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*Original Research Article*

# Evaluation of Serum Lipid Profile in Male Cannabis Smokers of College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus, Anambra State, Nigeria

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## ABSTRACT

Cannabis is the preferred name of the plant *Cannabis sativa*, *Cannabis indica*, and *Cannabis ruderalis*. The Cannabis plant is a known potent psychoactive substance. This study investigated the effect of cannabis in the serum lipid profile levels of smokers in apparently healthy male students of College of Health Sciences, Nnamdi Azikiwe University Nnewi campus, Anambra State, Nigeria. A total of 60 male subjects (40 cannabis smokers and 20 non-cannabis smokers) were recruited for the study. A well-structured questionnaire was used to obtain the demographic and anthropometric data of the subjects. Thereafter, 5mls of fasting blood sample was collected from the subjects and analysed for serum lipid profile (TC, TG, HDL, and LDL) respectively. The result showed no significant differences in the mean serum triglyceride, total cholesterol low density lipoprotein, and high density lipoprotein of cannabis smokers compared to the non- smokers. However, there were significant increase in the mean weight (73.87± 10.83mmol/l vs 67.75 ± 9.66mmol/l; p = 0.037) and body mass index (24.26 ± 3.61mmol/l vs 21.94 ± 2.18mmol/l; p = 0.011) of smokers when compared with non-smokers. This study shows that cannabis smoking may not have negative effect on serum lipid profile values.

***Key Words:*** Serum Lipid Profile, Male Cannabis Smokers, Nnewi Campus, Weight, Body Mass Index.

## INTRODUCTION

Smoking is an escalating public health problem in developing countries like Nigeria. World health organisation (WHO) has recently declared smoking as fourth global health threat (Soleiman *et al.*,2010). Cannabis remains the most widely used illicit drug worldwide due to its affordability and availability (Bauman and phongsavan, 1999). It has been estimated in 2009 that between 125 and 203 million people of the world population aged 15-64 years used cannabis at least once in a year (SAMHSA, 2010).Cannabis was said to be consumed through various routes, with the most common route being smoking followed by vaporization, and then by the oral route (Baggio *et al*., 2014).

Azorlosa *et al.*, (1995), reported that "THC ($\Delta^9$tetrahydrocannabinol) pharmacokinetics and effects vary as a function of the weight of a cannabis cigarette preparation, the rate of inhalation, depth and duration of puffs, volume inhaled, extent of breath-holding and escaped smoke".

It was reported that an extensive comparison of smoke generated by igniting cannabis and tobacco cigarettes, showed marked qualitative similarities in specific compounds (e.g. carbon monoxide, hydrogen cyanide) and also significant quantitative differences. (Moir *et al.,* 2008). The in vivo cardiovascular effects of cannabinoids are complex, with both increase and decrease in blood pressure being reported (Stark and Dews, 1980).As reported by different research groups, smoking increases the concentration of serum total cholesterol, triglycerides, LDL-cholesterol and decreases the levels of HDL cholesterol (Adam *et al*., 2011). Major component of total cholesterol is LDL-c which is directly related to coronary artery disease (CAD) has been reported to be increased by cannabis use (Brousseau and Schaefer, 2000).

Cannabis use was also said to be associated with vascular conditions that increase the risks of myocardial infarction, stroke, and transient ischemic attacks during cannabis intoxication (Thomas *et al*., 2014).

Smoking, in different forms has been reported to be a major risk factor for atherosclerosis and coronary heart disease (Fagerström, 2002).It was also reported that cannabis may produce adverse effects on the cardiovascular system, because cannabis and THC ($\Delta^9$tetrahydrocannabinol) cause a dose-dependent increase in heart rate. Cannabis use can also cause an increase in the risk of myocardial infarction in an hour after use, and provokes angina (inflammatory affection of the throat or faces especial such that tends to produce suffocation and choking, it can be marked by chest pain) in patients with heart disease (Hall and Degenhard, 2009).

While some data suggest cannabis use to confer cardio metabolic benefits such as reductions in Low Density Lipoprotein (LDL) (Penner *et al*., 2013).Some studies show that cannabis users have a lower plasma High Density Lipoprotein (HDL), which are important risk factors for cardiovascular disease (Muniyappa *et al*.,2013).

Some studies showed that cannabis users show higher BMI, total cholesterol, LDL-cholesterol, and triglycerides and that none of these metabolic parameters however reached statistical significance although certainly demonstrated a trend for unfavourable cardio metabolic profile among cannabis smokers (Issa *et al*., 2014). Cannabis may produce adverse effects on the cardiovascular system, because cannabis and THC ($\Delta^9$tetrahydrocannabiol) cause a dose-dependent increase in heart rate (Hall and Degenhard, 2009). Some studies show that cannabis users have a lower Serum High Density Lipoprotein (HDL), which are important risk factors for cardiovascular disease (Muniyappa *et al*.,2013). This is why an understanding of the effect of cannabis smoking on the different parameters of serum lipid profile is of great importance. This study may help to provide information on the potential effects of cannabis smoking on serum lipid profile and its health implications.

## MATERIALS AND METHODS

### Study Area

This research was conducted in College of Health Sciences Nnamdi Azikiwe University, Nnewi campus, Anambra state, Nigeria.

### Study Design

A total of 60 individuals (males) were recruited for this study which comprised of 20 male non-smokers used as the control group and 40 male cannabis smokers used as the test group. Both groups were apparently healthy and aged between 18-30 years. Questionnaires were used to obtain the anthropometric (weight, height, and body mass index) data of the subjects.

Thereafter, 5mls of fasting blood sample was collected from both groups in plain containers for the determination of serum lipid profile (TC, TG, HDL, and LDL) of subjects. Biochemical parameters (TC, TG, HDL, and LDL) were assayed using standard enzymatic methods as described by Roeschlau *et al*. (1974); Tietz, (2006); Burstein *et al*. (1980); and Assman *et al.* (1984) respectively.

**Ethical Consideration**

The ethical approval for this research was obtained from Ethics Committee of Nnamdi Azikiwe University Teaching Hospital, Nnewi and Ethics committee of Faculty of Health Sciences and Technology, Nnamdi Azikiwe University, Nnewi Campus in accordance with the Helsinki declaration by the world medical association (WMA) on the ethical principles for medical research involving human subjects (Levine and Robert, 2006). Informed consent was obtained from the subjects before sample collection.

**Inclusion Criteria**

Apparently healthy cannabis male smokers and non-smokers within 18-30 years of age were included for this study.

**Exclusion criteria**

Individuals with known cardiovascular disease, diabetes and those on drugs were excluded from this study.

**Statistical Analysis**

Statistical package for social science (SPSS) version 20.0 was used for the analysis of the results. The data generated was presented as mean ± standard deviation (SD).The Different serum lipid profile parameters were compared between groups using student's paired t-test. The level of Significance was set at $p<0.05$.

## RESULT

The mean weight (kg), height (meters) and body mass index ($kg/m^2$) of non-smokers and smokers were (67.75±9.66 kg, 1.75±0.79 m, 21.94±2.18 $kg/m^2$) and (73.87±10.83 kg, 1.74±0.86 m, 24.26±3.61 $kg/m^2$) respectively. All subjects were from young and apparently healthy population. When the anthropometric parameters of subjects were compared between smokers and non-smokers, there were significant increase in the mean weight and body mass index of smokers more than non-smokers (73.87±10.83 kg Vs 67.75±9.66 kg; p = 0.037 and 24.26±3.61 $kg/m^2$Vs 21.94±2.18 $kg/m^2$; p = 0.011) respectively. However, there was no significant difference in the mean height of both smokers and non-smokers (See table1).

**Table 1: The Anthropometric parameters of subjects studied (Mean ± SD; n=60)**

| Variables | Non-smokers n=20 | smokers n=40 | t- value | p- value |
|---|---|---|---|---|
| Weight (kg) | 67.75±9.66 | 73.87±10.83 | -2.137 | 0.037* |
| Height (meter) | 1.75±0.79 | 1.74±0.86 | 0.314 | 0.754 |
| BMI ($kg/m^2$) | 21.94±2.18 | 24.26±3.61 | -2.63 | 0.011* |

*statistically significant at $p<0.05$

Again, the result showed that the mean serum total cholesterol, triglyceride, high density lipoprotein, and low density lipoprotein levels did not differ significantly between smokers and non-smokers population ($p> 0.05$) (See table 2).

**Table 2: Lipid profile levels in subjects studied (Mean ± SD; n=60)**

| Variables | Non-smokers n=20 | Smokers n=40 | t- value | p- value |
|---|---|---|---|---|
| Total cholesterol (µmol/l) | 3.86±1.15 | 4.16±0.84 | -1.150 | 0.255 |
| Triglyceride (µmol/l) | 0.82±0.17 | 0.84±0.16 | -0.599 | 0.552 |
| High density lipoprotein (µmol/l) | 1.26±0.48 | 1.31±0.46 | -0.407 | 0.686 |
| Low density lipoprotein (µmol/l) | 1.96±0.56 | 2.07±0.42 | -0.804 | 0.425 |

*statistically significant at $p<0.05$

However, there was a strong positive correlation between body mass index and weight ($r=0.793$; $p=0.000$), total cholesterol and high density lipoprotein

(r=0.593;p=0.006), total cholesterol and low density lipoprotein (r=0.572;p=0.008), high density lipoprotein and low density lipoprotein (r=0.810;p=0.000) of non-smokers (control group). This was statistically significant at ($p < 0.05$) (See table 3).

**Table 3: The levels of Association Between parameters studied in control subjects (non-smokers)**

| Parameters | Subjects n=20 | Correlation coefficient pearson (r) | p-value |
|---|---|---|---|
| BMI vs Weight | | 0.793 | 0.000* |
| Weight vs Height | | 0.698 | 0.001* |
| TC vs HDL | | 0.593 | 0.006* |
| TC vs LDL | | 0.572 | 0.008* |
| HDL vs LDL | | 0.810 | 0.000* |

*statistically significant at p<0.05

More so, there was a strong significant negative correlation between the body mass index and height (r = 0.317; p = 0.046) in smokers. Also, there was a strong positive correlation between body mass index and weight (r = 0.771;p = 0.000), triglyceride and total cholesterol (r = 0.410;p = 0.009), total cholesterol and high density lipoprotein (r = 0.880; p = 0.000), low density lipoprotein and high density lipoprotein (r = 0.654; p = 0.000), low density lipoprotein and cholesterol (r = 0.694; p = 0.000) in smokers compared with the control subjects (see table 4).

**Table 4: The levels of Association Between parameters studied in smokers**

| Parameters | Subjects n=40 | Coefficient Pearson (r) | p-value |
|---|---|---|---|
| BMI vs Weight | | 0.771 | 0.000* |
| BMI vs Height | | -0.317* | 0.046 |
| Weight vs Height | | 0.353 | 0.025* |
| TC vs TG | | 0.410 | 0.009* |
| TC vs HDL | | 0.880 | 0.000* |
| LDL vs HDL | | 0.654 | 0.000* |
| LDL vs TC | | 0.694 | 0.000* |

*Statistically significant at p<0.05

## DISCUSSION

*Cannabis sativa* is the most widely used illicit drug worldwide due to its affordability and availability (Bauman and Phongsavan, 1999). Serum lipid profile has been reported to be associated with cardiovascular disease risk (Cooney *et al.*, 2009). Cannabis may produce adverse effects on the cardiovascular system, because cannabis and THC ($\Delta^9$tetrahydrocannabinol) cause increase in heart rate (Hall and Degenhard, 2009). However some data suggest cannabis use to confer cardio metabolic benefits such as reductions in Low Density Lipoprotein (LDL) (Penner *et al.*, 2013).

This study was therefore designed to investigate the serum lipid profile in male cannabis smokers of College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus, Anambra State, Nigeria. In this study, there was no significant difference in the mean serum high density lipoprotein cholesterol (HDL-c) level of cannabis smokers (p>0.05). This is in line with the study carried out by Hossein Hayatghaibi *et al.*, (2007) which investigated the hypercholesterolemic effect of drug-type *Cannabis sativa* seed in guinea pig, and found that serum high density lipoprotein cholesterol (HDL-c) level was not affected by the consumption of cannabis seed.

Again, in this current study, the mean serum levels of Total cholesterol, Low density lipoprotein and Triglyceride did not differ significantly in both smokers and control subjects (p>0.05). This result confirms the work carried out by Muniyappa *et al.*, (2013), which revealed that cannabis consumption did not affect the total cholesterol, triglyceride, and low density lipoprotein in both subjects.

Interestingly, there was a significant increase in the mean weight of cannabis smokers when compared with non-smokers (73.87±10.83 kg Vs 67.75±9.66 kg; p = 0.037). This result is in agreement with the work carried out by Jin *et al.*, (2017), which investigated the association between use of cannabis in Adolescence and weight change, which showed that cannabis use promotes weight gain. Again, there was a significant increase in the body mass index of cannabis smoker in this study (24.26±3.61 kg/m$^2$ Vs 21.94±2.18 kg/m$^2$; p = 0.011). This result confirms the work carried out by Issa *et al.*, (2014), which showed that cannabis smokers had higher body mass index than non-smokers. However, this is in contrast

with the work carried out by Ghanshyam Gahlot *et al*., (2017*)* which revealed that there was tendency towards a lower BMI among cannabis users. The significant increase in the weight of cannabis smokers may be due to the presence of cannabinoid content of cannabis which has been found to stimulate appetite via activation of endocannabinoid system and potentially promoting weight gain (Lexie *et al.*, 2017).

HDL-c has preventive role in coronary artery disease and some studies in animal models of atherosclerosis support the cardio protective role of HDL-c (Kawahiri *et al*., 2000). The HDL level of cannabis smokers was not significantly raised but there was a trend for HDL-c to increase, this means that cannabis could be beneficial to cardiovascular health. Some studies have also established that appetite is modulated by the cannabinoid (Kirkham and Williams, 2001).

## CONCLUSION

In conclusion, we found no significant differences in the mean serum lipid profile of both smokers and non-smokers alike. However, there were significant increases in the mean body mass index and weight of smokers compared to the control subjects. This study therefore, suggests that cannabis smoking may not have deleterious effect on serum lipid profile values.

### *Recommendation*

Based on our findings, we recommend that further studies in which both the frequency and duration of cannabis smoking among participants are included should be carried out in order to further unravel the full potential effects of cannabis use in humans.

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