8.13± 3.6, PaO_2/FiO_2 was 225.8± 103.6, APACHE II score was 19.86± 3.6, SOFA score was 7.4± 2.4, Haematocrit was 35.2± 8.4%, Total WBC was 35.2± 8.4 cells/cumm, Platelets was 2.3± 0.3 cells/cumm, INR was 1.42± 0.54, Serum creatinine was 1.4± 0.61 mg/dL, Serum bilirubin was 1.45± 1.72 mg/dL, Serum lactate was 2.3± 2.3 mmol/L, Serum sodium was 125.26± 12.3 mEq/L, Serum potassium was 3.2± 1.1 mEq/L, CPK was 1881± 2146 IU/L, ICU ALOS was 17.1± 18.12 and Ventilator days were 11.3± 15.18. Common neurological symptoms in patients were disorientation (50.3%), comatose (36%), seizures (32.45%) and drowsiness (10.15%).

Conclusion: Patients with heat related illnesses had high morbidity and mortality. They had multiple organ failures. There is need to educate the people regarding symptoms and precautions that can help them preventing getting severe harmful effects.

Keywords: Glasgow Coma Scale, Heat Related Illnesses, Seizures

INTRODUCTION

Heat-related illness (HRI) is a spectrum of disorders ranging from minor heat cramps, heat exhaustion to life-threatening heat stroke. A core body temperature > 40°C and characterized by central nervous system (CNS) abnormalities such as coma, delirium or convulsions is termed as heat stroke. Symptoms include dry skin, rapid, strong pulse and dizziness.[1]

Heat stroke leads to 2% deaths and it is relatively common in sports. United states had recorded a record 3442 deaths from heat illness from year 1999- 2003. 423 workers died from heat illness in the US between 1992 and 2006. Person working in hot temperature are at risk of developing heat stroke. Heat stroke, the extreme form of HRI is associated with significant mortality and morbidity, ranges from 10% to 50%. There is multiple organ system involvement and those survive, they develop permanent neurologic damage. Heat stroke may be divided into exertional and non-exertional heat stroke. While exertional heat stroke is associated with exercise, classic heat stroke is typically seen in debilitated patients during high ambient temperature and humidity. Old age, psychiatric medications, alcoholics, neurological disease and dehydrating illness are common risk factors. In order to prevent developing heat stroke, drugs such as antihypertensives, diuretics, and anticholinergics etc. should be avoided. Other management includes gradual adjustment to heat, and sufficient fluids and electrolytes replacement.[3]

The present study was conducted to assess the profile of patients admitted to ICU with features of heat related illness.

MATERIAL AND METHODS

This retrospective study included 40 patients with heat related illnesses. Patients were informed regarding the study and written consent was taken.

Patients with CNS infection, stroke and other causes of encephalopathy were excluded. Patients's management included appropriate organ support, electrolyte replacement, fluid resuscitation and active cooling. Supportive measures like analgesics, prophylaxis for deep vein thrombosis, stress ulcer, glycaemic control, nutritional support were also utilized.

Patient's information such as name, age, gender, co-existing

[1]Assistant Professor, [2]Professor and Head, [3]Associate Professor, Department of Anesthesia, Critical Care and Pain Medicine, Hind Institute of Medical Sciences, Barabanki, UP, India.

Corresponding author: Dr. Somnath Longani, Assistant Professor, Department of Anesthesiology, Critical Care and Pain Medicine, Hind Institute of Medical Sciences, Safedabad, Barabanki, U.P., India

How to cite this article: Rajiv Lakhotia, Somnath Longani, Jaishree Bogra, Archana Aggarwal. Profile of patients admitted to ICU with heat related illnesses - a clinical study. International Journal of Contemporary Medical Research 2017;4(7):1530-1532.

illness, current medications, admission vitals and Glasgow coma scale (GCS) score were recorded. Other laboratory parameters required to calculate Acute Physiology and Chronic Health Evaluation II (APACHE II) and Sequential Organ Failure Assessment (SOFA) scores were also recorded. These two scores were calculated using the worst parameters recorded during the first 24h of ICU admission. Details regarding cerebrospinal fluid analysis, echocardiography and neuroimaging studies obtained wherever indicated were also considered. Other parameters such as outcome data on mortality, ICU length of stay (LOS), number of ventilator days, discharge GCS and SOFA score were recorded.

STATISTICAL ANALYSIS

Results obtained were subjected to statistical analysis using chi- square test. P value < 0.05 was considered significant.

RESULTS

Table 1 shows that out of 40 patients, 22 were males and 18 were females. Mean age of males were 45 ± 2.4 years and of females was 41±2.1 years. The difference was non - significant (P > 0.05). Figure 1 shows that 15 patients had history of hypertension, 10 had type II D.M, 4 had coronary artery disease (CAD), 3 had Parkinson's disease, 2 had dementia, 2 had hypothyroidism, 1 had seizure and 1 had rheumatoid arthritis. Figure 2 shows that 10 patients had history of oral hypogycaemics, ace inhibitors (12), anti-parkinsons (3), beta blocker (8), immunosuppressant (16), anti convulsant (17) and anticholinergic (5).

Table 2 shows that mean temperature in patients was 102.2± 2.5 degree C, heart rate was 110.2± 12.4 beats/ min, MAP was 84.2± 22.1 mm/Hg, GCS was 8.13± 3.6, PaO_2/FiO_2 was 225.8± 103.6, APACHE II score was 19.86± 3.6, SOFA score was 7.4± 2.4, Haematocrit was 35.2± 8.4%, Total WBC was 35.2± 8.4 cells/cumm, Platelets was 2.3± 0.3 cells/cumm, INR was 1.42± 0.54, Serum creatinine was 1.4± 0.61 mg/dL, Serum bilirubin was 1.45± 1.72 mg/dL, Serum lactate was 2.3± 2.3 mmol/L, Serum sodium was 125.26± 12.3 mEq/L, Serum potassium was 3.2± 1.1 mEq/L, CPK was 1881± 2146 IU/L, ICU ALOS was 17.1± 18.12 and Ventilator days were 11.3± 15.18.

DISCUSSION

There can be death from heat-related illnesses due to heat stroke. Symptoms includes nausea, vomiting, hot, dry skin or profuse sweating, loss of consciousness, very high body temperature, throbbing headache, confusion, difficulty in speaking, hallucinations, strange behavior and seizures.[4]

In management of heat related illnesses, patient should be shifted to cool area. Clothing such as socks and shoes should be removed. Cool wet clothes or ice should be applied to head, face or neck. Patient should be given water or clear juice. Immediately, medical assistance should be taken.[5]

The present study was conducted to assess the profile of patients admitted to ICU with features of heat related illness. In this study, off 40 patients, 22 were males and 18 were females. Mean age of males were 45 ± 2.4 years and of females was 41±2.1 years. This is in agreement with Semenza JC et al.[6]

We also assesses the past medical history and found that patients had history of hypertension, type II D.M, coronary artery disease (CAD), Parkinson's disease, dementia, hypothyroidism, seizure and rheumatoid arthritis. This is similar to findings of Argaud L et al.[7] While taking the

Total - 40			
Gender	Male	Female	P value
Number	22	18	0.2
Mean age (years)	45±2.4	41±2.1	0.1

Table-1: Distribution of patients

Variables	**Mean ± S.D**
Temperature	102.2± 2.5
Heart rate (beats/min)	110.2± 12.4
MAP (mm/Hg)	84.2± 22.1
GCS	8.13± 3.6
PaO_2/FiO_2	225.8± 103.6
APACHE II score	19.86± 3.6
SOFA score	7.4± 2.4
Haematocrit (%)	35.2± 8.4
Total WBC (cells/cumm)	14256± 8134
Platelets (cells/cumm)	2.3± 0.3
INR	1.42± 0.54
Serum creatinine (mg/dL)	1.4± 0.61
Serum bilirubin (mg/dL)	1.45± 1.72
Serum lactate (mmol/L)	2.3± 2.3
Serum sodium (mEq/L)	125.26± 12.3
Serum potassium (mEq/L)	3.2± 1.1
CPK (IU/L)	1881± 2146
ICU ALOS	17.1± 18.12
Ventilator days	11.3± 15.18

Table-2: Variables in patients

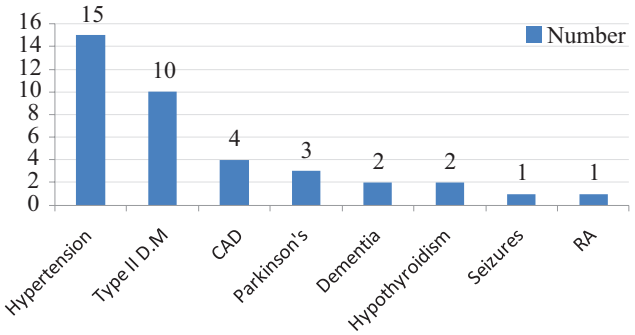

Figure-1: Patients with pre – existing medical conditions

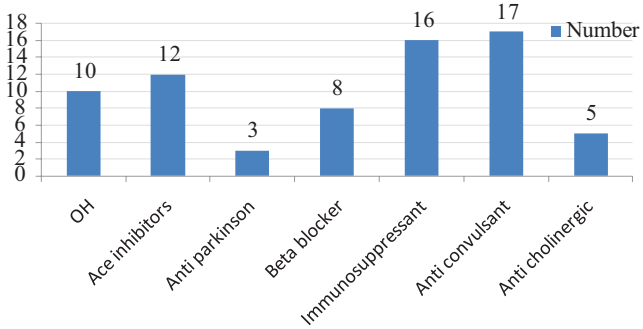

Figure-2: Patients with prior medications

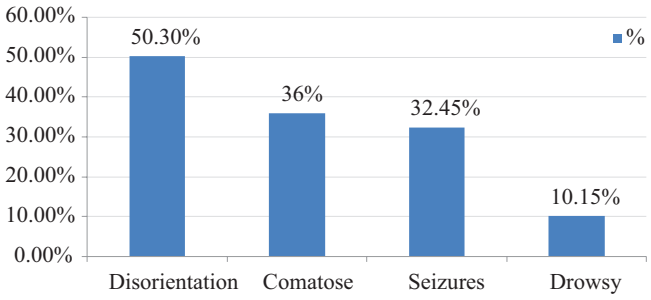

Figure-3: Neurological involvement in heat-related illness

history of drug intakes we found that patients had history of oral hypogycaemics, ace inhibitors, anti- Parkinsons, beta blocker, immunosuppressant, anti convulsant and anticholinergic. This is similar to results of Miset B et al.[8]

In this study, we found that mean temperature in patients was 102.2± 2.5 degree C, heart rate was 110.2± 12.4 beats/ min and MAP was 84.2± 22.1 mm/Hg. Mclaughlin CT[9] in his study found similar results. When we assessed the APACHE II score and SOFA score, it was 19.86± 3.6 and 7.4± 2.4 respectively. This is similar to Van stavern.[10]

There is to elevation of body temperature due to exposure to high temperatures. There is activation of physiological compensatory mechanisms which include increased cutaneous circulation and concomitant vasoconstriction of the renal and splanchnic circulation. There is cell damage by apoptosis, release of inflammatory mediators and endothelial damage leading to multi organ failure. We found that serum creatinine, serum bilirubin, serum lactate, serum sodium, serum potassium, CPK, ALOS score was raised in patients. Similar results were seen in study of Sudhakar.[11]

We found that that common neurological symptoms in patients were disorientation (50.3%), comatose (36%), seizures (32.45%) and drowsiness (10.15%). Guererro WR[12] found similar findings in his study (figure-3).

CONCLUSION

Patients with heat related illnesses had high morbidity and mortality. They had multiple organ failures. There is need to educate the people regarding symptoms and precautions that can help them preventing getting severe harmful effects.

REFERENCES

1. Lugo-Amador NM, Rothenhaus T, Moyer P. Heat-related illness. Emerg Med Clin North Am. 2004; 22:315-27.
2. Bouchama A. Heatstroke: A new look at an ancient disease. Intensive Care Med. 1995;21:6235.
3. Bouchama A, Knochel JP. Heat stroke. N Engl J Med. 2002;346:1978-88.
4. Dematte JE, O'Mara K, Buescher J, Whitney CG, Forsythe S, McNamee T, et al. Near-fatal heat stroke during the 1995 heat wave in Chicago. Ann Intern Med. 1998;129:173-81.
5. Bouchama A, Hammami MM, Haq A, Jackson J, al-Sedairy S. Evidence for endothelial cell activation/ injury in heatstroke. Crit Care Med. 1996;24:1173-8.
6. Semenza JC, Rubin CH, Falter KH, Selanikio JD, Flanders WD, Howe HL, et al. Heat-related deaths during the July 1995 heat wave in Chicago. N Engl J Med. 1996;335:84-90.
7. Argaud L, Ferry T, Le QH, Marfisi A, Ciorba D, Achache P, et al. Short- and long-term outcomes of heatstroke following the 2003 heat wave in Lyon, France. Arch Intern Med. 2007;167:2177-83.
8. Misset B, De Jonghe B, Bastuji-Garin S, Gattolliat O, Boughrara E, Annane D, et al. Mortality of patients with heatstroke admitted to intensive care units during the 2003 heat wave in France: A national multiple-center risk-factor study. Crit Care Med. 2006;34:1087-92.
9. McLaughlin CT, Kane AG, Auber AE. MR imaging of heat stroke: External capsule and thalamic T1 shortening and cerebellar injury. AJNR Am J Neuroradiol. 2003; 24:1372-5.
10. Van Stavern GP, Biousse V, Newman NJ, Leingang JC. Downbeat nystagmus from heat stroke. J Neurol Neurosurg Psychiatry. 2000;69:403-4.
11. Sudhakar PJ, Al-Hashimi H. Bilateral hippocampal hyperintensities: A new finding in MR imaging of heat stroke. Pediatr Radiol. 2007;37:1289-91.
12. Guerrero WR, Varghese S, Savitz S, Wu TC. Heat stress presenting with encephalopathy and MRI findings of diffuse cerebral injury and hemorrhage. BMC Neurol. 2013;13:63.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 25-06-2017; **Accepted:** 29-07-2017; **Published:** 11-08-2017