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Short Communication

BENEFICIAL EFFECTS OF COFFEE AND MAINTENANCE OF URIC ACID LEVELS

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ABSTRACT

Objective: This study aimed in finding out if drinking coffee over a long term showed a marked influence on the serum uric acid level and Fasting blood glucose level.

Methods: The study population had 200 healthy subjects out of whom 143 were coffee drinkers and 90 diabetic subjects out of which 48 were coffee drinkers.

Results: It was seen that the mean value of uric acid in coffee consumers was significantly lower in both normal and diabetic study population. Further, the relation of Fasting blood glucose (FBG) with uric acid in diabetic coffee consuming study population was much linear than in the normal study population.

Conclusion: Since hyperglycemia and hyperuricemia are associated with the risk of cardiovascular disease and end-stage renal disorder in type 2 diabetes, coffee is considered to be useful in such subjects. The amounts of chlorogenic acid and caffeine in coffee are now considered beneficial on long term usage since it improves insulin sensitivity and lowers the uric acid and sugar level.

Keywords: Coffee, Fasting Blood Glucose, Type 2 diabetes, Uric acid.

Coffee is the most commonly consumed beverage~~s~~ across the world. The health impact of caffeine and chlorogenic acid of coffee has focused new implications on health benefits. These potential effects have lead to epidemiological research, and the outcome was a significant inverse association between the coffee intake and risk of type 2 diabetes [1, 2], Parkinson's disease [3] and liver disease [4]. It was well understood from animal studies that the phenolic content has the ability to decrease the glucose uptake at the intestinal brush border [5]. Increased uric acid (UA) level is considered as a component of metabolic syndrome, and pathogenesis is most commonly associated with type 2 diabetes. Clinically hyperuricemia is considered as a prognostic indicator of renal disease [6] diabetes mellitus or cardiovascular disease (CVD) [7]. A balance between the dietary purine intakes, production in the liver with excretion of uric acid is thought to determine the serum uric acid concentration.

It seems that over the inflow of free fatty acid to the liver is connected to the *de novo* purine synthesis through HMP pathway which may elevate the synthesis of uric acid [8]. Several studies suggested that hyperinsulinemia as seen in visceral obesity; reduce the excretion of urate in urine along with sodium [9]. Since insulin resistance is linked with uric acid levels, the phytochemicals of coffee is known to improve insulin activity; we tried to find out if there was any relation between blood glucose levels and levels of uric acid in coffee consumers and noncoffee consumers.

This was a cross-sectional study, conducted in Dakshina Kannada District, comprised of diabetic and normal subjects. We enlisted 143 normal subjects who consumed coffee with 77 normal subjects who did not consume coffee or any other caffeinated drink. They were matched with 48 diabetic subjects who consumed coffee and 42 diabetic subjects who did not consume coffee or any other caffeinated drink at all. All the healthy participants were free from any type of ailments. The diabetics were on oral hypoglycemic drugs and were free from any micro and macrovascular complications. The coffee consumed was filtered coffee, wherein the coffee beans (70%) were roasted and ground with a dash of chicory (30%) added. The coffee drink was prepared using a filter known as Filter Coffee or as Drip Coffee as the hot water passes through the grounds solely by gravity and not under pressure or in longer-term contact. The decoction was taken for approximately 15grams of powdered content. The subjects consumed 3-4 cups of coffee per day for more than 16 y.

Five ml of blood was drawn on a fasting state (8-10 h of fasting). Blood glucose was estimated by Glucose Oxidase-Peroxidase (GOD-POD) method using Agappe commercial kit and uric acid was estimated by using Agappe commercial kit. The patient's history was also taken, and care was given to the habitual consumption of filter coffee and those never consumed coffee.

The data collected was entered in excel format and the statistics were calculated using SPSS 11.0 version. Mean and standard deviation were estimated. The significance between the groups was calculated using Student's unpaired't' test. P value<0.05 was considered to be statistically significant. Ethical clearance for the study was obtained from Yenepoya University Ethics Committee, Mangalore.

Table 1 and 2 show~~s~~ the values of the biochemical parameter analyzed. It was obvious that a difference of 3.88 in the fasting blood glucose value in the healthy individual and a drastic decrease of 22.49 in the diabetic study population indicate improved insulin sensitivity among the coffee drinkers. This decrease in the percentage of 5.13 in normal to 22.49 percent in diabetic study population indicates the improved beneficial effects of coffee consumption in type 2 diabetic subjects.

Table 1: Characteristics of normal subjects with the level of significance

Characteristics of normal subjects	Coffee consumed mean±SD (n=143)	Without coffee mean±SD (n=77)	P value
FBG(mg/dl)	75.57±13.35	79.45±12.37	0.036*
UA(mg/dl)	7.76±1.28	8.56±1.35	<0.0001***

FBG = Fasting Blood Glucose, UA = Uric Acid.

Furthermore, improvement was also seen in uric acid level among the study population. A decrease of 10.30 percent in normal subjects and 12.87 percent decrease in diabetic subjects showed a better effect of coffee consumption. This enhanced effect of a decrease in fasting blood glucose and uric acid level is much marked in diabetics (as shown in fig.1 and 2) than in normal individual indicating the efficiency of coffee consumption in the diabetic population.

Table 2: Characteristics of diabetic subjects with the level of significance

Characteristics of Diabetic subjects	Coffee Consumed mean±SD (n=48)	Without coffee mean±SD (n=42)	P value
FBG(mg/dl)	104.58±27.37	128.1±31.66	0.0003***
UA(mg/dl)	8.70±1.19	9.82±1.6	0.0004***

FBG = Fasting Blood Glucose, UA = Uric Acid

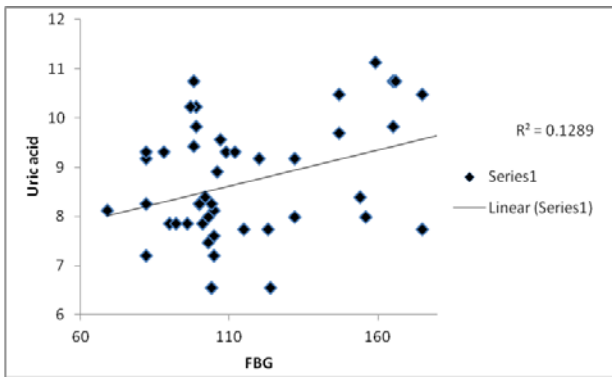

Fig. 1: Relationship between FBG and Uric acid level in the coffee consumers in the diabetic study population

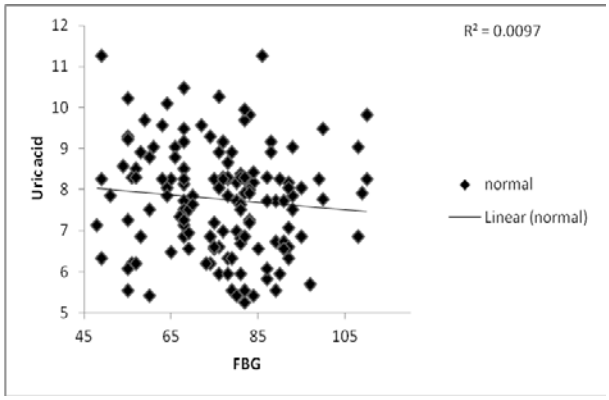

Fig. 2: Relationship between FBG and Uric acid level in the coffee consumers in the normal study population

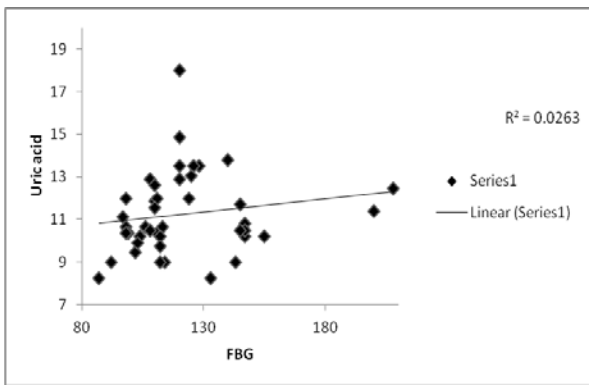

Fig. 3: Relationship between FBG and Uric acid level in the non-coffee consumers in the diabetic study population

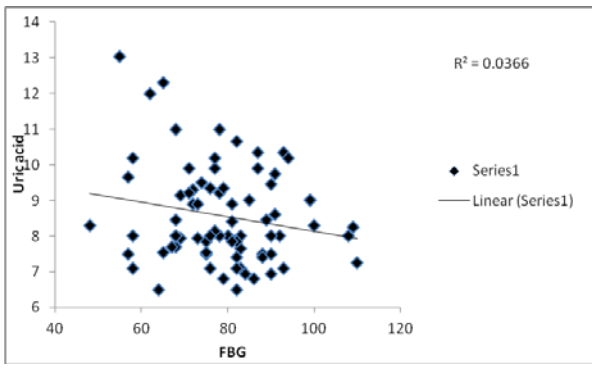

Fig. 4: Relationship between FBG and Uric acid level in the non-coffee consumers in the normal study population

Coffee is the most widely consumed beverage in the world, with reported benefit s and risks of its consumption [10, 11]. The composition of coffee is carbohydrate (38-42%), amino acid and lipids. In addition, to this Melanoidins make up 23% of the weight and are what give the beans their brown colour. They also contain minerals, aliphatic and chlorogenic acids, trigonelline, and volatile aromas. Of the alkaloids, the most studied and recognized one is caffeine, which makes up 1.3 to 2.4% of the bean's weight [12] followed by other purinic alkaloids such as theobromine and theophylline and pyridine such as trigonelline.

Biologically, type 2 diabetes is associated with insulin resistance hence hyperglycemia along with hyperuricemia prevails. Among the study population, regular coffee drinkers (more than three cups per day for more than16 y) had a lower level of fasting blood sugar level (table 1 and table 2) indicating a clear inverse relation with the risk of diabetes or hyperglycemia [13, 14] studies also support that a 5-17% reduction of risk for diabetes can be seen for every addition cup of coffee intake [15]. It is understood that Coffee is the major source of the phenol chlorogenic acid, which is a strong antioxidant [16, 17] and improves insulin sensitivity [18]. Chlorogenic acid also acts as a competitive inhibitor of glucose absorption in the intestine [19]. Previous studies have suggested that plasma glucose concentrations are reduced by chlorogenic acid [20], which may combine with other antioxidants in coffee to decrease oxidative stress.

Further, the effect of hyperinsulinemia is known to cause hyperuricemia which is developed as a consequence of increased uric acid reabsorption [21] and accumulation the substrates for uric acid production [8]. It was seen that uric acid in the diabetic study group was higher when compared to a healthy individual who shows that insulin resistance and hyperinsulinemia goes hand in hand. The study also showed a decrease in uric acid level in coffee drinkers in both healthy and diabetic individuals when compared to non-coffee drinkers (table 1 and table 2), this was also supported by other studies [22, 23]. The decrease in uric acid may be because of the phenolic content (Chlorogenic acid) of coffee which is known to improve insulin sensitivity and, in turn, a decrease in uric acid level through increased uric acid secretion. Hence a linear relation was seen among coffee consumers (fig. 1 and fig. 3). Furthermore, coffee

contains non-caffeine xanthines which may inhibit xanthine oxidase, thus add to lowering of serum uric acid levels [23].

The beneficial effects of coffee now warrant the effect of lowering level of uric acid and sugar hence improving insulin sensitivity. Further, the antioxidant activity decreases the oxidative damage thus improving the quality of health of people thus coffee can act as a therapeutic intervention among the people with higher risk factors for diabetes and its associated complications.

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CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest.

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