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## Fasting Blood Glucose Test in Nepal - Time for a Harmonized Definition

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### ABSTRACT

There are various views in defining protocols for fasting blood glucose test currently being used by healthcare providers in Nepal. A number of modifiable factors can influence the result of an estimation of fasting blood glucose in a clinical laboratory. Variations in the results of fasting blood glucose tests are usually controlled by minimizing the discrepancies in the pretesting variables, one of which is the inconsistency in what represents fasting. In order to minimize the complications of erroneous reporting of fasting blood sugar tests, it is crucial to define the protocols for the test and adopt them in unison by all clinical laboratories of Nepal.

**Keywords:** Clinical laboratory; fasting blood glucose; pretesting variables.

### INTRODUCTION

Patient- I had tested my fasting blood glucose level in ABC laboratory. It was 156 mg/dL. Next day I again tested at XYZ laboratory. I had similar meals and took same medication a day before. This time, it was reported as 111 mg/dL. I am concerned why the reports are totally different.

What should be our approach in such a situation? This article discusses the various factors that can influence the result of a fasting blood glucose test. This article also makes recommendations for a consensus in protocols for estimation of fasting blood glucose in clinical laboratories of Nepal.

### DISCUSSION

Fasting blood glucose is the most common laboratory test performed these days. Besides hospital settings, it can be performed anywhere by anyone with the use of a point-of-care device like glucometer. There are vast numbers of factors that can influence the results of laboratory estimation of blood glucose. These are thoroughly described in standard text-books of Clinical Chemistry and Laboratory Medicine but it is alarming that due attention is not paid to these factors in all clinical laboratories. It is important that clinicians, laboratory personnel, and patient understand the common pretesting variables that can influence the result of a fasting blood glucose test.

Pretesting variables are checked in the preanalytical phase of any biochemical investigation; preanalytical phase is one of the three phases of investigation and perturbations in this phase is known to affect the result of a biochemical investigation the most.<sup>1</sup> Major portion of preanalytical phase takes place outside the laboratory and most of the healthcare providers are unaware of the errors in the results of fasting blood glucose tests due to high variations in preanalytical phase. It is urgent that standardized procedures for these pre-laboratory activities be established and followed for fasting blood glucose testing in Nepal.

Fasting is required for a number of laboratory investigations apart from glucose testing. Patient preparation prior to laboratory testing for fasting samples is one of those essential areas, for which various working groups are established. For example, the working group on preanalytical phase of the European Federation of Clinical Chemistry and Laboratory Medicine has suggested certain standards for collection of fasting samples.<sup>2</sup> Various nations have their own national guidelines for collection of blood sample in fasting state. Besides this various established and accredited laboratories have their own guidelines for collection of blood sample in fasting state. Some of these guidelines also give directions to be followed by patients. Only few clinical laboratories in Nepal, which are accredited, are found to set and follow guidelines for collection of blood sample in the fasting state.

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Great heterogeneity exists in the definitions of fasting for the purpose of testing blood glucose levels in Nepal. The standard practice of patient counseling among clinicians while ordering fasting glucose test is lacking. Further, various laboratories are not equipped with the quality health care providers who follow strict guidelines in sample collection. More importantly, the patient are not properly explained what they are being tested for and what directions they must follow before a test. It is essential to understand that the glucose level varies in response to numerous factors. These factors can be broadly categorized into patient-related factors (eating behavior, food composition, smoking, tea and coffee consumption, time of the day when test is performed, duration of fasting, level of stress, quality of sleep, posture at the time of sample collection and physical activity before sample collection) and laboratory-related factors (delay between blood sampling and analysis, storage time, storage temperature, proper centrifugation and addition of stabilizers like sodium fluoride, lithium iodoacetate, citrate buffer). The total variability in fasting glucose result is controlled by minimizing these modifying factors.

Common consensus regarding standardizing the way patients are prepared for laboratory testing of blood glucose should be established. Duration of fasting, what to eat and what to avoid, time of sampling and preservation of sample till analysis should all be standardized and followed by all clinical laboratories throughout Nepal. To obtain optimal standardization, 8 hours of fasting is recommended with sample collection between 7 am and 9 am.<sup>3</sup> Water consumption should be freely permitted except an hour before a blood draw. Patients should be advised to avoid alcohol for 24 hours before a blood draw and patients should refrain from cigarette smoking, tea and coffee as well as strenuous exercise in the morning of the blood draw for testing.<sup>2,4</sup> Patients should be advised to take all regular medications as usual unless instructed otherwise. Prior to blood draw for testing, a patient should rest for 15 minutes in sitting position.<sup>4</sup>

It should be noted that serum glucose concentration is 2%-5% higher than plasma as a result of fluid shift from erythrocytes to plasma because of anticoagulants such as heparin used in plasma tubes.<sup>5</sup> Plasma glucose is 10%-15% higher than whole blood, because a major component of the measured glucose is located outside the red blood cell.<sup>5</sup> The concentration of glucose in a sample tube decreases continuously due to the continuing glycolytic action of erythrocytes.<sup>6</sup> Studies have shown that despite the use of purported glucose level stabilizers such as

sodium fluoride to inhibit glycolytic reaction, glucose concentration decreases.<sup>7</sup> The use of centrifuge machine also varies with laboratory in relation to revolution per minute and use of refrigerated form of centrifuge.<sup>7</sup> Furthermore, most importantly; the total quality control is different in each laboratory in Nepal.

## CONCLUSIONS

With rising incidence of diabetes mellitus in Nepalese population, it is crucial that a harmonized nation-wide definition of protocols for fasting blood glucose testing be worked out and adopted urgently to minimize the current discrepancies in the results reported by different clinical laboratories of Nepal.

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