

Frequency of steroid induced hyperglycemia in patients with dermatological disorders

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Abstract

Objective To assess the frequency of steroid-induced hyperglycemia in patients taking systemic steroids (30mg or more of prednisolone or equivalent) for dermatological disorders.

Methods We included 150 patients of either sex and with ages between 12 and 70 years in this cross-sectional study, carried out in the department of dermatology, Jinnah Hospital, Lahore for a duration of 6 months. Their baseline fasting blood glucose level prior to the start of steroid treatment was recorded. Patients taking 30mg or more of prednisolone (or equivalent) were followed up after one week of treatment and their random blood sugar levels were checked by the same laboratory on venous blood, to see whether they developed hyperglycemia or not after treatment with steroids.

Results Mean age of the patients was 41.83 ± 16.42 years. Ninety-four (62.7%) patients were male while 56 (37.3%) were female. Hyperglycemia was found in 28 out of 150 (18.7%) patients.

Conclusion Steroid induce hyperglycemia occurred in 18.7% of the study population.

Key words

Steroid-induced hyperglycemia, frequency, dermatological disorders.

Introduction

Corticosteroids, due to their strong immunosuppressive and anti-inflammatory action,¹ have a vital role in the treatment of various skin diseases including inflammatory, autoimmune and eczematous conditions. Various steroids in use include prednisolone, betamethasone, dexamethasone, fludrocortisone, methylprednisolone, hydrocortisone and triamcinolone. Steroids can be given as low dose (<10mg of prednisolone/day), medium dose (10-20 mg/day of prednisolone) and high dose (>20mg prednisolone/day). Similarly duration of therapy varies according to the need and we can prescribe them for short term (for less than one

month) or long-term (more than a month).²

Steroids can induce hyperglycemia in patients with and without prior history of diabetes. By increasing insulin resistance, steroids increase hepatic production of glucose and decrease its peripheral utilization, causing both fasting and postprandial hyperglycemia. Maximum effect is seen 4 to 6 hours after the morning dose i.e. about mid-day. Therefore, random plasma glucose monitoring is more reliable than fasting sugar levels.³

Increased risk of hyperglycemia is seen with increasing dose and duration of therapy, age and body mass index.⁴ Most of the studies done internationally^{3,4} focus on hyperglycemia developing after long-term steroid therapy, and no guidelines are available for monitoring patients on short term steroids.⁵ Priti *et al.*⁶

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conducted a study, in India in 2011, in which 62.5% patients on steroids developed hyperglycemia after three days of starting steroids. There are no available data on our population's response to steroids for reference. This study was done to assess the tendency of our population to develop high blood sugar in response to steroid therapy. This will help us to decide whether more frequent blood sugar monitoring is required or not. Knowing the risk will help us know whether we need some intervention in future to decrease the morbidity associated with steroid induced hyperglycemia.

Methods

This cross-sectional study was conducted at outpatient department of dermatology Unit-1, Jinnah Hospital, Lahore for a duration of six months from November 2014 to May 2015. A total of 150 patients suffering from various dermatological disorders requiring 30 mg or more of prednisolone (or equivalent), belonging to either sex and with ages between 12 and 70 years were enrolled after informed consent. Patients with history or laboratory evidence of diabetes or patients taking drugs known to affect blood sugar level were excluded. Detailed demographic data were collected from enrolled patients. Pre-treatment fasting blood sugar levels were recorded to rule out diabetes according to American Diabetes Association Criteria. All patients were followed up after one week of treatment with steroids and their post-lunch blood glucose levels were measured to record any evidence of steroid-induced hyperglycemia.

Data were entered and analyzed in SPSS version 21.0. Numerical variables like age, blood sugar level and total dose of steroid were presented as mean \pm standard deviation. Data were stratified

for dose of steroids, age and gender to address the effect modifiers. Poststratification chi-square test was applied to check the significance with p -value < 0.05 as significant.

Results

A total of 150 patients were enrolled. Mean age of the patients was 41.83 ± 16.42 years (range 12-70 years). Out of 150, 94 (62.7%) patients were male while remaining 56 (37.3%) patients were female. Mean dose of steroids used was 47.81 ± 9.99 mg/day.

Mean value of fasting sugar levels before starting treatment was 79.85 ± 8.05 mg/dL, while mean value of postprandial levels after one week of taking steroids was 152.19 ± 45.87 mg/dL.

Out of 150 patients, steroid-induced hyperglycemia was found in 28 (18.7%) patients.

Among patients who developed hyperglycemia, majority were more than 50 years old (71.4%). Remaining 28.6% of subjects with hyperglycemia were 25 to 50 years old. No patient below 25 years of age developed steroid-induced hyperglycemia (**Table 1**).

Among patients who developed hyperglycemia, majority (71.4%) were males while 28.6% were females (**Table 1**).

Effect of dose on development of steroid-induced hyperglycemia was also analyzed. Among patients who developed hyperglycemia, majority was taking 30 to 50 mg of prednisolone (60.7%), while 39.3% were taking 51 to 70 mg of prednisolone (**Table 1**).

Table 1 Stratification of patients showing hyperglycemia with regard to age, gender and dose of steroid (n=150).

	Hyperglycemia		Total N=150
	Yes, N=28	No, N=122	
Age of patients			
< 25 years	-	29 (19.3%)	29 (19.3%)
25-50 years	8 (28.6%)	70 (57.4%)	78 (52.%)
> 50 years	20 (71.4%)	23 (18.9%)	43 (28.7%)
Gender			
Male	20 (71.4%)	74 (60.7%)	94 (62.7%)
Female	8 (28.6%)	48 (39.3%)	56 (37.3%)
Steroid dose (mg/day)			
30-50 mg/day	17 (60.7%)	93 (76.2%)	110 (73.3%)
51-70 mg/day	11 (39.3%)	29 (23.8%)	40 (26.7%)

Discussion

Corticosteroids are synthetic forms of cortisol.² They are usually prescribed in a once a day regimen to match the normal circadian rhythm of steroid hormones and to avoid adrenal suppression.⁴ Despite being life-saving, steroids have many adverse effects. Most notable are the metabolic derangements including hyperglycemia, insulin resistance, dyslipidemia and hypertension.¹ Steroids are the most common culprit causing drug-induced hyperglycemia.⁴

Many people have studied the effect of long-term steroids on blood sugar level. However, the effect of short-term, high dose steroids on blood sugar levels has not been evaluated much. In our study, frequency of steroid-induced hyperglycemia was assessed after one week in patients with dermatological disorders taking 30mg or more of steroids. Hyperglycemia was found in 18.7% of the study population.

In an English study conducted on patients of rheumatoid arthritis with a mean age of 62 years, nearly 9% developed diabetes in the 2 years after starting steroid treatment, which was a higher rate than expected.⁶ Results of our study are comparable with this study although they followed the patients for longer time period and mean age of patients was also more than that of our patients (41.83 years).

In a Korean study on patients with respiratory disorders, prevalence of steroid induced diabetes was found to be 14.7%.⁷ This is quite comparable to our results.

According to a Japanese study conducted on non-diabetic patients with primary renal disease treated with prednisolone 0.75 mg/ kg/day, 42% were found to have 2-hour post-lunch plasma glucose concentrations higher than 200 mg/dL but normal fasting glucose levels.⁸ These results were quite higher than our study probably because of effect of renal excretion of glucose in these patients or difference in ethnicity and cultural factors.

Most of the studies done previously were on long-term, high dose steroid intake. They were conducted on various ethnic groups other than ours. Priti *et al.*⁵ in India in 2011 conducted a study in which they followed the patients after 3 days of steroid intake. They found the frequency of hyperglycemia to be 62.5%, which is quite higher than our observation. This may be because the patients were followed too early before the physiological correction of drug-induced hyperglycemia occurs.

Regarding age, among patients who developed hyperglycemia majority were more than 50 years old (71.4%). No patient below 25 years of age developed steroid-induced hyperglycemia. It is seen there was significant risk of developing

hyperglycemia with advancing age ($p < 0.05$). Similar effect of age was concluded by a Norwegian study conducted on renal transplant recipients.⁹

In our study, there was no association of gender or dose of steroids on development of hyperglycemia. Similar results were seen in the Norwegian study⁹ and a Swiss study¹⁰, which showed no effect of gender on frequency of hyperglycemia after treatment with steroids. Therefore, our result was comparable with these studies. Another study done in Mexico,¹¹ on patients with rheumatic disease, however, showed that increased dose of steroids was an independent risk factor for development of steroid induced hyperglycemia. The difference is probably due to small sample size and different ethnic origin of study populations.

From the study, it becomes clear that even after short-term use of corticosteroids a considerable number of patients (18.7%) developed hyperglycemia. It is suggested that blood sugar level may be checked in a patient on short course steroids to reduce the morbidity associated with hyperglycemia, because hyperglycemia, even if of short duration is potentially harmful.⁴

Conclusion

It is concluded from present study, that frequency of steroid induced hyperglycemia, among patients of dermatological disorders taking 30 mg or more of prednisolone is 18.7% in the study population.

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