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Case Report

# Exacerbation of hyperglycemia in patients with type 2 diabetes after vaccination for COVID19: Report of three cases

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## 1. Introduction

Vaccinations have been initiated in India from January 16, 2021 onwards. More commonly taken is Covishield™ (ChAdOx1 nCoV-19), is a recombinant, replication-deficient chimpanzee adenoviral vector ChAdOx1, containing the SARS-CoV-2 spike glycoprotein antigen, manufactured under technology transfer from Oxford/AstraZeneca[1], being produced by Serum Institute India. Second and less commonly distributed is COVAXIN (BBV-152) which contains whole-virion inactivated SARSCoV-2 antigen (Strain: NIV-2020-770)[2], produced by the Bharat Biotech have been used. Recently Sputnik V (also known as Gam-COVID-Vac, the vaccine uses a heterologous recombinant adenovirus approach using adenovirus 26 (Ad26) and adenovirus 5 (Ad5) as vectors for the expression of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) spike protein) have been approved for use in India. From May 1, 2021, vaccination is open to all adults >18 yrs. of age.

However, there are number of uncertainties regarding the usage of COVID19 vaccines in India(1). In addition, there is increasing reports of adverse effects of vaccination globally. However, no report, except one, exists till now whether the vaccines can exacerbate hyperglycemia. We present here 3 cases reports of exacerbation of hyperglycemia in patients with diabetes following vaccination with Covishield™.

## 2. Case reports

### 2.1. Case 1

A 58-year-old female, known case of T2DM for the last 20 years, was being treated with empagliflozin, metformin, vildagliptin and repaglinide and showed good blood glucose control on self-monitoring of blood glucose (SMBG). Patient was compliant to diet and exercise regime. On March 4, 2021, the patient received the first dose of Covishield™ vaccine without any immediate adverse effects. While he continued his previous diet and exercise schedule, increasing blood glucose values were noted (Table 1). Blood glucose levels remained high for almost a month and needed increased dose of metformin.

### 2.2. Case 2

A 64-year-old male with T2DM (duration, 11 years) was being treated successfully with glargine & lispro insulins, and metformin. Patient had been following diet and exercise regimen properly. On January 18, 2021, the patient received the first dose of Covishield™ vaccine without any problems. Subsequently, his blood pressure increased from 130/80 mm of Hg to 160/90 mmHg by the end of the day. Additionally, he had tachycardia, sweating, and palpitations for

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**Table 1**
Blood glucose values before and after vaccination.

| Cases | Blood glucose values on SMBG | Pre- vaccination | Post Vaccination | Time of elevation of blood glucose after vaccination | Other adverse effects |
|---|---|---|---|---|---|
| Case 1 | Fasting | 110 | 183 | ≈1 day | none |
| 58 yr/F | Post meals | 165 | 269 | | |
| Case 2 | Fasting | 95 | 150 | ≈1 day | increased BP/tachycardia |
| 64yr/M | Post meals | 155 | 220 | | |
| Case 3 | Fasting | 107 | 186 | ≈6 days | none |
| 65yr/M | Post meals | 122 | 220 | | |

*All values are average values of blood glucose based on multiple estimations of fasting and post meal (post breakfast, post lunch and post dinner) blood glucose values as per patients' SMBG records.

a few hours. Post vaccination blood glucose values showed increase for 3 days and then reverted to normal without additional intervention. (Table 1).

### 2.3. Case 3

A 65-year-old male, known case of T2DM for the last 16 years, was being treated successfully with dapagliflozin, metformin, and gliclazide. He was following advice for diet and exercise in a proper manner. SMBG values before vaccination showed excellent glycemic control. On March 13, 2021, the patient received the first dose of Covishield™ vaccine. On day 6 after vaccination, his blood glucose values were elevated as compared to previous (Table 1). Blood glucose levels reverted to previous values in 15 days without any intervention.

## 3. Discussion

Common side effects that have been reported with the Covishield™ vaccine include fatigue, chills, headache, fever, flu-like symptoms. Less common side effects include abdominal pain, enlarged lymph nodes, itchy skin, or rash. However, increase in blood pressure, or changes in blood glucose levels in diabetic or non-diabetic individuals have not been mentioned in the vaccine trial data [2].

All three cases described here showed exceptionally good compliance to diet and exercise before administration of vaccine and maintained good glycemic control for a long period of time. In these cases, all other causes of elevation of blood glucose elevation were excluded. Overall, it appears that vaccine is a likely cause of sudden increase in blood glucose levels. Such a phenomenon, of mild to moderate elevation of blood glucose levels following vaccination has been theoretically discussed [1] but not described previously. In one case report, hyperosmolar hyperglycemic state following vaccination has been reported following Pfizer-BioNTech COVID-19 vaccine [3] It would be interesting to research pathogenesis of such hyperglycemic response. In our cases, mild and transient elevation of blood glucose values is likely to be due to immediate vaccine induced inflammation and later, immune response. Fortunately, in all cases hyperglycemia was self-limiting, not requiring major changes in treatment, further strengthening transient immuno-inflammation as the cause. In difference to this, case of hyperosmolar hyperglycemic state after vaccination as described by Abu-Rumaileh et al. [3] may be due to several factors including damage to beta cells as previously described [4].

## Declaration of competing interest

The authors declare 'no conflict of interest' regarding this particular article.

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