New Onset Diabetes in Covid 19 Patients Treated With Steroids

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ABSTRACT

Background: The most successful therapies for a severe COVID-19 infection include steroids. The objective of this study was to investigate the prevalence of steroid-induced diabetes and the risk variables that have been linked to it in COVID-19 patients.

Methods: From 1 June 2020 to 31 December 2021, this retrospective cohort study was conducted in a government hospital in Bhopal. Data on all RTPCR positive instances of COVID-19 patients admitted and treated for COVID-19 were gathered from the medical record department, with a sample size of 200 patients.

Results: 44 (22%) of the 200 COVID-19 patients in the current study who underwent glucocorticoid medication and developed steroid-induced diabetes. Age was a distinct risk factor for GI-DM in our cohort of 200 individuals who were given steroids for respiratory conditions. With age, glucose tolerance gradually decreases, which leads to a high prevalence of type 2 diabetes and reduced glucose tolerance in the elderly population.

Conclusions: This study documented that 22% of in-patients treated for COVID-19 infection in a tertiary care centre developed steroid induced DM. The incidence of steroid induced DM was higher among patients who were older in age. The study highlights the importance of monitoring blood glucose levels in patients receiving steroids for the treatment of COVID-19. Additionally, the results suggest that patients with certain risk factors like older age may benefit from closer monitoring of blood glucose levels.

Keywords- covid 19, steroid induced diabetes

I. INTRODUCTION

Glucocorticoids have played a key role in the treatment of several inflammatory illnesses ever since they first came to the forefront of medicine in the 1950s[1] This includes spectrum of respiratory diseases like chronic obstructive pulmonary disease (COPD), Asthma interstitial and hypersensitivity pneumonitis. Steroids' ability to reduce inflammation comes at a cost in the form of a number of negative side effects, including fluid retention that can cause edema, elevated blood pressure, menstrual problems, weight gain, Cushing's syndrome, gastric ulceration, insomnia, and recurrent infections because immunity is suppressed. Impaired metabolism of glucose is one of the most common untoward effect encountered. Glucocorticoids not only increase the episodes of high blood glucose levels in already known diabetic patients but can also cause elevated blood glucose levels leading to diabetes in patients with no prior history of high blood glucose levels[5] . Mostly, this condition of raising blood sugar levelsis temporary, but some cases may develop clinical manifestations of diabetes like persistent polydipsia, polyuria, and repeated infections where the treatment with glucocorticoids merely seem to uncover the hidden diabetes.. If persistent, increase in blood glucose can increase the risks of developing cardiovascular disease and microvascular complications[6] . We have reviewed the incidence and risk factors leading to steroid-induced diabetes mellitus (GI-DM) in COVID-19 patients with respiratory complications.

II. METHODS

This is a retrospective hospital based cohort study where we reviewed records of all adults cases of covid 19 admitted and treated from 1st June 2020 to 31st December 2020 after permission from Institute's ethics committee. All the admitted patients with moderate to severe disease who received glucocorticoids (dexamethasone) as a part of standard treatment protocol were included in study. The starting dose was 4 mg BID dexamethasone. Doses varied in some cases as per severity of infectionand also included pulse steroids up to 500 mg daily of methylprednisolone for 3 to 5 days. Thosecases with the pre-existing diabetes, having random sugar levels greater than 200mg/dl at the time of ICU admission and patients who were already taking steroids because of other medical conditions like malignancy, rheumatoid arthritis, renal transplant or nephrotic syndrome were excluded from study. During the period of 21 days, we check the frequency of occurrence of persistent

hyperglycemia. Patients details including detailed history , demographic profile, vital parameters were documented in proforma.Daily andtotal dose of steroids along with the total duration of treatment was documented. Student's 't' test was used to compare and analyze continuous variables between two groups of patients (with and without GI-DM) while Chi-square test was applied on categorical variables. To find outthe predicting factorsfor GI-DM, we used multiple logistic regression models.Results with P value <0.05 were considered statistically significant and data was compiled using SPSS 20 software.

III.   RESULTS

The median age was 58 years (23–88 years) and 140 were males (70%). The median glucose level checked at random before starting steroids in all 200 patients was 103 mg/dl .New onset DM was diagnosed in 44 (22 %).Time of onset of Diabetes mellitus was 9.3 days (6-21 days); 21 patients (47.7%) developed DM in the first week, while 8 (18.18%) in the second week of treatment. The remaining 15 cases were diagnosed after first two weeks.All patients have been advised follow-upafter diagnosis of Steroid induced DM was established, 35 were treated with oral medication (Metformin) and 9 received insulin.

Variable	Patients with steroid-induced diabetes (n=44)	Patients without steroid induced diabetes (n=156)	P value
Age (years) median range	69 (50-84)	56 (23-84)	<0.001
Male	36(81.8)	104(66.6%)	0.07
Female	8(18.18%)	52(86.6%)	0.04
Body mass Index(kg/m^2)	23.8+/- 0.9	21.2+/-0.7	0.43
Hypertension	12(27.2%)	26(16.6%)	0.44
Dyslipidemia	8(18.18%)	10(6.4%)	0.06
Chronic kidney disease	2(4.5%)	1(0.64%)	0.9
Random glucose (mg/dl)	123.6	102.3	0.2

IV.   DISCUSSION

By increasing insulin resistance, which triggers hepatic gluconeogenesis and reduces peripheral glucose uptake in muscles and fat, steroids cause hyperglycemia[5],[7]. Due to the abovementioned mechanism, a varied glucose metabolism is seen in patients on glucocorticoid therapy. In our study of 200 patients with COVID-19 pneumonia who received glucocorticoids, 44 (22%) patients developed steroid induced DM. International research has shown that steroid-induced diabetes mellitus (DM) can range from 0.4% to 54% in other glucocorticoid-treated disorders, such as connective tissue diseases.[8][9] The proportion of COVID-19 individuals in our study who experienced DM following steroid medication is comparable to the findings of Kimet al..9 The large range of variation in the literature that is now accessible is likely caused by variations in study populations and sample sizes, various glucocorticoid kinds and dosages, and maybe various GI-DM labeling criteria. Old age, high body mass index (BMI), decreased glucose tolerance prior to steroid initiation, cumulative dose, and length of steroid treatment were some of the suggested risk factors for developing steroid

induced diabetes.[4][6[It is well known that glucose tolerance declines with advancing age, and this results in a higher chance of developing type 2 diabetes (T2DM) and impaired glucose tolerance in geriatric patients. [9][10] In addition, there are several other factors associated with aging that play their role in the altered glucose metabolism, includingobesity, less physical activity, addition of daily medications and systemic diseases.

V.   LIMITATIONS

There are certain limitations to our study.
1)   Despite the fact that the effects of steroids on glucose metabolism are more pronounced after meals, we have evaluated fasting blood sugar levels (BSF) rather than postprandial glucose. 14 The prevalence of steroid-induced diabetes may be underestimated in this situation.
2)   Because this was a single center study, further data from multiple centers will be useful in understanding the condition. To establish the link between steroid-induced diabetes in COVID-19 patients, more thorough data analysis and more cases are required.

VI.   CONCLUSION

Diabetes mellitus caused by glucocorticoids frequently develops in COVID-19 patients receiving steroid therapy for respiratory issues. In order to prevent further difficulties brought on by glucocorticoid-induced diabetes mellitus, treating physicians should take this fact into account, particularly when working with older patients who have SARS CoV-2 infection.

REFERENCES

[1].   De Bosscher K, Vanden Berghe W, Haegeman G. Mechanisms of anti-inflammatory action and of immunosuppression by glucocorticoids: negative interference of activated glucocorticoid receptor with transcription factors. J Neuroimmunol 2000; 109: 16-22 .

[2].   Swafe L, Narwani V, Stavraka C, Dhatariya K. How frequently are bedside glucose levels measured in hospital inpatients on glucocorticoids? Clin Med 2014;14:327-8.

[3].   The Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. N Engl J Med 1993; 329: 977-86.

[4].   Tryfon S, Papanas N. Corticosteroid-induced diabetes in patients with chronic obstructive pulmonary disease. Clin Pulm Med 2008; 15: 127- 31.

[5].   Clore JN, Thurby-Hay L. Glucocorticoid-induced hyperglycemia. EndocrPract 2009; 15: 469-74.

[6].   Uzu T, Harada T, Sakaguchi M, Kanasaki M, Isshiki K, Araki S, et al. Glucocorticoid-induced diabetes mellitus: prevalence and risk factors in primary renal diseases. Nephron Clin Pract 2007; 105: c54-7. 7. Panthakalam S, Bhatnagar D, Klimiuk P. The prevalence and management of hyperglycaemia in patients with rheumatoid arthritis on corticosteroid therapy. Scott Med J 2004; 49: 139-41.

[7].   Kim S, Yoo C, Lee C, Chung H, Kim Y, Han S, Shim Y, Yim J. Incidence and risk factors of steroid-induced diabetes in patients with respiratory disease. J Korean Med Sci 2011; 26(2), 264-7.

[8].   Kim SG, Yang SW, Choi SI, Park SH, Lee KR, Park JH, et al. Prevalence of diabetes mellitus in the elderly of Namwon county, South Korea. Korean J Med 2001; 60: 555-66.

[9].   Thearle M, Brillantes AM. Unique characteristics of the geriatric diabetic population and the role for therapeutic strategies that enhance glucagonlike peptide-1 activity. CurrOpin Clin NutrMetab Care 2005; 8: 9-16. 13. Chang AM, Halter JB. Aging and insulin secretion. Am J Physiol Endocrinol Metab2003; 284: E7-12. 14. Geer EB,IslamJ,BuettnerC.Mechanisms of glucocorticoid-induced insulin resistance. Endocrinol Metab Clin North Am2014;43:75–102.