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EFFECT OF SHORT-TERM INSTANT COFFEE (NESCAFE) CONSUMPTION ON PLASMA TOTAL CREATINE KINASE AND WEIGHT

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ABSTRACT

The effect of instantcoffee (nescafe) intake on plasma total creatine kinase (CK) and weight were examined on 30 apparently healthy persons within Port Harcourt metropolis. A total of 60 blood samples were collected (30 samples before coffee intake and 30 after coffee intake). Instant coffee (black) was consumed for 14days with a dosage of one teaspoonful of coffee with 70millilitres of hot water twice daily (morning and evening). Results obtained indicated significantly higher values of 142.9±34.06 in total CK levelafter coffee consumption compared with 133.1±27.33 before coffee consumption when the overall subjects (male and female combined) were analyzed at p<0.01. Similarly, when female subjects were considered, results obtained also indicated significantly higher values of 164.3±35.16 in total CK after coffee consumption compared with 144.6±32.60 before coffee consumption at p<0.01. Additionally, the comparison of male subjects showed no significant differences in CK levels and weight before and after coffee consumption. Furthermore, the analysis of data obtained indicated significant increase in the weight of female subjects with value of 65.8±5.69 compared to male subjects with 61.14±3.26 before coffee consumption. However, no significant difference was observed in CK level. Finally, significant increase in the CK of female subject with value of 164.3±35.16 compared to male subjects with 132.1±28.68 after coffee consumption was also observed. Also, significantly higher value of 65.21±5.62 was observed in the female subjects compared with 60.87±3.24 in the male subjects when weight was considered. The study indicates that consumption of caffeinated coffee of 2 cups daily for a period of 14 days (short-term) by non-habitual subjects induced increased CK level. However, no significant differences were seen in the weights of these subjects.

KEYWORDS: Instant Coffee, Creatine kinase, Weight.

1. INTRODUCTION

Coffee is a widely consumed beverage in the world. It is natural product grown in many tropical and sub-tropical belts in South and Central America, Asia and Africa.[1] The two most important grown species of coffee plant are *coffee Arabica* and *coffee canephora,* which is usually referred to as the robusta (used in preparing Nescafe classic – a 100% pure coffee).

The majority of all caffeine consumed worldwide comes from coffee.[2] The caffeine content of a simple serving varies between 65 – 150mg/coffee cup depending on the types of coffee and method of preparation.[2] Caffeine is an alkaloid chemically related to compounds such as theophyline and theobromine pharmacologically referred to as methylxanthies.[3] Caffeine alongside theoplylline and theobromine belong to a group of psychomotor stimulators and bronchodilators called methylxanthines. They act by several mechanisms including translocation of extracellular calcium, increase in cyclic adenosine monophosphate (cAMP) and cyclic monophosphate (cGMP) caused by inhibition of phosphodiesterase and blockage of adenosine receptors.[3], [4]

Coffee beverage (containing caffeine) are consumed for several reasons, some for the purpose of weight reduction, to remain awake and increase alertness, to remain active and alert during exercise or sports to give good performance while some consume coffee for its flavour and routinely as a means of breakfast or lunch in many homes.[3],[5]

Studies suggests that coffee consumption (80 – 200mg/day) has shown to reduce the risk of Alzhermer's disease, Parkinson's disease, diabetes mellitus type 2 heart disease, cirrhosis of the liver and gout.[5][6] Scientific findings further suggested coffee as a central nervous system stimulant (containing 80 – 200mg/caffeine/day) elevates moods (euphoria) and counter depression.[3] A separate report[4], states that caffeinated coffee increases vigilants, decreases fatigue, stimulate mental alertness as a result of stimulating the cortex and other areas of the brain.On the contrary,

consumption of caffeinated coffee has been reported to cause hypomagnesaemia[5], lethal dose of about 100 cups of coffee (10grams of caffeine) has been reported to induce cardiac arrhythmias, lethargy, irritability, stimulates increased secretion of gastric secretion of hydrochloric acid and pepsin.[4],[7] Coffee also enhances β-oxidation of lipid affecting lipid metabolism.[4],[7] Therapeutically, caffeinated coffee are useful as smooth muscle relevant especially bronchial at asthma, appetite suppressant medications for its diuretic effects and in combination with other substance to treat headache (e.g. Aspirin).[3],[4] In this research work, the effect of instant coffee (Nescafe) consumption (black) on plasma Creatine-kinase activities and weight of apparently healthy subjects will be evaluated.

2. MATERIALS AND METHODS
The materials used were electric heated laboratory incubator (J02714), spectrophotometer (optima SP – 300), automatic micropipette, Instant coffee (Nescafe), Creatine-kinase Randox reagent kit purchased from the United Kingdom.

2.1 Subjects
A total of 30 apparently healthy subjects (10 female and 20 males) within the age range of 20 – 27 years weighing between 57kg – 78kg in Port Harcourt metropolis, Nigeria were recruited for study after informed consent were obtained.

2.1.1 Inclusion Criteria
Subjects that have not been exercising vigorously for at least two weeks before the start of study that were free from any form of muscular dystrophy, ulcer, myocardial infarctioncerebral infraction, hyperthyroidism or other dysfunctions that could cause CK raise. Similarly, individuals included were not in any form of caffeine containing substances or drugs and are not habitual consumers of coffee.

2.1.2 Exclusion criteria
Individuals that exercise regularly at least a week before the study were excluded. In addition, habitual consumers of coffee, individuals with medical history of ulcer, muscular dystrophy, hyperthyroidism, cerebral infraction, cardiac infraction and other known conditions or drugs that cause increase in CK were excluded from the study.

2.2 Subject Preparation and Specimen Collection
Subjects were provided with 200grams of instant coffee (Nescafe), teaspoon and water. Regarding, the Nescafe classic consumption, a teaspoonful (2 grams) of instant coffee were dissolved in 70mls of hot water (no additives such as milk, sugar, honey, etc.) was consumed twice daily (morning and evening) for 14 days. Whole blood specimens were collected from the subjects before and after treatment. The specimens were collected into heparinbottles, which were centrifuged at 4000rpm for 10 minutes to obtain plasma specimens for the analysis.

2.3 Method and principle of Creatine Kinase Assay
The photometric method at ultraviolet (UV) range (375nm wavelength) employing kinetic method (change in enzyme activities with time) was used for the analysis of plasma creatine kinase with reaction in the reverse direction as instructed by the manufacturer. The principle of measurement is based on enzymatic approach converting creatinine phosphate to creatine and ATP and finally to gluconte-6-phosphate.

2.4 Measurement of Body Weight
Of the 30 subjects that took part in the study, measurement of bodyweight was done on the first day of study before the commencement of the coffee consumption and on the day 14 at the end of the study. Body weights obtained before and after were recorded.

2.5 Statistical Analysis
Data obtained were analysed using graphpad prism 5.03 version and were represented in the form of mean ± standard deviation (SD). Statistical significance was seen at $P < 0.01$.
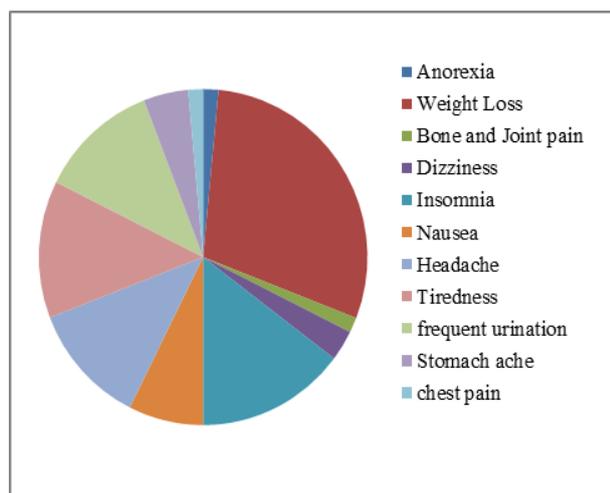
3. RESULTS
Results obtained from the study showed that 7(23.3%) showed a decrease in total CK levels, 2(6.7%) showed no change in total CK value while 21(70.0%) showed an increase in total CK levels after coffee intake (figure 3.1).
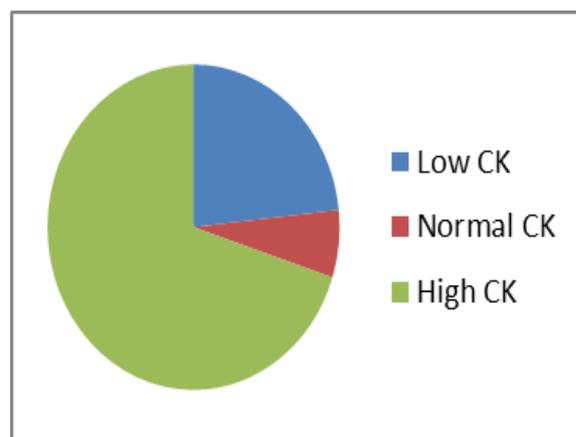
Figure 3.1: Percentage distribution of Creatine-kinase concentration after coffee consumption.

In addition, it was observed that after the short-term consumption of black coffee, 3.3% gained weight, 3.4% experienced increased hunger, 66.7% lost weight, 3.3% had complaint of bones and joint pains, 6.7% complained of dizziness and inability to concentrate, 33.3% complained of insomnia, 30.0% reported mental alertness, 16.7% complaint of nausea, 26.7% complained of headache, 26.7% reported frequent urination, 10% stomach ache (figure 3.2).

Figure 3.2: Percentage distribution of symptoms associated with coffee consumption.

Statistical analysis of the results obtained indicated significantly higher values of 142.9±34.06 in total CK levelafter coffee consumption compared with 133.1±27.33 before coffee consumption when the overall subjects (male and female combined) were analyzed at p<0.01. However, no significant difference was observed in the weights of the overall subjects before and after coffee consumption (table 3.1).

Also, when female subjects were considered, results obtained also indicated significantly higher values of 164.3±35.16 in total CK after coffee consumption compared with 144.6±32.60 before coffee consumption at p<0.01. However, no significant difference was observed in the weights of the female subjects before and after coffee consumption (table 3.2). In addition, the comparison of male subjects showed no significant differences in CK levels and weight before and after coffee consumption (table 3.3).

Furthermore, the analysis of data obtained indicated significant increase in the weight of female subjects with value of 65.8±5.69 compared to male subjects with 61.14±3.26 before coffee consumption. However, no significant difference was observed in CK level (table 3.4). Finally, significant increase in the CK of female subject with value of 164.3±35.16 compared to male subjects with 132.1±28.68 after coffee consumption was also observed. Also, significantly higher value of 65.21±5.62 was observed in the female subjects compared 60.87±3.24 in the male subjects when weight was considered (table 3.5).

Table 3.1: Comparison of CK level and Weight of overall Subjects before and after Coffee Consumption.

Parameters	Before (n=30)	After(n=30)	p-value	t-value	Remark
CK (U/L)	133.1±27.33	142.9±34.06	0.0245	2.373	S
Weight (Kg)	62.69±4.69	62.32±4.58	0.0601	1.956	NS

Table 3.2: Comparison of CK level and Weight of female Subjects before and after Coffee Consumption.

Parameters	Before (n=10)	After (n=10)	p-value	t-value	Remark
CK (U/L)	144.6±32.60	164.3±35.16	0.0389	2.416	S
Weight (Kg)	65.80±5.69	65.21±5.62	0.2613	1.199	NS

**Table 3.3: Comparison of CK level and Weight of Male Subjects before and after Coffee Consumption.**

Parameters	Before (n=20)	After (n=20)	p-value	t-value	Remark
CK (U/L)	127.4±23.07	132.1±28.68	0.2875	1.094	NS
Weight (Kg)	61.14±3.26	60.87±3.24	0.1042	1.706	NS

**Table 3.4: Comparison of CK level and Weight of Female against Male Subjects before Coffee Consumption.**

Parameters	Female (n=10)	Male (n=20)	p-value	t-value	Remark
CK (U/L)	144.6±32.60	127.4±23.07	0.1043	1.679	NS
Weight (Kg)	65.8±5.69	61.14±3.26	0.0078	2.868	S

Table 3.5: Comparison of CK level and Weight of Female against Male Subjects after Coffee Consumption.

Parameters	Female (n=10)	Male (n=20)	p-value	t-value	Remark
CK (U/L)	164.3±35.16	132.1±28.68	0.0120	2.688	S
Weight (Kg)	65.21±5.62	60.87±3.24	0.0117	2.690	S
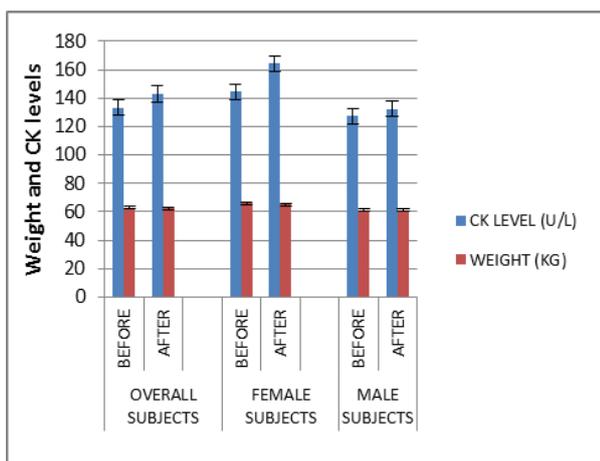
Figure 3.3: Graph showing CK and Weight of overall, female and male subjects before and after coffee consumption.
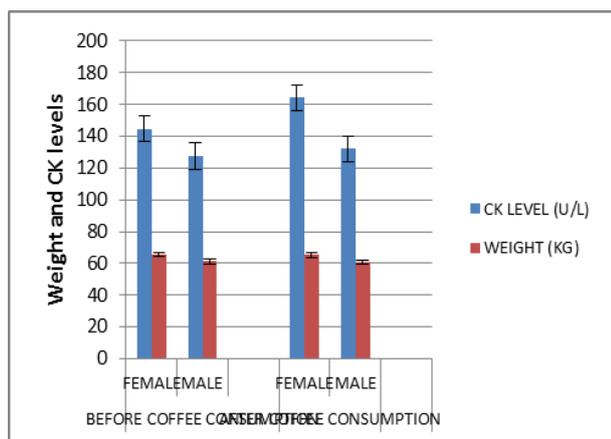
Figure 3.4: Graph Comparing CK and Weight of female and Male Subjects before and after coffee Consumption.

4. DISCUSSION

In this study, the effect of short-term consumption of caffeinated coffee on plasma Creatinekinase levels and weight were investigated. Of the 30 subjects that took part in the studies, 3.3% gained weight after coffee intake, 3.4% experienced hunger, 66.7% loss of weight, 3.3% had complaint of bones and joint pain and 6.7% complained of dizziness and anxiety and induced sleepiness after Nescafe intake. 33.3% complained of insomnia, 16.7% nausea and fever and 30.0% experienced increased mental alertness. In addition, 26.7% complaint of frequent urination, 10.0% of abdominal disturbances and 3.3% complaint of headache (figure 3.2). These information were gathered from the questionnaires used inthe study. Some of these observations reported concur with the literature and findings of.[8] It was reported that coffee consumption enhanced wakefulness (insomnia), mental alertness and increased diuresis.

Also, in the studies 6.7% showed no change in CK value before and after Nescafe consumption, 23.3% showed decrease in serum CK value after Nescafe intake and

70.0% showed an increase in CK value after Nescafe intake of the 30 subjects. When these values were analyzed statistically, the comparison of overall subjects (male and female combined) before and after instant coffee consumption indicated significantly higher values in CK after coffee consumption compared to before coffee consumption (table 3.1). More so, when female subjects were analyzed, CK also showed significantly higher values after coffee consumption compared to before (table 3.2). However, there was a no significant increase in CK levels when males were compared (table 3.3). Though, it was further observed that no significant differences were seen in the weights of the overall (male and female), female and male subjects before and after coffee consumption.

The increase observed in CK levels after 2 cups of black caffeinated coffee consumption daily agrees with the finding of[9], who reported that consumption of 1 -3 cups of caffeinated coffee increased CK levels. This finding also concurs with the reports of[10], but contrary to the findings of.[11] They also reported increase in CK after coffee consumption when investigated in albino rats. The increase in CK levels of female subjects as observed in this study is contrary to the reports of.[12] They reported no significant difference in CK levels in healthy women that consume coffee compared with control healthy women. The non-significant increase in the male subjects is also in line the reports of.[11]

The increase in CK after 2 cups of black instant caffeinated coffee (containing about 80 – 140mg of caffeine per cup) consumption could be as a result of enhanced muscular activities of the muscles (skeletal, smooth and cardiac) induced by caffeine in the coffee. The increased CK levels observed in this short-term study could also suggest possible increased workload for the muscular cells activities. Increased muscular cells workload has been linked to enhanced micro-muscular tissue damages. Caffeine as an enhancement drug tends to induce muscular damage by limiting the fatigue threshold. These muscular damages could lead to complex health issues such as cardiovascular diseases especially in habitual users if not properly monitored. Though coffee (caffeinated) consumption has been reported as a predisposing factor associated with coronary heart disease, several researchers have also reported otherwise.

Furthermore, the comparison of female and male CK levels showed no significant differences before coffee consumption. However, significantly higher values were seen in female CK levels after coffee consumption compared to male. Weight analysis in both sexes showed significantly higher values in the females compared to the males before and after coffee consumption.

The higher value of CK levels seen in the females compared to the males after coffee consumption could be

due to the differences in the body mass of the sexes, which is proportionate to the amount of CK.

5. CONCLUSION

The study indicates that consumption of caffeinated coffee of 2 cups daily for a period of 14 days (short-term) by non-habitual subjects induced increased CK level. However, no significant differences were seen in the weights of these subjects. Increased CK is an indicator of enhanced or increased cells activities of the smooth, skeletal and cardiac muscles. If short-term consumption of caffeinated coffee has been observed to induce increased CK, prolonged consumption could be a predisposing factor for muscular cells damages.

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