VALUE OF ASSESSING POST PRANDIAL PLASMA GLUCOSE AS A SURROGATE FOR POST-GLUCOSE PLASMA GLUCOSE IN THE POPULATION OF BURDWAN DISTRICT

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ABSTRACT

Background: During routine screening, Post-glucose method is preferred over post-prandial blood glucose. Post-glucose blood glucose estimation is also standard parameter to exclude diabetes mellitus. But Post-glucose plasma glucose measurement is not friendlier both in case of laboratory personal as well as patient in regarding procedure. Aim: To assess the value of estimation of postprandial blood sugar as a surrogate for post-glucose blood glucose. Method: Nine hundred and fifty three healthy normal individuals were subjected post-glucose as well as post-prandial plasma glucose estimation. Result: It was observed that there was no statistically difference between the two mode of blood collection for estimation of 2 hour blood glucose (p>0.05). Conclusion: Post-meal blood glucose could be used to rule out the diabetes in place of conventional PG glucose.

KEY WORDS: Post-glucose blood glucose, Post-prandial blood glucose.

1. INTRODUCTION

Diagnosis of Diabetes mellitus is done by fasting blood glucose (FBS) or post-glucose blood glucose (PG) measurement.¹ But in our Medical College and hospital, during daily routine laboratory investigations of otherwise normal individuals coming for casual health check up or routine blood glucose testing to rule out diabetes mellitus in both indoor as well as
outpatient department, it is found that the post glucose level of plasma glucose (PG) is remarkably preferred by most clinicians than postprandial blood glucose (PP) level and moreover, WHO has considered the PG as the gold standard for diagnosis of diabetes.\textsuperscript{[2,3]} though PG estimation has got relatively cumbersome procedure and time consuming. So, the present study was conducted to investigate whether PPBS can replace the PG as a parameter to rule out diabetes mellitus.

2. MATERIALS AND METHODS

2.1 Study area
The present study was conducted in the Department of Biochemistry of Burdwan Medical College, Burdwan, West Bengal, India, with the collaboration of a metabolic and medical lifestyle management clinic. All participants were recruited from the same geographical area of the northern and southern areas of the Burdwan district.

2.2 Selection of participants
A total of 953 individuals were selected, from 2317 healthy people residing in the study area, by simple random sampling between February 2011 and May 2014. Informed consent was obtained from individuals after details of the procedure were explained to them. Information regarding age, gender, smoking and food habits was gathered.

2.3 Collection of samples
Post glucose blood glucose estimation was carried out to all study population with 75 gms anhydrous glucose dissolved in water or 1.75 g/kg body weight up to a maximum of 75 gms after usual daily diet (with more than 150 g carbohydrate per day) and physical exercise for at least preceding three days before the test.\textsuperscript{[4]} Then similarly postprandial blood glucose measurement was done to all population under the study with the usual principal meal (conventional Bengali diet comprising rice, pulses, vegetable and fish curry) on 4\textsuperscript{th} day of post glucose blood glucose estimation. Peripheral venous blood was drawn and collected into fluoride-oxalated vial to obtain plasma.

2.4 Estimation of plasma glucose level
Plasma glucose level was estimated by glucose oxidase-peroxidase enzymatic method using span diagnostic kit as per the manufacturer’s instructions.\textsuperscript{[5]} by completely automated clinical chemistry analyzers – ERBA XL-600 after usual daily calibration and ensuring quality performance before starting analysis and the samples were analyzed along with the other
routine samples. Intraassay CV% was 1.2% and interassay CV% was 2.1%. Qualitative detection of glucose in urine was accomplished by Benedict’s test.

2.5 Statistical analysis
The data for biochemical analysis was subjected to standard statistical analysis using the Statistical Package for Social Science (SPSS) 11.5 software for windows. All data were statistically analyzed using Student’s t-test, and chi-square (linear by linear correlation) tests, as applicable (with a preset probability of p<0.05). Experimental results are presented as arithmetic mean ± SD. Comparison between post-prandial and post-glucose plasma glucose level in same person in present study population was done using paired t test.

3. RESULT
3.1 Personal profile and clinical details of population under the study
The personal profiles and clinical parameters of all the subjects under study are shown in Table 1.

<table>
<thead>
<tr>
<th>Demographic profiles</th>
<th>Data</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>953</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>52.1± 15.4</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (%)</td>
<td>489 (51.3)</td>
<td>0.17</td>
</tr>
<tr>
<td>Female (%)</td>
<td>464 (48.7)</td>
<td></td>
</tr>
<tr>
<td>Geographic distribution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>493 (51.7)</td>
<td>0.11</td>
</tr>
<tr>
<td>Rural</td>
<td>460 (48.3)</td>
<td></td>
</tr>
<tr>
<td>Food habits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetarian</td>
<td>467 (49)</td>
<td>0.34</td>
</tr>
<tr>
<td>Non-vegetarian</td>
<td>486 (51)</td>
<td></td>
</tr>
</tbody>
</table>

Data are expressed as numbers (group percentages in parentheses) for categorical variables and mean values ± SD for continuous variables.

3.2 Comparison of mean value plasma glucose of same study population by two modes of blood samples
The mean value of PPBS was higher than PG blood glucose but it was not statistically significant (p>0.05) as shown in the Table 2. Glucose in urine was not detected in any sample.
Table 2. Comparison of mean value of two modes of blood samples for glucose estimation.

<table>
<thead>
<tr>
<th>Modes of blood samples</th>
<th>Plasma glucose (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-glucose</td>
<td>95.34 ± 9.19</td>
</tr>
<tr>
<td>Post-prandial</td>
<td>97.87 ± 7.83</td>
</tr>
<tr>
<td>Post-glucose vs Post-prandial</td>
<td>CI = 0.75148 -1.77852</td>
</tr>
<tr>
<td></td>
<td>p = 0.19</td>
</tr>
</tbody>
</table>

Values are mean ± SD; CI = confidence interval.

4. DISCUSSION

American Diabetic Association (ADA) or World Health Organization (WHO) give have chosen PG blood glucose as a diagnostic parameter of diabetes,[6,7] but in developing countries like India where patient burden is a problem, this particular mode of blood collection could not be used in large scale. PPBS is an another method of blood glucose estimation after 2 hours, where no so much patient preparation is required. Moreover, it is simpler, easy, time-consuming and patient friendly. Present study was performed whether PPBS could be used in place of PG blood glucose in otherwise normal population. Our result indicates that mean value of PPBS higher than PG blood glucose. It might be that the insulin response is relatively brisk with glucose than with meal, a more natural stimulus which allows much slower entry of glucose into the intestine due to complex carbohydrate and other factors in the meal like fiber, fat etc which delay absorption.[8] but it was not statistically significant. So, PPBS can easily be replaced the PG blood glucose in normal healthy population to exclude the diabetes mellitus.

5. CONCLUSION

In view of the above, it may be concluded that in otherwise normal individuals glucose not appears to be a stronger factor than the usual meal in causing remarkably difference between PP and PG plasma glucose level. So, PPBS could be used to rule out the diabetes in place of conventional PG glucose in respect to patients, clinician as well as laboratory point of view.

6. ACKNOWLEDGEMENT

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7. Declaration of conflict of interest
We, the authors, are declaring that we do not have any conflict of interest regarding this study.

REFERENCES