

Assessment of Serum Triglycerides in Pankshin Plateau State North Central Nigeria

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Abstract

The study shows the evaluation of serum triglycerides. Triglycerides are the main constituents of body fats acids. The study was held in Pankshin in Plateau State. The distribution shows 5(5%) of the adults have 141-164mg/dL, 6(6.0%) of adults have 40-140mg/dL and the remaining 89 (89.0%) were above 165mg/dL. This clearly shows that most of the adults within Pankshin town have high triglycerides. The table presented results of serum triglycerides based on age ranges which 52 adults that were below 50 years were examined which 6(6.0%) were normal, 39(39.0%) have high serum triglycerides, 7(7.0%) have low triglycerides. A total number of 48 adults where above 50 years were examined which 5(5.0%) have normal serum triglycerides, 33(33.0%) have high serum triglycerides and the remaining 10(10.0%) have low triglycerides. This implies that most adults below 50 years have high triglycerides than others above 50 years. The table presented 41 males were sampled in this study which 6 (6.0%) of the male were normal of serum triglycerides, 31(31.0%) were high of triglycerides, 4 (4.0%) were low of triglycerides while 59 females were examined but 5(5.0%) have normal serum triglycerides, 46(46.0%) have high serum triglycerides and the remaining 6(6.0%) have low triglycerides. This clearly shows that most of the people sampled in this study have high level of serum triglycerides but male had normal triglyceride than female.

Keywords: Serum triglycerides, Pankshin town, heart disease.

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INTRODUCTION

Serum triglyceride (TG), triacylglycerol, (TAG), or triacylglyceride) is an ester derived from glycerol and three fatty acids (from *tri-* and *glyceride*). Triglycerides are the main constituents of body fat in humans and other vertebrates as well as vegetable fat (Amos and Carty, 2010). They are also present in the blood to enable the bidirectional transference of adipose fat and blood glucose from the liver and are a major component of human skin oils.

High triglyceride levels can increase your risk for heart disease, stroke and nerve damage. There is a link between chronically elevated triglyceride levels and atherosclerosis, as well as insulin resistance (Amos and Carty, 2010).

Triglyceride is a disease in which the body's ability to produce or respond to the hormone insulin is impaired, resulting in abnormal metabolism of carbohydrates and elevated levels of glucose in the blood and urine, (Merriam, 2017).

Triglycerides are composed of a glycerol molecule bound to three fatty acids and are digested by pancreatic lipase. Triglycerides are a major component of very-low-density lipoprotein (VLDL) and serve as a source of energy. They are broken down in the intestine, absorbed by intestinal cells, and combined with cholesterol and proteins to form chylomicrons that are transported in lymph to the bloodstream. Triglycerides are measured using enzymatic reagents, including lipase, glycerol kinase, and glycerol-3-phosphate oxidase linked

to a peroxidase-chromogen detection system (Evans, 2009).

Triglycerides (TGs, also called neutral fats, triacylglycerols, or triacylglycerides) are a common, simple type of lipid consisting of three long-chain fatty acids esterified to glycerol. There are exogenous (chylomicrons) and endogenous (pre- β -lipoproteins) triglycerides. Exogenous triglycerides originate from food, while endogenous triglycerides are formed in the liver. Two main biosynthetic pathways are known, the sn-glycerol-3-phosphate pathway, which predominates in the liver and adipose tissue, and a monoacylglycerol pathway in the intestines. Hence, TGs constitute the main source of energy for the body, apart from being the main and most reliable energy reserves of the human body, triacylglycerols take part in metabolic processes that determine the rate of fatty acid oxidation, the plasma levels of free fatty acids, the biosynthesis of other lipid molecules and the metabolic fate of lipoproteins.

Triglycerides are fat molecules that make up most of the body fat and the fat found in food. Along with cholesterol, they are one of the lipids that circulate in the blood. The medical term for having elevated levels of triglycerides is hypertriglyceridemia. In fasting laboratory tests, a normal triglyceride level is below 150 mg/dL. Borderline high is 150 to 199 mg/dL. High is considered 200 to 499 mg/dL. Very high is over 500 mg/dL (Hsieh, 2008).

Fatty liver disease occurs when triglycerides and other fats build up in the liver, which can cause inflammation and interfere with normal liver function. The condition often develops in people who are overweight or obese. It is now one of the leading causes of serious liver disease worldwide. Fat accumulation in liver cells is known as steatosis. Fatty liver is a common consequence of heavy drinking. When it occurs in people who drink little or no alcohol, its milder form is known as non-alcoholic fatty liver disease (NALFD) and its more severe form is non-alcoholic steatohepatitis (NASH). Most people who have fatty liver disease don't have hepatitis B or C. Located on the right side of the abdomen behind the ribcage, the liver carries out many vital functions. These include filtering the blood, helping convert food into energy, processing medications and producing proteins that help the blood clot after an injury. Over time, fat accumulation in liver cells can lead to inflammation and progressive liver damage. This can include: **Fibrosis** – build-up of collagen and other fibrous scar tissue, leading to a 'stiff' liver. **Cirrhosis** – serious scarring that blocks blood flow through the liver and interferes with liver function. **Hepatocellular carcinoma (HCC)** – a type of cancer that starts in the liver. **End-stage liver disease** – severe loss of liver function that can result in death without a liver transplant.

MATERIALS AND METHODS

Study area: Pankshin Town is made up of two (2) electoral wards namely; Pankshin West and Pankshin Central. And the town is the headquarter of Pankshin Local Government Area. The local government area share boundary with Mangu Local Government Area to the North and to the South it is bordered with Qua'anpan Local Government area to the West the Local Government Area share boundary with Kanke while in the East, it is bordered with Shendam Local Government Area (Middlebeltforum.com, 2007).

The population of Pankshin Local Government Area is about 175,454 (Census 2006). This population size is too dense for this study to cover, hence the sample size calculated will be done to ascertain a minimum number of people that will be sample for this study to be successful.

Pankshin local government is located at the central zone of Plateau State about 127km away from Jos the Plateau State capital.

The main occupation of people living in Pankshin Local Government area are farming, trading, civil service and many other job opportunities that members of the community depend on as a source of livelihood.

The climatic weather of Pankshin is mostly dry season from November to early March, Raining from March to October. Pankshin climate is mostly cold and winter. The weather is good for agriculture and settlement.

Sample Size: In determining sample size for this study, Theresa (2010) determined sample size of diabetes mellitus in adult using $n = \text{sample size}$, $d = \text{degree of freedom}$, $z = \text{constant}$, $p = \text{Prevalence rate of serum lipids among liver and HIV diseases}$.

Using the following formular;

$$N = \frac{Z^2 P (1-P)}{d^2}$$

Where $Z^2 = Z$ score of 95% confidence level = 1.96

$P = \text{prevalence rate} = 7\%$

$d = \text{precision to be adopted in the study} (5\%)$

Calculation

$$N = \frac{z^2 p (1-p)}{d^2}$$

$$d = 5\% = 0.05$$

$$P = 11\% = 0.07$$

$$n = 1.96^2 \times 0.07$$

$$(1-0.07) \times 0.05^2$$

$$= 3.8416 \frac{0.07(0.93)}{0.0025}$$

$$= 3.8416 \times 0.0651$$

$$0.0025 = \frac{0.25008816}{0.0025}$$

$$= 100$$

Ethical Permission

Before collection of samples from the study area, the researcher sought for permission from the Medical Superintendent Pankshin General Hospital, Pankshin through a formal letter given by Head of Department/school medical laboratory Sciences. The formal letter was endorsed and conveyed to the field of study for approval to carry out the study.

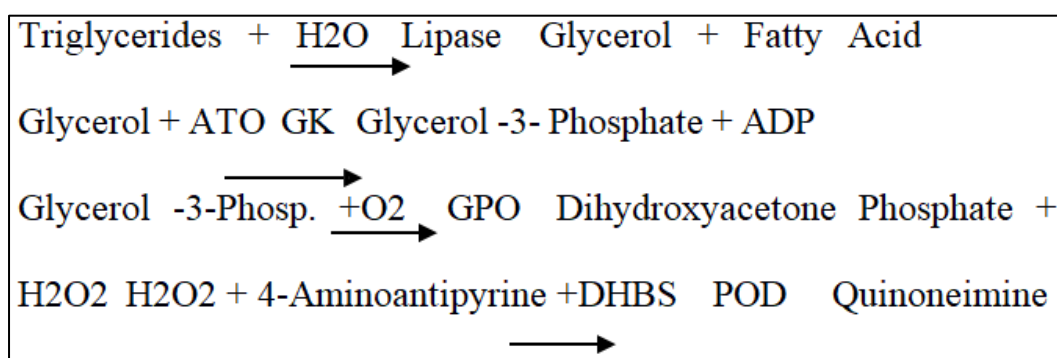
SAMPLE COLLECTION

5mls of blood was collected via venipuncture, using BD vacutainer system into heparinised bottle anticoagulated bottle under strict aseptic techniques. The

blood sample was centrifuged at 3000 rpm for ten minutes on a bench-top centrifuge. The serum obtain was transferred into sterile plastic tube and stored immediately until ready to be analyzed.

PRINCIPLE

Lipase hydrolyses triglycerides sequentially to Di & Monoglycerides and finally to glycerol. Glycerol liberated kinase (GK) using ATP as PO4 source converts Glycerol-3-Phosphate (G-3-Phosphate). G-3-Phosphate Oxidase (GPO) Oxidises, G-3-phosphate formed to Dihydroxy acetone phosphate and hydrogen formed, to oxidize 4-Aminoantipyrene and DHBS (3,5, dischloro-2-hydroxy benzene sulphate) to a red coloured complex. The absorbance of the coloured complex is measured at 520 nm (500-550 nm) or with GREEN filter which is proportional to Triglyceride concentration.



STATISTICAL ANALYSIS

Data obtained was entered into a statistical package (such as SPSS version 22) on a computer to define the nature of the distribution of data for each group. Statistical differences of data were analyzed using series of statistical analysis such as mean, standard deviation, Chi –square, student’s t-test, ANOVA depending on the nature (categorical or continuous) and

distribution of data (normal or non-normal). Pearson’s correlation was used to determine the relationship between sets of data. Probability (p≤0.05) was used to determine the level of significant for all statistical analysis.

RESULTS

Table 1: Distribution of serum triglycerides based on ranges

Result	Number examine	% of serum triglyceride
40-140 mg/dL.	6	6
141-164mg/L	5	5
165mg/L above	89	89
Total	100	100%

The above distribution shows 5(5%) of the adults have 141-164mg/dL, 6(6.0%) of the adults have 40-140mg/dL and the remaining 89 (89.0%) were above

165mg/dL. This clearly shows that most of the adults within Pankshin town have high triglycerides.

Table 2: Showing distribution of serum triglycerides based on age ranges

Age ranges	Number examine	Normal serum triglycerides (%)		High serum triglycerides		Low triglycerides	
<50 yrs	52	6	6.0	39	39.0	7	7.0
>50 yrs	48	5	5.0	33	33.0	10	10.0
Total	100	11	11.0%	72	72%	17	17%

The above table presented results of serum triglycerides based on age ranges which 52 adults that

were below 50 years were examined which 6(6.0%) were normal, 39(39.0%) have high serum triglycerides,

7(7.0%) have low triglycerides. A total number of 48 adults were above 50 years were examined which 5(5.0%) have normal serum triglycerides, 33(33.0%)

have high serum triglycerides and the remaining 10(10.0%) have low triglycerides.

This implies that most adults below 50 years have high triglycerides than others above 50 years.

Table 3: Showing distribution of serum triglycerides based on sources of samples.

Age ranges	Number examine	Normal serum triglycerides (%)		High serum triglycerides		Low triglycerides	
Gen. Hospital	80	6	6.0	70	70.0	4	4.0
P.H.C Pankshin	20	5	5.0	2	2.0	17	17.0
Total	100	11	11.0%	72	72%	17	17%

The above distribution shows 80 adults that were examined were from General hospital which 6(6.0%) were normal of serum triglyceride, 70(70.0%) have high serum triglyceride and the remaining 4(4.0%) have low triglycerides. A total number of 20 sampled adults were sourced from P.H.C Pankshin which 5(5.0%) have normal serum triglycerides, 2(2.0%) have high

serum triglycerides and the remaining 17(17.0%) have low triglycerides.

This clearly shows that most of the sampled adults that were sourced from General hospital have high serum triglycerides than others.

Table 4: Showing distribution of serum triglycerides based on gender

Gender	Number examine	Normal serum triglycerides (%)		High serum triglycerides		Low triglycerides	
Male	41	6	6.0	31	31.0	4	4.0
Female	59	5	5.0	46	46.0	6	6.0
Total	100	11	11.0	77	77%	10	10%

The above table presented 41 males were sampled in this study which 6 (6.0%) of the male were normal of serum triglycerides, 31(31.0%) were high of triglycerides, 4 (4.0%) were low of triglycerides while 59 females were examined but 5(5.0%) have normal serum triglycerides, 46(46.0%) have high serum triglycerides and the remaining 6(6.0%) have low triglycerides.

This clearly shows that most of the people sampled in this study have high level of serum triglycerides but were male had normal triglyceride than female.

DISCUSSION

Results presented the distribution of 5(5%) adults have 60-165mg/dL, 6(6.0%) of the adults have 40-140mg/dL and the remaining 89 (89.0%) were above 165mg/dL. This clearly shows that most of the adults within Pankshin town have high triglycerides. Results in regards to age ranges shows serum triglycerides based on age ranges which 52 adults that were below 50 years were examined which 6(6.0%) were normal, 39(39.0%) have high serum triglycerides, 7(7.0%) have low triglycerides. A total number of 48 adults were above 50 years were examined which 5(5.0%) have normal serum triglycerides, 33(33.0%) have high serum triglycerides and the remaining 10(10.0%) have low triglycerides.

Findings in relation to health facility shows 80 adults that examined were from General hospital which 6(6.0%) were normal of serum triglyceride, 70(70.0%) have high serum triglyceride and the remaining 4(4.0%)

have low triglycerides. A total number of 20 sampled adults were sourced from P.H.C Pankshin which 5(5.0%) have normal serum triglycerides, 2(2.0%) have high serum triglycerides and the remaining 17(17.0%) have low triglycerides. The study on gender presented 41 males were sampled in this study which 6 (6.0%) of the male were normal of serum triglycerides, 31(31.0%) were high of triglycerides, 4 (4.0%) were low of triglycerides while 59 females were examined but 5(5.0%) have normal serum triglycerides, 46(46.0%) have high serum triglycerides and the remaining 6(6.0%) have low triglycerides.

CONCLUSION

The rate of serum triglycerides is high as revealed in this study. Furthermore, it is observed that such group of people that have high serum triglycerides do not have healthy eating habit. This is a resultant effect that led to several risk factors leading to complications such as serious problems with the eyes, kidneys, nerves, heart, blood vessels, and other areas in the body. There is no doubt that duration and degree of high fats play a major role in the development of complications. In general, complications include: Kidney disease and kidney failure (diabetic nephropathy) Nerve damage (diabetic neuropathy) which causes pain and numbness in the feet, as well as a number of other problems with the stomach and intestines, heart and other body organs. Eye disease (diabetic retinopathy) Cataracts, damage to blood vessels that supply the legs and feet (peripheral vascular disease) Foot sores or ulcers, which can result in amputation, Glaucoma high blood pressure, high cholesterol, Molecular edema, Stroke, Worsening of

eyesight or even blindness. Other complications include: Erectile dysfunction, Infections of the skin, Female genital tract, and Urinary tract.

RECOMMENDATION

Based on the findings, the study recommend the following for further attention Health educators should see the need to adopt healthy lifestyle such as exercises and healthy diet to reduce excessive triglycerides in the blood.

Government Hospital such as the General Hospital Pankshin and Pankshin PHC should see the need to encourage Government to make provision for reagents that will help in diagnosing triglycerides.

Government should make diagnosis of triglycerides affordable to all the members of the community. People within the Local Government should develop positive attitude towards diagnosing triglycerides.

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