Blood Glucose and Gamma Glutamyl Transferase Levels Among 400 Level Medical Laboratory Science Students of Abia State University Uturu


Abstract: Glucose is the final absorptive sugar of the body which gets oxidized to general energy for the body. However, continuous increase in blood glucose levels just as in Diabetes Mellitus poses serious health challenge worldwide and this challenge becomes more cumbersome when evident amongst a dependent population like students. Therefore, this study is aimed at investigating the blood glucose levels and the gamma glutamyl transferase level in 400 level Medical Laboratory Science Students of Abia State University, Uturu. Hundred subjects comprising of fifty test subjects (students) and fifty controls (non-students) were selectively chosen for this study. Plasma glucose levels and gamma glutamyl transferase levels were measured using semi-auto analyzer. Data obtained were analyzed using Statistical Package for Social Sciences (SPSS version 25) and one-way analysis of variance (ANOVA), student t test and expressed as Mean standard deviation. Significant level for the analysis was set at P-value equal to or less than 0.05 (P<0.05) which was considered as being statistically significant. The percentage incidence of elevated random glucose in 400 level medical laboratory science students was significantly increased when compared with controls. There was no significant difference (P>0.05) in the gender and age difference among 400 level medical laboratory science students. This study has shown that random plasma glucose and gamma glutamyl transferase was significantly higher in 400 level medical laboratory science students compared to the controls. This suggests that 400 level medical laboratory science students may be predispose to having hyperglycaemia if they continue with their life style. Random blood glucose and gamma glutamyl transferase analysis should be a routine Laboratory test for students to enable early detection and identification of students at risk of developing diabetes Mellitus.

Keywords: Blood Glucose, Gamma Glutamyl Transferase Level

INTRODUCTION

Glucose is the most important carbohydrate fuel in the body which provides the body with energy. Glucose concentration is maintained by gluconeogenesis and glycogenolysis (Dietzlar et al., 2000(Stephen et al., 2004)). The circulation glucose is regulated by an interplay of pathways modulated by several hormones. These pathways are the Glycolytic pathway, Gluconeogenesis pathway and Glycogenolysis pathway (Carl et. al., 2008).

Furthermore, the organs like liver and skeletal muscle, store this glucose when excess is found in blood stream. This is made possible by the hormone insulin which also comes to play in cellular absorption. Glucagon is another hormone which stimulates the conversion of glycogen in the liver most particularly to glucose and releases it into the blood stream. (Dietzlar, 2008).

Fasting blood glucose levels gives vital clues about how the body is managing their blood glucose, whether diabetic or non-diabetic, the blood glucose tends to peak about an hour after feeding and tends to decline after that (Zawn, 2019). The concentration of glucose in the blood is maintained at a relatively stable
concentration from 80-120mg/dl at the random state. In fasting state for non-diabetics, a range between 70-100mg/dl (Dietzlar, 2008).

Blood glucose outside the normal range is an indicator of hypoglycemia or hyperglycemia. Where there is persistent hyperglycemia, it is an indicator of diabetes mellitus depending on the etiology, it can be type 1 or the type 2 diabetes. Beforehand, the risk factors for developing type 2 diabetes includes family history in the first or second degree relative or in signs associated with insulin resistance or hypertension (Brink, 2014).

While liver is a major organ for glucose metabolism and regulation, Gamma Glutamyl Transferase (GGT) is a cell-surface protein contributing to the extracellular catabolism of glutathione (GSH). The enzyme is produced in many tissues, but most Gamma Glutamyl Transferase is carried primarily with lipoproteins and albumin (Whitefield, 2001). Serum level of gamma glutamyl transferase are determined be several factors: alcohol intake, body day content, plasma lipid/lipoproteins and glucose levels, and various medications. Gamma Glutamyl Transferase is an ectoplasmic enzyme that catalyzes the transfer of gamma glutamyl functional groups from glutathione to other accessories to regulate the redox status and is a marker of oxidative stress. (Rantala et al., 2017)

Increased oxidative stress, leads to beta cell dysfunction hence reducing or numbing the insulin action, causing increased glucose level; Therefore, serum gamma glutamyl transferase can reflect several different processes relevant to diabetes pathogenesis. Several studies such as Lee et. al., (2003, Damodaran, 2018) have reported that elevated baseline gamma glutamyl transferase even within normal range are strongly associated with increased risk of type 2 diabetes mellitus (Lee et. al., 2003).

In relation to Students, the study conducted by Onyeiriuka et al., (2013), explained that most students are a dependent population and development of diabetes mellitus will pose a burden to parents and the society, hence the need to continually access the blood glucose of students. Also, prompt commencement of treatment in with established diabetes will improve quality of life and prevent complications.

Series of epidemiological studies consistently suggest that early GGT increase outside the normal range might be an early and sensitive enzyme related to oxidative stress. However, elevated gamma glutamyl transferase can be linked to an increased risk to a multitude of diseases conditions including cardiovascular disease, Diabetes, metabolic syndrome and all-cause mortality (Whitefield, 2001).

The study was therefore aimed at investigating the plasma glucose level (random and fasting) and plasma gamma glutamyl transferase level of 400 level medical laboratory science students of Abia State University, Uturu. This is to enable the early detection of young adults heading towards hyperglycemia, manage such conditions appropriately before they get into critical health conditions.

MATERIALS AND METHODS

This study was carried out in ABA metropolis, Abia State. One hundred male and female subjects participated in this study, Fifty 400 level medical laboratory science students were recruited as test subjects. Fifty apparently healthy non-students were randomly selected from the street of Abia State University Teaching Hospital as controls. The students were grouped based on their sex and age brackets. The study lasted for twelve weeks. Glucose and gamma glutamyl transferase were determined using Reitz, (1994) and Trindle,(1969) methods respectively. Data was analyzed using the statistical package for social sciences (SPSS). The differences between the groups were compared using one-way analysis of variance (ANOVA) and Student t-test with a P value less than or equal to 0.05 (P=<0.05) which will be considered as being statistically significant. Results were expressed as mean ± SD (standard deviation).
RESULTS AND DISCUSSION

**Table 1:** Comparison of Mean ± Standard Deviation of Fasting Blood Sugar, Random Blood Sugar and Gamma Glutamyl Transferase in 400 Level Medical Laboratory Science Students and Controls.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Test (n=50)</th>
<th>Controls (n=50)</th>
<th>Calc. t</th>
<th>Crit. t</th>
<th>P (≤0.05)</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBS (mmol/L)</td>
<td>5.51±1.43</td>
<td>5.29±0.55</td>
<td>1.023</td>
<td>1.98</td>
<td>0.3090</td>
<td>NS</td>
</tr>
<tr>
<td>RBS (mmol/L)</td>
<td>6.96±1.61</td>
<td>6.33±1.16</td>
<td>2.244</td>
<td>1.98</td>
<td>0.0271</td>
<td>Sig</td>
</tr>
<tr>
<td>GGT (IU/l)</td>
<td>29.08±19.50</td>
<td>20.56±8.27</td>
<td>2.816</td>
<td>1.98</td>
<td>0.0059</td>
<td>Sig</td>
</tr>
</tbody>
</table>

**KEYWORDS:** The following abbreviations stands for:

- Crit. t - Critical t value
- Cal. t - Calculated t value
- Sig - Significant
- NS - Not Significant
- FBS - Fasting Blood Sugar
- RBS - Random Blood Sugar
- GGT - Gamma Glutamyl Transferase

**Table 2:** Comparison of Mean ± Standard Deviation of Fasting Blood Sugar, Random Blood Sugar and Gamma Glutamyl Transferase in 400 Level Medical Laboratory Science Students by Gender.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Test (n=25)</th>
<th>Controls (n=25)</th>
<th>Calc. t</th>
<th>Crit. t</th>
<th>P (≤0.05)</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBS (mmol/L)</td>
<td>5.58±1.69</td>
<td>5.45±1.10</td>
<td>0.320</td>
<td>1.98</td>
<td>0.7504</td>
<td>NS</td>
</tr>
<tr>
<td>RBS (mmol/L)</td>
<td>7.11±1.86</td>
<td>6.82±1.29</td>
<td>0.632</td>
<td>1.98</td>
<td>0.5302</td>
<td>NS</td>
</tr>
<tr>
<td>GGT (IU/l)</td>
<td>34.28±18.96</td>
<td>23.88±18.62</td>
<td>1.917</td>
<td>1.98</td>
<td>0.00612</td>
<td>NS</td>
</tr>
</tbody>
</table>

**KEYWORDS:** The following abbreviations stands for:

- Crit. t - Critical t value
- Cal. t - Calculated t value
- Sig - Significant
- NS - Not Significant
- FBS - Fasting Blood Sugar
- RBS - Random Blood Sugar
- GGT - Gamma Glutamyl Transferase

**Table 3:** Comparison of Mean ± Standard Deviation of Fasting Blood Sugar, Random Blood Sugar and Gamma Glutamyl Transferase in 400 Level Medical Laboratory Science Students by Age Groups

<table>
<thead>
<tr>
<th>Parameters</th>
<th>20-22 Years (N=17)</th>
<th>23-26 Years (N=20)</th>
<th>27-29 Years (N=13)</th>
<th>Calc. F</th>
<th>Crit. F</th>
<th>P (≤0.05)</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBS (Mmol/L)</td>
<td>5.38±0.80</td>
<td>5.53±1.99</td>
<td>5.68±1.99</td>
<td>0.155</td>
<td>3.20</td>
<td>0.8572</td>
<td>NS</td>
</tr>
<tr>
<td>RBS (Mmol/L)</td>
<td>6.64±0.97</td>
<td>6.93±1.48</td>
<td>7.45±2.22</td>
<td>0.926</td>
<td>3.20</td>
<td>0.4034</td>
<td>NS</td>
</tr>
<tr>
<td>GGT (iu/l)</td>
<td>28.0±18.55</td>
<td>26.45±20.40</td>
<td>34.54±18.17</td>
<td>0.694</td>
<td>3.20</td>
<td>0.5045</td>
<td>NS</td>
</tr>
</tbody>
</table>

**KEYWORDS:** The following abbreviations stands for:

- Crit. F - Critical F value
- Cal. F - Calculated F value
- Sig - Significant
- NS - Not Significant
- FBS - Fasting Blood Sugar
- RBS - Random Blood Sugar
- GGT - Gamma Glutamyl Transferase
Table 4: Percentage Incidence Of Dysglycemia In 400 Level Medical Laboratory Science Students And Controls

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total % (n)</th>
<th>Test % (n)</th>
<th>Controls % (n)</th>
<th>P (≤0.05)</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevated FBS (mmol/L)</td>
<td>66 (33)</td>
<td>46 (23)</td>
<td>20 (10)</td>
<td>0.0721</td>
<td>NS</td>
</tr>
<tr>
<td>Elevated RBS (mmol/L)</td>
<td>4 (2)</td>
<td>4 (2)</td>
<td>0 (0)</td>
<td>0.00018</td>
<td>Sig</td>
</tr>
<tr>
<td>Elevated FBS (mmol/L)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSION

In this study, the plasma glucose level, and gamma glutamyl transferase were assessed and compared among 400 level medical laboratory science students and controls. A significant increase in the values of random plasma glucose and gamma glutamyl Transferase and was found in Students when compared to controls. The elevations can be attributed to an increase in consumption of energy or carbohydrate drinks and junkie good which is popular among Students and this can lead to hyperglycaemia (Ma et al., 2018).

A quick rise in blood glucose concentrations from high load of junky foods leads to high demand of insulin which place more demand on the pancreas leading to oxidative stress. This is responsible for the significant increase in the levels of plasma glucose and gamma glutamyl Transferase. This can result to developing metabolic diseases such as diabetes Mellitus among these apparently healthy students due to their dietary lifestyle. (Ludwig et al., 2015).

There was no significant difference in the mean values of the fasting blood glucose, random blood glucose and gamma glutamyl transferase among 400 level medical laboratory science students when grouped based on their age groups. This conforms with the study of Savji et al., (2013).

There was no significant difference in the mean values of fasting plans glucose, random plasma glucose and gamma glutamyl transferase among 400 level medical laboratory science students when compared based on gender. This nullifies gender as a risk factor of developing diabetes Mellitus. This is agreement with the study of Gale et al., (2012).

A very high significant increase was found in random plasma glucose when the percentage incidence of glycemic index was compared between the 400-level medical laboratory science students and the control. This correlate with the study of Hanan et al., (2020). Though the mean values of the fasting plasma glucose levels were not significantly different.

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REFERENCES


