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Original Research Article

EVALUATION OF SOME REPRODUCTIVE HORMONES AND LIVER ENZYMES AMONGST MALE *CANNABIS SATIVA* SMOKERS IN BENIN CITY, NIGERIA

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Abstract: Cannabis sativa is an annual herbaceous plant intended for use as a psychoactive drug. The chemical compound (cannabinoid) in the plant *Cannabis* abused is assumed to be the cause a lot of medical conditions. There is paucity of information on the effects of this herb on certain reproductive hormones and liver enzymes, therefore this study is aimed at accessing the liver function, Hormonal activities and pancreatic amylase activities in male *Cannabis* smokers in Benin City. Samples were collected from two hundred (n=200) subjects which served as *Cannabis* smokers group and another one hundred (n=100) control as non-*Cannabis* smokers group. Samples were analyzed using Reflotron Plus for Liver function test and Pancreatic Amylase and Stat Fax 4200 ELISA System for Hormonal profile. From this study, Liver function tests ALT, AST,GGT and ALP were higher in smokers than non-smokers ($P < 0.01$), except for P-amylase which showed no significant difference ($P > 0.05$). Testosterone, FSH, LH and TSH levels were lower in smokers than non-smokers ($P<0.001$).It is therefore concluded that smoking *Cannabis* may cause elevation of liver enzymes, reduce serum TSH and can significantly depress serum testosterone concentration in males and this could significantly contribute to male infertility.

Key Words: Cannabis sativa, hormones, enzymes, males

Introduction: Cannabis is one of the most widely used illegal drugs in Nigeria. Cannabis has no religious or medical use in the country, in addition to such widespread international terms as marijuana, hemp, ganja, and pot, cannabis in Nigeria is also referred to by terms such as igbo, gbana, kaya, wee-wee, and abana.(Etannibi and Alemika 1998). Cannabis is a preparation of the *Cannabis sativa* plant intended for use as a psychoactive drug or medicine .The main psychoactive part of cannabis is tetrahydrocannabinol (THC); one of 483 known compounds in the plant, including at least 65 other cannabinoids. Cannabis can be used by smoking, vaporization, within food, or

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as an extract. (Ethan, 2013), The primary effects of cannabis are caused by the chemical compounds in the plant, including cannabinoids such as tetrahydrocannabinol (THC), which is only one of about 400 different cannabinoids. Cannabis has various psychological and physiological effects on the human body. Acute effects while under the influence can include both euphoria and anxiety. Cannabidiol (CBD), another cannabinoid found in cannabis in varying amounts, has been shown to alleviate the adverse effects of THC that some consumers experience. With very high doses, THC can induce auditory and visual hallucinations. (Osborne *et al*,.2008).

Mandal and Das (2010) in their findings suggested that injection of intra-peritoneal injection of cannabis extract at a low dose induces adverse effect on the testes with resulting lowered serum Testosterone, FSH and LH. It is assumed that the THC affects these hormones through its ability to alter various neural transmitters in the hypothalamus or central nervous system which impinge on the hypothalamus.

Materials and Methods

In this study, a total of 200 male cannabis smokers between 20-35years, from different cannabis smoking joints in Benin City . Only subjects with a minimum of 5 years of smoking cannabis were recruited for the study, why apparently healthy 100 male subjects who have never smoked cannabis (20-35years) living in Benin City, were recruited into the study as control group. The test subjects and control willingly indicated interest to participate in the study after enlightenment of the aim of the study.

Biochemical analysis

Ten milliliters (10mls) of whole blood was aseptically collected from each subject/control and dispensed into Gel clothing and activator tubes, thereafter, spun at 4000rpm and separated the serum into pre-labeled plain containers. The serum was stored frozen and only thawed when needed for analysis. Then concentration of TSH, LH, FSH and Testosterone, were estimated using Enzyme Linked Immunosorbent Assay (ELISA) method on micro plate format. The kit used was the product of Accubond USA. Why the concentration of. The serum concentration of AST, ALT, GGT, ALP and Pancreatic amylase were estimated using Dry cell chemistry method on a test strip. The Strips used was the product of Roche Reflotron plus Germany.

Statistical Analysis

Data obtained was analyzed using the t-test at 95% confidence limits ,result was expressed as a mean +/- standard error of the mean(Mean +/- SEM). P-value<0.05 indicate statistical significant difference and P-value >0.05 indicate no statistical difference. All analysis was done with SPSS 19 statistical software

Results/ Discussion

From tables, Mean±SEM of testosterone, FSH, LH and TSH levels in cannabis smokers were highly significantly decreased when compared with non-smokers. Also the Mean±SEM of AST, ALT and GGT were significantly increased when compared with non-smokers. There was however no significant difference between the mean of ALP when compared with non-smokers. There is also no significant difference in pancreatic amylase when compared with non-smokers.

Table 1: Mean ± SEM of Fertility Hormones in Male Cannabis smokers and Non-smokers subject.

Parameter	Smokers	Non-smokers	P-value	Level of Significance
TET (ng/ml)	3.08±0.05	7.50±0.22	0.000	P<0.001
FSH (mIU/ml)	1.08±0.06	2.89±0.17	0.000	P<0.001
LH (mIU/ml)	2.85±0.07	4.41±0.20	0.000	P<0.001

Table 2: Mean ± SEM of Liver Function Test in Male Cannabis smokers and Non-smokers subject.

Parameter	Smokers	Non-smokers	P-value	Significance Level
AST(U/L)	24.38±0.54	21.75±0.48	0.002	P<0.01
ALT(U/L)	21.63±0.52	19.16±0.52	0.003	P<0.01
ALP(U/L)	64.23±1.30	61.96±1.46	0.282	P>0.05
GGT(U/L)	23.55±0.48	21.81±0.45	0.022	P<0.05

Table 3: Mean ± SEM of Thyroid and Pancreatic function Test in Male Cannabis smokers and Non-smokers subject.

Parameter	Smokers	Non-smokers	P-value	Significance Level
TSH (ng/ml)	1.939±0.057	3.091±0.066	0.000	P<0.001
P-amy (U/L)	25.005±0.549	23.830±0.731	0.209	P>0.05

Results of Testosterone, FSH and LH in cannabis smokers show very highly significant decrease (3.08± 0.5, 1.08±0.62 and 2.85± 0.01) accordingly, p-value was (0.000) when compared with the control values. This result agrees with the previous study (Selma *et al*., 2015), who stated that cannabis affects a variety of hormones that are regulated by hypothalamic function. It also agrees with recent study (Okosun *et al*., 2014) which states that smoking cannabis significantly decreases Testosterone, FSH and LH levels in males, and it also agrees with (Mandal and Das 2010) findings, that injection of intra-peritoneal injection of cannabis extract at a low doses induces adverse effect on the testes with resulting lowered serum Testosterone , FSH and LH .It is assumed that the THC affects these hormones through its ability to alter various neural transmitters in the hypothalamus or central nervous system which impinge on the hypothalamus.

The levels of AST and ALT showed a highly significant increased levels (24.39± 0.54 and 21.63± 0.52) for male cannabis smokers compare to (21.75±0.48 and 19.16 ±0.52) for non-smokers respectively, p-value was (0.002 and 0.003) when compared with the control. This result agrees with, (Paulo *et al*.,2004), stating that smoking cannabis can result in a possible hepatotoxicity. This work is at variance with (Mallet *et al*., 2011) whose research showed that cannabidiol (CBD) a major cannabinoid found in cannabis that activates the CB2 receptors of the body's endocannabinoid system is therapeutically beneficial for treating many liver disorders.

It was also found in this study that smoking cannabis has no effect on the pancreas as there was no significant increase in the level of P-amylase (25.01± 55) for cannabis smokers and (23.83 ± 0.73) for non-smokers, p-value was (0.209), this study is in variant with (Paul and Pankaj 2004) which concluded that cannabis can induce pancreatitis.it is also in variant with this work of (Fatmah *et al*., 2013) that smoking cannabis causes acute pancreatitis with no biliary dilatation or obstruction.

Lastly, in this study, TSH level in male cannabis smokers was found to be highly significantly reduced (1.94 ±0.06) when compared to that of non-smokers (3.09 ±0.07), p-value was (0.000), this result is in agreement

with (Todd *et al.*, 2002) that cannabis and its active agent THC affects multiple endocrine system, and also agrees with the work of (Sonali *et al.*, 2015) that chronic cannabis usage is associated with decreased T3 and TSH levels but not significantly changed in the level of T4. This study has shown that smoking cannabis have a negative effect on male fertility, Liver function and thyroid function.

Conclusion: This study indicate a gradual damage to the liver and an impaired fertility hormone of male marijuana smokers in Benin-city .I therefore conclude that smoking marijuana can elevate liver enzymes, reduce serum TSH and can significantly depress serum testosterone concentration in males and this could significantly contribute to male infertility and therefore should not be overlooked in the assessment of male infertility, specifically in those already showing symptoms of infertility.

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