Stress induced hyperglycemia in stroke patients

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STRESS INDUCED HYPERGLYCEMIA IN STROKE PATIENTS

ABSTRACT

Background: Stroke is the third most common cause of death in developed countries and second most common cause of death worldwide. High proportion of patients may develop hyperglycemia after an acute stress such as stroke or myocardial infarction even in the absence of preexisting diagnosis of diabetes mellitus. Prolonged stress hyperglycemia in ischemic stroke increases the risk of in-hospital 28- day mortality, especially in non-diabetic patients. Aims and objectives: to determine the frequency of stress-induced hyperglycemia in non-diabetic patients with ischemic or hemorrhagic stroke. Subjects and methods: A total of 255 patients admitted with acute stroke, fulfilling the inclusion criteria were included in the study. After informed consent capillary blood glucose was monitored at the time of admission and after every 8-hour for three days. Glycosylated hemoglobin (hba1c) was measured simultaneously. Results: Hyperglycemia was noted in 67 (26.32%) patients. Out of which 50 (74.6%) presented with ischemic stroke while only 17 (25.4%) were associated with hemorrhagic stroke. Undiagnosed diabetes was found in 10% cases. Conclusion: Stress related hyperglycemia after acute stroke was found in 26% of patients especially those with high BMI, visceral obesity and positive family history for diabetes.

Key words: Ischemic stroke, stress hyperglycemia, acute stroke, acute hyperglycemia.
which is 21%. Non-probability purposive sampling technique was used. Patients > 15 years of age, non-diabetic, presenting with acute stroke (ischemic or hemorrhagic) were included.

Table 1: Baseline characters of stroke patients;

<table>
<thead>
<tr>
<th></th>
<th>Ischemic stroke n=167</th>
<th>Hemorrhagic stroke n=88</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age</td>
<td>54.2±6.8</td>
<td>59.1±6.2</td>
</tr>
<tr>
<td>Male</td>
<td>103(61.7%)</td>
<td>48(54.5%)</td>
</tr>
<tr>
<td>Female</td>
<td>64(38.3%)</td>
<td>40(45.5%)</td>
</tr>
<tr>
<td>Smokers</td>
<td>58(34.7%)</td>
<td>28(31.8%)</td>
</tr>
<tr>
<td>Mean BMI</td>
<td>32.5</td>
<td>27.5</td>
</tr>
<tr>
<td>Family history of diabetes mellitus</td>
<td>26(57.8%)</td>
<td>19(42.2%)</td>
</tr>
</tbody>
</table>

Table 2: Frequency of hyperglycemia in stroke sub-types;

<table>
<thead>
<tr>
<th></th>
<th>Ischemic n=167</th>
<th>Hemorrhagic n=88</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euglycemia</td>
<td>105(62.9%)</td>
<td>68(77.3%)</td>
</tr>
<tr>
<td>Stress hyperglycemia</td>
<td>50(30%)</td>
<td>17(19.3%)</td>
</tr>
<tr>
<td>Undiagnosed diabetes</td>
<td>12(7.1%)</td>
<td>3(3.4%)</td>
</tr>
</tbody>
</table>

Patients diagnosed as transient ischemic attack, brain imaging showing features, like tumor, CNS infections or trauma, having metabolic disorders like diabetes mellitus, chronic liver disease, sepsis and renal failure, all were excluded. Patients receiving intravenous dextrose, systemic corticosteroids, thiazides, phenytoin, phenothiazines, protease-inhibitors, and beta-agonists, which promote hyperglycemia by inducing hepatic gluconeogenesis were also excluded. Informed consent was taken before enrolling for the study, from the conscious patients otherwise from the next of kins. Demographic data, age, gender, body mass index (BMI), smoking status, family history of diabetes was recorded for each patient. Blood pressure was recorded using aneroid sphygmomanometer, waist circumference was also recorded. Capillary random blood glucose levels (at least two hours after last feed) were monitored, at the time of admission and after every 8-hour for first 72 hours (using accu-check active glucometer).

Table 3: Comparison of characters between euglycemic and stress hyperglycemia groups;

<table>
<thead>
<tr>
<th></th>
<th>Stress hyperglycemia n=67</th>
<th>Euglycemia n=173</th>
<th>P values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean systolic blood pressure</td>
<td>165.2 mmhg</td>
<td>168.4</td>
<td>0.67</td>
</tr>
<tr>
<td>Mean bmi</td>
<td>33.31</td>
<td>27.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mean waist circumference</td>
<td>48.4 inches</td>
<td>41.2 inches</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Family history of diabetes</td>
<td>35(52%)</td>
<td>10(5.7%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Smokers</td>
<td>42(62%)</td>
<td>44(24%)</td>
<td>0.423</td>
</tr>
</tbody>
</table>

HBA1c (glycosylated hemoglobin) was measured simultaneously. A confirmed value of hba1c at or above 6.5% was used as diagnostic for diabetes mellitus as recommended by the american diabetes association. Stress hyperglycemia was labeled if blood glucose ≥ 140mg/dl any time during first 72 hours when hba1c was < 6.5. Undiagnosed diabetes was diagnosed when blood sugar was > 140 mg/dl and HBA1c > 6.5. Data was analyzed using spss version 21. Quantitative data i.e age, BMI, systolic blood pressure, waist circumference were presented as mean ± SD, while qualitative data gender, smoking, family history of diabetes and frequency of stress hyperglycemia were presented as frequencies or percentages. Statistical analysis was performed using chi-square for qualitative variables and students t test for quantitative data. P value of 0.05 or less was considered as the level of significance.

RESULTS

A total of 255 patients admitted with cerebrovascular accident (stroke) were evaluated, out of which 167 (65.4%) had ischemic stroke while 88(34.5%) had hemorrhagic stroke. In ischemic group 103(61.7%) were male and 64(38.3%) were female. In hemorrhagic group 48(54.5%) were male and 40(45.5%) were female. Mean age was 54.2 + 6.82 years in ischemic group while 59.1+ 8.2 in hemorrhagic group. In ischemic group 58(34.7%) were smoker and in hemorrhagic group 28(31.8%) were smoker. Mean BMI (body mass index) was 32.5 in ischemic group while 27.5 in hemorrhagic group. Family history of diabetes was positive in 26 (57.77%) patients with ischemic stroke while 19 (42.22%) patients with hemorrhagic stroke. (table 1) In ischemic group, 105 (62.9%) were euglycemic, 50 (30%) had stress hyperglycemia and 12 (7.1%) had underlying undiagnosed diabetes. In hemorrhagic group 68(77.3%) were euglycemic, 17(19.3%) had stress hyperglycemia while 3 (3.4%) had undiagnosed diabetes. (table 2) On comparison of different features in euglycemic and stress hyperglycemic patients there was statistically significant difference in mean bmi and mean waist size. (p value <0.001) Moreover positive family history of diabetes mellitus was found to be more common in patients with stress hyperglycemia; however there was no significant difference systolic blood pressure and frequency of smoking. (table 3)

DISCUSSION

Hyperglycemia detected during acute illness is associated with adverse outcomes. Among patients without known diabetes admitted to hospital with myocardial infarction (MI), stroke, pneumonia, and exacerbation of chronic obstructive pulmonary disease (COPD), higher glucose levels are associated with in-hospital and longterm mortality, intensive care unit admission, prolonged length of stay, and discharge to long-term nursing. Our study evaluated stress induced hyperglycemia in patients with acute stroke found that 26.3% patients had hyperglycemia in the
absence of diabetes mellitus. This result was comparable to other studies. We also observed that stress hyperglycemia was in patients with ischemic than hemorrhagic stroke which is different from some studies. We observed that over all 6% patient had undiagnosed diabetes at the time of admission. The prevalence of recognized diabetes mellitus in acute stroke patients is between 8% to 20%, but between 6% to 42% of patients may have undiagnosed diabetes mellitus before presentation. In comparison of various characters in patients with euglycemia and stress hyperglycemia, we observed that stress hyperglycemia was significantly common in patients with high BMI and central obesity( higher waist circumference), the same observation was seen in other studies. It was also noted that patients with stress hyperglycemia had greater incidence of diabetes mellitus in first degree relatives than patients with euglycemia. However there was no significant difference in systolic blood pressure in between two groups.

CONCLUSION

Stress related hyperglycemia after acute stroke was found in 26% of patients especially those with high BMI, visceral obesity and positive family history for diabetes. These patients can constitute a high risk group requiring close monitoring of blood sugars and thus preventing complications. Further studies should be directed towards determining mortality and complications related to stress induced hyperglycemia and the effects of management on patient outcome.

ACKNOWLEDGEMENT

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REFERENCES

15. Bravata DM, KIM N, CONCATO J, BRASS LM.
Bangladesh, and Sri Lanka) has inclined and is expected of the disease in the western population, the burden of stroke is the third common cause of death in the world.

The study was conducted at the medical ward of Jinnah Hospital, Karachi, Pakistan. Study was conducted for six months, from July to December 2013. Sample size was from the medical college hospital located in suburban area of the city Karachi, Pakistan. Study was conducted for six months, from July to December 2013. Sample size was 255 patients admitted with cerebrovascular disease. A total of 255 patients admitted with cerebrovascular disease were included in the study. Of these, 181 (71%) were men and 74 (29%) were women. Of the sample, 48 (19.0%) were male and 40 (15.8%) were female in hemorrhagic stroke. A total of 255 patients admitted with cerebrovascular disease were included in the study. Of these, 181 (71%) were men and 74 (29%) were women. Of the sample, 48 (19.0%) were male and 40 (15.8%) were female in hemorrhagic stroke.

**DISCUSSION**

Comparison of characters between euglycemic and stress hyperglycemic patients there was statistically significant difference in mean BMI and mean waist size. (p value <0.001) 17(19.3%) had stress hyperglycemia while 3 (3.4%) were diabetic, presenting with acute stroke (ischemic or hemorrhagic). Stress hyperglycemia in patients with acute ischaemic stroke indicates a greater risk for death in patients without diabetes. Acp J Club 2002 May-Jun; 136(3):114. Pm id:11985455[pubmed]

**REFERENCES**