ORIGINAL ARTICLE

Effects of Green Tea Consumption on Blood Pressure and Blood Glucose Levels among Type 11 Diabetic and Non Diabetic Individuals

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ABSTRACT

Background: Green tea (GT) contains 4000 or more active biological compounds, from which the most important family is polyphenols. These polyphenols are rich in Flavonoids which contain catechins, that serve as anti-oxidants. During metabolisms these catechins in green tea eliminates toxic free radicals from body.

Aim: To study the effects of consumption of green tea on blood pressure as well as blood glucose levels among healthy controls and type 2 diabetes mellitus individuals.

Methodology: This cross sectional study was done at the outpatient department of medicine, Arif Memorial Hospital Lahore, Pakistan from August 2017 till January 2018 after completing protocol. Total 100 individuals from which 50 healthy control and 50 diabetic patients. Their pulse, blood pressure and blood sugar was recorded on day 1 and day 90. Data was analyzed using SPSS 21. Student "t" test and Chi square test. A p-value ≤0.05 was considered significant.

Results: A significant improvement in blood pressure and blood sugar level was seen at the 90th intervention day in the diabetics and also some improvement on lower side in normal controls.

Conclusion: It is concluded from the present study that green tea consumption could significantly improve blood pressure and glucose level in diabetic patients and also pose beneficial effects on normal control individuals.

Keywords: Green Tea, Blood Pressure, Diabetes Mellitus.

INTRODUCTION

Cardiovascular diseases (CVD) are major health concerns around the globe[1], being the second most common cause of mortality. Despite new advanced techniques in its management, CVD had approximately 30% mortality rate in the year 2015[2]. In sedentary living multiple etiologies are related with CVD, like obesity, hypokalemia, alcohol intake, vitamin D deficiency and salt overuse. A high systemic blood pressure is among the major risk factors of renal failure, brain stroke and coronary heart disease. Prevention of hypertension requires general measures such as life style modification along with antihypertensive drugs [3]. Systemic hypertension can damage blood vessels in different organs like eyes, kidneys and brain etc [4]. Likewise Diabetes mellitus type 2 (T2DM) has exceeded mortality and morbidity rate in developing countries as compared to the infectious disease. A 2010 estimate showed that 70% of Type 2 DM subjects belong to developing countries of the world [5]. The pathogenesis of T2DM has not been clearly understood. It is an endocrine defect characterized by an abnormal metabolism of glucose resulting from either absolute or relative deficiency of insulin[6]. Traditional herbal therapies may act synergistically to give required results. New advanced therapies target to improve cholesterol and glucose level by life style modifications and/or drug agents[7].

Tea is the second most common beverage used worldwide after the water[8]. All varieties of tea are derived from a commercial crop, Camellia Sinensis. Tea can be black tea, green tea and Olong tea; all these differ their chemically and in their processing technique[9]. GT is comprised of approximately 4000 polyphenols and out of these the most important ones are flavonoids which contain catechin[10]. The underlying role of GT in reducing blood pressure includes lowering the action of angiotensin converting enzyme inhibitor which is needed in relaxation of blood vessels. The polyphenols decrease the levels of kallikrein and prostaglandin E2 and various other endothelial derived hyper polarizing factors (EDHF) that increase the nitric oxide production thus resulting in decreased blood pressure[11]. The aim of present work is to study the role of GT consumption for prolonged periods on parameters of cardiovascular diseases like blood pressure.

The objective of the study was to demonstrate green tea consumption effects on blood glucose and blood pressure among Type 2 diabetic patients and non diabetic healthy individuals.

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MATERIALS AND METHODS

Setting and Study Design: This cross sectional study was done at the outpatient department of medicine, Arif Memorial Teaching Hospital (AMTH) Lahore, Pakistan affiliated with Rashid Latif Medical College Lahore, Pakistan (RLMC) from August 2017 till January 2018 after taking written consent from all participants of the study and explaining them the details of research and approval from institutional review board (IRB) of the college. Total 100 individuals from which 50 healthy control (employees of AMTH) and 50 patients of type 2 Diabetes mellitus which were on diet control from general population living nearby the hospital. The volunteers were divided into two groups i.e.; healthy control and diabetic cases.

Group 1: Included 50 healthy people with normal pulse, blood pressure and blood glucose level.

Group 2: Included 50 Type 2 Diabetes mellitus patients which were on diet control only and were not using any anti hyperglycemic drugs.

Inclusion criteria For both groups (1 and 2) , are adult males ages 40 to 50 years having normal LFTs, nonsmokers, consuming less caffeine (approximately <200 mg/day or a cup of tea daily) and group 2 specially include diet control type 2 diabetic males. Exclusion criteria for both groups includes all females and males having age below 40 and above 50 years, anyone having abnormal LFTs, smokers, consuming caffeine >200 mg/day, using any medicine or any multivitamins regularly, any medical issue or a psychiatric condition or consuming soft drinks regularly.

METHODOLOGY

This study was done in 2 parts:

Part 1: included screening and selection of candidates;

Part 2: consisted of 90 days intervention period during which candidates took GT at home using defined amounts of GT. A light breakfast meal preferably bread and milk was taken before taking test drink. Subjects were explained not to take any beverage containing caffeine in this period.

Test Drink: The drink was prepared from 1.5 g green tea bag (Lipton) added into 250 ml hot water. A standard cup of GT if prepared according to the manufacturer's instructions contains approximately 83mg of catechins and 30mg of caffeine.

Data collection: The data on general physical examination, pulse by right radial palpatory method and blood pressure by using sphygmomanometer were recorded and noted on each candidate's Performa .

Fasting blood glucose estimation: Done by ACCU-Check Performa Strips.

Data analysis: Data were entered onto the SPSS 21.0 (IBM, Incorporation, and USA). Student t test and Chi square test were used to analyze the data. Any p-value ≤ 0.05 was considered to be statistical significant.

RESULTS

Total 100 subjects were chosen for the study, out of which 50 were healthy controls and 50 were type 2 diabetics (T2DM). Controls and diabetics were gender and age matched. Mean ±SD age of both groups were noted to be 46.54 ±3.9 years and 47.6±3.0 years respectively (p-value=0.056). Table 1 and 2 shows statistically significant difference in systolic, diastolic and blood sugar levels (Fasting) respectively in control and diabetic individuals before and after consumption of green tea.

Table 1: Systolic & Diastolic BP in Controls and Diabetic Subjects

		Baseline (day 1)	After (day 90)	p-value
Systolic BP (mmHg)	Controls	119.8±1.2	116.7±1.04	<0.001
	D M	138.5±17.06	132.6±18.60	<0.001
Diastolic BP (mmHg)	Controls	82.12±2.51	78.21±3.05	<0.001
	D M	86.79±11.76	82.21±9.16	<0.001

Table 2: Blood Sugar Level in Controls and Diabetic Subjects

Blood Glucose Level (Fasting) (mg/dL)	Baseline (day 1)	After (day 90)	p-value
Control	102.81±9.59	98.06±12.42	0.035
Diabetes Mellitus	167.73±.31	165.62±9.30	0.004

DISCUSSION

Green tea is a famous beverage which is rich in flavonoids. The benefits of GT are mainly attributed to catechins, that are Flavonoids like the polyphenols[12]. In this study, positive role of GT on systemic blood pressure and blood sugar were noted at baseline and after 90 days of consuming GT which shows statistically significant. Peng X et a l[13] noted in thirteen random controlled trials the beneficial effect of green tea in lowering of systemic blood pressure. His findings are in consistence with the present study since we have also observed the same effects of green tea on systolic and diastolic BP. Some other studies performed in vivo have also revealed that intake of GT extract could improve blood pressure and endothelial cell function significantly among the hypertensive rats[14]. Another study[15] shows that in normal rats and in alloxan induced diabetic rats intake of GT could improve glucose tolerance and lowers blood glucose level significantly. Our findings are in accordance with another study which concluded that consuming 2 cups/day of green tea would improve coronary artery disease and cardiovascular physiology[16]. Another study in the USA on a cohort of 1017 (with a 33 years age group) had suggested that intake of coffee would increase blood pressure[17]. Although it is in contrast to our findings, however the probable explanation may be because of high dose of caffeine in comparison with this study. A study from China[18] reported that GT improves blood pressure but smoking can abolish this effect. The results of this study also support our current research. In our research, a positive role of GT on blood glucose level was noted in both groups, which is in accordance with Chacko et al, who noted in his study that GT consumption could improve metabolism of carbohydrates[19]. In a recent study conducted in Arizona, USA[20], 146 participants (80 females, 66 males) were enrolled. After a 6-months intervention, women using green tea showed a 30.1% decrease in Alanine transaminase and significant decrease in both systolic and diastolic blood pressure. However, no significant change was observed in men. This study is also supports our study demonstrating that a regular consumption of green tea would result in significantly lowering of both systolic and diastolic BP in women's.

CONCLUSION

This current study concludes that a regular intake of green tea for long time could improve both blood pressure and

glucose level in normal healthy and type 2 diabetic individuals.

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