The Frequency of Stress Hyperglycemia in Hospitalized Patient Without a History of Diabetes

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Abstract

Objective: The aim of this study was to determine the frequency of stress hyperglycemia in hospitalized patient without a history of diabetes. **Material and methods:** One hundred thirty seven patients admitted in ward, were selected in this cross-sectional study using non-probability consecutive sampling from department of medicine Nishtar Hospital Multan from March 2016 to April 2017 and SPSS - 20 was used to analyze the data. **Results:** Of these 137 study cases, 74 (54 %) were male patients while 63 (46 %) were females. Mean age of our study cases was 48.35 ± 12.11 years ranging from 22 to 78 years and majority of our study cases i.e. 89 (65 %) were aged more than 40 years of age. Of these 137 study cases, 60 (43.8%) were from rural areas while 77 (56.2%) were from urban areas. Mean body mass index (BMI) of our study cases was 23.54 ± 2.87 kg/m^2. Obesity was present in 19 (13.9 %) of our study cases while 80 (58.4%) were from poor families and 57 (41.6%) were from middle income background. Eighty seven (63.5%) were illiterate and 50 (36.5%) were literate. Family History of diabetes was present in 39 (28.5 %) of our study cases. Majority of our study cases i.e. 39 (28.5 %) presented with stroke followed by 33 (24.1%) patients with chronic liver diseases. Mean HbA1C was noted to be 5.01 ± 0.31 %; ranging from 4.6 % to 5.6%. Stress hyperglycemia was noted in 41 (29.9 %) of our study cases. **Conclusion:** Our study results have reported a high frequency of stress hyperglycemia in non – diabetic patients admitted to a medical ward. Stress hyperglycemia was significantly associated with male gender, increasing, obesity, family history of diabetes, presenting complaints and baseline HbA1C. Our study results suggest to monitor blood glucose levels of all non – diabetic patients admitted in medical wards to diagnose stress hyperglycemia which leads to poor clinical outcomes and high mortality if left untreated.

Keywords: Stress hyperglycemia, non – diabetic, frequency.

Introduction

Hyperglycemia is quite common among hospitalized patients and it leads to extra financial impact on healthcare system in any country all over the world. As compared with known diabetic patients, risks for complications associated with hyperglycemia are more prominent in patients without previous known history of diabetes and optimal management of proper glycemic control leads to reduction in hospital related complications [1].

American Association of Clinical Endocrinologists (AACE) and American diabetes Association (ADA) stated as per consensus statement in year 2008 that hyperglycemia is significantly associated with poor clinical outcomes, irrespective of underlying its causes. AACE and ADA consensus statement 2008 also defined stress hyperglycemia (also known as hospital-related hyperglycemia) as "blood sugar levels more than 140 mg/dl without previous history of diabetes"[2] and should be noticed that hyperglycemia only occurs during the course of acute illness among previously optimal glucose tolerance [3]. Stress hyperglycemia leads to increase in mortality rate among hospitalized patients particularly critically ill patients [4], however, it is not known whether hyperglycemia in patients admitted to general hospital wards is associated with poor outcome.[4]

Although exact prevalence of stress hyperglycemia remains unknown while different reports have reported strong association between stress hyperglycemia and adverse outcomes including mortalities, morbidities, prolonged hospitalization, ICU admissions, sepsis and other complications [5]. It is also suggested for every 1 mmol/L (18 mg/dL) increase in fasting blood glucose levels is associated with increase in mortality rates up to 33% [6-8]. A study done in medical ICU reported that stress hyperglycemia was an important risk factor in cardiac, neurosurgical and cardiothoracic ICUs [9]. Another study shows that Hospital hyperglycemia rates were 46.0% among ICU patients while it was 31.7% [10] for non-ICU patients. Furthermore stress hyperlglycemia is also important predictor for disease severity and mean glucose levels during hospitalization is associated with clinical outcomes [9] while improvement in mean blood glucose levels leads to improvement in outcomes in terms of

morbidity, disease severity and mortality [11].

Very little work has been done on the frequency of stress hyperglycemia in non-diabetic hospitalized patients in Pakistan. In such patient future risk of developing diabetes mellitus is very high. This study will help to identify patients with stress hyperglycemia so that it can be prevented by taking some adaptive measures to screen for diabetes in future.

Material and methods

One hundred thirty seven patients admitted in ward, meeting the inclusion criteria (hospitalized patients having HbA1c less than 5.7%) were selected from department of medicine Nishtar Hospital Multan from March 2015 to April 2017. Patients Having HbA1c > 5.7 %, on steroids, patients on Antipsychotic medications, patients on antimalarial drugs and patients on dextrose infusion were excluded. On admission, venous blood sample for HbA1c of all patients were sent to Central Laboratory Nishtar Hospital Multan. HbA1c was determined usingDirect Enzymatic HbA1c Assay.All Patients were monitored for Random blood sugar. Venous Blood Sample for Random Blood Sugar was sent to Central Lab Nishtar Hospital Multan. The outcome variable i.e. Random Blood Sugar, stress hyperglycemia (Any hospitalized non Diabetic Patient with Random Blood Sugar > 140mg/dl[12]) was noted on the Performa by the researcher of this study and data was analyzed using SPSS 20.0. Mean ±S.D. was calculated for age and HbA1c levels. Frequencies and percentages were calculated for qualitative variables i.e. gender, stress hyperglycemia. Effect modifiers like age, residential status, gender, family history of diabetes, socioeconomic status, and literacy were controlled by stratification and their effect on outcome was seen applying chi-square test taken P 0.05 as significant.

Results

Of these 137 study cases, 74 (54 %) were male patients while 63 (46 %) were females. Mean age of our study cases was 48.35 ± 12.11 years ranging from 22 to 78 years and majority of our study cases i.e. 89 (65 %) were aged more than 40 years of age.

Of these 137 study cases, 60 (43.8%) were from rural areas while 77 (56.2%) were from urban areas. Mean body mass index (BMI) of our study cases was 23.54 ± 2.87 kg/m^2. Obesity was present in 19 (13.9 %) of our study cases while 80 (58.4%) were from poor families and 57 (41.6%) were from middle income background. Eighty seven (63.5%) were illiterate and 50 (36.5%) were literate. Family History of diabetes was present in 39 (28.5 %) of our study cases. Majority of our study cases i.e. 39 (28.5 %) presented with stroke followed by 33 (24.1%) patients with chronic liver diseases. Mean HbA1C was noted to be 5.01 ± 0.31 %; ranging from 4.6 % to 5.6%. Stress hyperglycemia was noted in 41 (29.9 %) of our study cases.

Table I Cross-tabulation of stress hyperglycemia with respect to different variables.

Variables		Stress hyperglycemia		P – value
		Yes	No	
Gender	Male (n=74)	31	43	0.001
	Female (n=63)	10	53	
Age (In Years)	Up to 40 (n=48)	07	41	0.006
	> 40 (n=89)	34	55	
Residential status	Rural (n=60)	15	45	0.347
	Urban (n=77)	26	51	
Socioeconomic status	Poor (n=80)	30	50	0.011
	Middle class (n=57)	11	46	
Obesity	Yes (n=19)	19	00	0.001
	No (n= 118)	22	96	
Family History of diabetes	Yes (n=39)	31	08	0.001
	No (n=98)	10	88	
Literacy	Illiterate (n= 87)	30	57	0.064
	Illiterate (n=50)	11	39	

Table II Stratification of stress hyperglycemia with regards to presenting complaints.

Presenting complaints	Stress hyperglycemia		P - value
	Yes (n = 41)	No (n = 96)	
CLD (n = 33)	15	18	
Stroke (n = 39)	11	28	
CRF (n = 30)	07	23	**0.000**
GIT (n = 27)	00	27	
ARF (n = 08)	08	00	
Total	137		

Discussion

Stress hyperglycemia is commonly encountered entity in hospitalized patients particularly in critically ill patients which may possibly be a predictor for disease severity. Additionally mean values of blood glucose levels during course of hospitalization is an independent predictor with clinical outcomes of the patients. This association appears to be causal with varying levels of protocols and programs for optimum glycemic control in these hospitalized patients. Moreover, correction of these elevated glucose levels have been reported to improve prognosis, reduce prolonged length of hospitalization and infection rates.

   Our study included a total of 137 study cases meeting inclusion criteria of our study. Of these 137 study

cases, 74 (54 %) were male patients while 63 (46 %) were females. Ogunmola et al [13] also reported male gender predominance with 54.3% in medical wards which is in compliance with our study results. Another study conducted by Noor et al [14] from Sudan has also reported male gender predominance. Ike et al [15] also reported male gender predominance in medical ward with 58% which is in compliance with that of our study. Ashraf et al [16] reported female gender predominance which is different from that of our study results.

Mean age of our study cases was 48.35 ± 12.11 years ranging from 22 to 78 years and majority of our study cases i.e. 89 (65 %) were aged more than 40 years of age. Ogunmola et al [13] reported 56.1 ± 18.8 years mean age which is slightly higher than that of our study results. The reason for this difference is due to our range of age in inclusion criteria was 25 – 60 years while Ogunmola et al [13] recruited up to 120 years patients. A study conducted by Noor et al [14] from Sudan reported 52.06 ± 18.9 years which is close to our study results. Ogun et al [17] reported 49 ± 1.7 years mean age which is similar to our study findings. Similar results have been reported by Ashraf et al. [16]

Of these 137 study cases, 60 (43.8%) were from rural areas while 77 (56.2%) were from urban areas. Mean body mass index (BMI) of our study cases was 23.54 ± 2.87 kg/m². Obesity was present in 19 (13.9 %) of our study cases while 80 (58.4%) were from poor families and 57 (41.6%) were from middle income background. Eighty seven (63.5%) were illiterate and 50 (36.5%) were literate. Noor et al [14] from Sudan reported 55.4 % patients from Urban areas which is similar to that of our study results.

Family History of diabetes was present in 39 (28.5 %) of our study cases. Majority of our study cases i.e. 39 (28.5 %) presented with stroke followed by 33 (24.1%) patients with chronic liver diseases. Ogunmola et al [13] also reported 39 % stroke patients admissions which is close to our study results. Noor et al [14] and Ashraf et al [16] also reported similar results.

Mean HbA1C was noted to be 5.01 ± 0.31 %; ranging from 4.6 % to 5.6%. Stress hyperglycemia was noted in 41 (29.9 %) of our study cases. Afzal et al [18] reported 30 % stress hyperglycemia in non – diabetic patients admitted in medical wards which is close to our study results. Samiullah et al [19] reported 27 % stress hyperglycemia which is close to our study results. Lleva et al [10] reported hospital hyperglycemia (with RBS >180 mg/dL) prevalence was 46.0% for ICU and 31.7%[10] for non-ICU patients. These findings are close to our study results.

Conclusion

Our study results have reported a high frequency of stress hyperglycemia in non – diabetic patients admitted to a medical ward. Stress hyperglycemia was significantly associated with male gender, increasing age, obesity, family history of diabetes, presenting complaints and baseline HbA1C. Our study results suggest to monitor blood glucose levels of all non – diabetic patients admitted in medical wards to diagnose stress hyperglycemia which leads to poor clinical outcomes and high mortality if left untreated.

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