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A REVIEW ON PROTECTIVE ROLE OF COFFEE IN CHRONIC DISEASES

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ABSTRACT

Coffee is a beverage with a distinct taste and aroma that commonly is consumed throughout the world and is being assessed for its potential health benefits. Besides its culinary value, coffee has long been suggested to affect human health and disease. For instance, a decreased risk of type 2 diabetes, heart disease, and stroke, liver disorders and cancer has been described in regular coffee drinkers. From a public health perspective, it is most relevant to investigate whether coffee consumption affects morbidity from major chronic diseases and whether individual disease risks are competing with each other to optimally translate evidence-based recommendations. The purpose of this article is to review existing data regarding the effects of long-term coffee consumption, with a focus on chronic diseases. Coffee consumption is also associated with various other health effects. For instance, coffee may reduce the risk of depression, a known risk factor for the development of Cardio Vascular diseases. Caffeine content of coffee, phenolic compounds such as chlorogenic acid and diterpenes such as cafestol and kaweol has been shown to play a major role in the prevention of following diseases. It can be speculated that the unfavorable lifestyle characteristics of high coffee consumers, especially with respect to smoking and alcohol consumption, may be responsible for the positive association between coffee consumption and the risk of various chronic diseases. In conclusion, the currently available evidence on coffee and decreased risk of chronic diseases is largely reassuring, and suggests that, coffee is helpful in preventing them.

KEYWORDS: Coffee, Caffeine, Chlorogenic Acid, Diterpenes, Type 2 Diabetes, Liver Disorders, Cancer

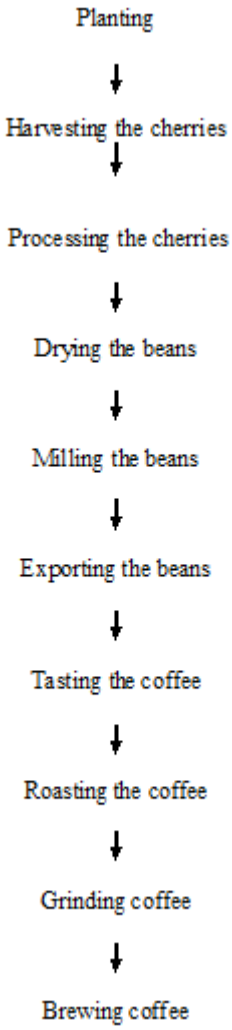
INTRODUCTION

Coffee is one of the world's most popular consumed beverages. The top 5 coffee producer in the world are Brazil, Vietnam, Indonesia, Columbia, Ethiopia respectively. India is the world's sixth-largest coffee exporter, may turn a net importer the next decade as the Domestic consumption is growing five-six per cent a year.

Coffee has a very complex chemical composition. In addition to caffeine, other substances have been shown to have biological effects, for example, phenolic compounds in coffee (chlorogenic acid, ferulic acid, p-coumaric acid), magnesium, trigonelline, and quinides have been associated with improved insulin sensitivity. Phenolic compounds also have antioxidant activity.In addition, diterpenes in coffee (cafestol and kahweol) have anticarcinogenic properties [13]. Hence coffee can play a very crucial role in the prevention of many diseases. The pharmacological actions of green tea and caffeine are mainly attributed to polyphenols that includes epigallocatechin-3-gallate (EGCG), epicatechin, epicatechin-3-gallate, epigallocatechin [6].

Coffee traces its biological heritage to a genus of plants known as coffee within the genus there are over 500

genera and 600 species of tropical trees and shrubs.In the commercial coffee industry there are two important coffee species- Arabica and Canephora. The steps included in the processing of coffee are as follows [26]



Decaffeination removes nearly all the caffeine from the beans. It is carried out while the beans are still 'green', before they are roasted. Under European law decaffeinated coffee must contain 0.1%, or less, caffeine in roasted coffee beans, and up to 0.3%, or less, in soluble/instant coffee.

Decaffeination takes place in food manufacturing facilities. The process involves:

- Swelling the green coffee beans with water or steam so the caffeine can be extracted
- Extracting the caffeine from the beans. This is done with water, a solvent or activated carbon.
- Drying the decaffeinated coffee beans back to their normal moisture level.

Decaffeination and filtration can be carried out to remove caffeine and lipids. It is clear that coffee undergoes various changes in its flavour and physicochemical properties in the above processes [4].

Levels of Caffeine Consumption

Caffeine is generally consumed in amounts less than 300mg per day, roughly equivalent to:

3-4 cups of roasted and ground coffee ,5 cups of instant coffee ,5 cups of tea.

Customary caffeine consumption has been classified as follows:

Low caffeine users: less than 200mg per day

Moderate caffeine users: 200-400mg per day

High caffeine users: more than 400mg per day.

Biologically Active Constituents of Coffee

Coffee is a complex beverage containing >1,000 compounds. Among the many with known biological activity are caffeine (a potent stimulant and bronchodilator), diterpene alcohols (which can increase serum cholesterol), and chlorogenic acid (one of many types of antioxidant and anti-inflammatory compounds found in coffee). Caffeine is by far the most studied compound in coffee, and this agent largely accounts for the inherently habit-forming nature of the beverage [7].

Coffee Consumption Induces an Increase in Coffee-derived Compounds in Plasma

Plasma concentrations of coffee biomarkers were very low when participants abstained from coffee drinking, whereas coffee consumption led to increases in their concentrations. In detail, plasma concentrations of caffeine, paraxanthine, theobromine, theophylline and caffeic acid, dihydrocaffeic acid, ferulic acid, isoferulic acid, dihydroferulic acid, dihydroisoferulic acid, 3-(3- hydroxyphenyl)propionic acid, 3-(3,4-dimethoxyphenyl) propionic acid, 3,4-dimethylcaffeic acid, and 3-coumaric acid increased significantly after consumption of 4 or 8 cups coffee/d [12].

The biological effects of coffee may be substantial and are not limited to the actions of caffeine. Coffee is a complex beverage containing hundreds of biologically active compounds, and the health effects of chronic coffee intake are wide ranging. From a cardiovascular (CV) standpoint, coffee consumption may reduce the risk of type 2 diabetes mellitus and hypertension, as well as other conditions associated with CV risk such as obesity and depression. The potential benefits also include protection against neurodegenerative diseases, improved asthma control, and lower risk of select gastrointestinal diseases. A daily intake of approximately 2 to 3 cups of coffee appears to be safe and is associated with neutral to beneficial effects for most of the studied health outcomes [11].

Coffee and Type 2 Diabetes

Adiponectin, also known as adipocyte complement-related protein is a hormone of adipocyte origin that is involved in the homeostatic control of circulating glucose and lipid levels.

Hypoadiponectinemia is closely associated with insulin resistance and risk of type 2 diabetes. Interestingly, adiponectin concentrations were higher in diabetic than in non-diabetic women in a comparison of individuals who drank 4 cups caffeinated coffee/d and those who drank, 1 cup/wk. There was also a significant, but less pronounced increase in adiponectin concentrations in response to increasing coffee consumption [15].

Proinsulin-to-C-peptide ratios are stronger predictors of diabetes in comparison with proinsulin-to-insulin ratios. Therefore the use of C-peptide as the denominator for proinsulin ratios, accurately reflect the degree of disproportional hyperproinsulinaemia. Caffeinated coffee intake was significantly positively related to Insulin Sensitivity and strongly inversely related to 2 h post load glucose. Interestingly, decaffeinated coffee intake was favourably related to measures of beta cell function, which included a significant positive relationship with Acute Insulin Response and significant inverse

relationships with intact and split proinsulin to C peptide ratios. It has been suggested that the polyphenol content in coffee, mainly in the form of chlorogenic acid, may protect beta cells from oxidative stress [16].

Table 1: Compilation of the Studies on Protective Role of Coffee in Relation with Type 2 Diabetes

Authors, Year of publication	Sample Details	Methodology	Results	Conclusion
Lecoultre V et al 2014 (18) **OBJECTIVE:** To assessed whether the consumption of chlorogenic acid–rich coffee attenuates the effects of short-term fructose overfeeding, dietary conditions known to increase intrahepatocellular lipids (IHCLs), and blood triglyceride concentrations and to decrease hepatic insulin sensitivity in healthy humans.	A sample size of 10 male participants between the age group of 21-25 yrs participated. They were light to moderate coffee consumers (<4 cups coffee/d) and had low to moderate physical activity levels (>30 min walking/d and <3 structured physical activities/wk). All subjects were in good physical health.	Effects of 3 different coffees were assessed. Intra hepatic cellular lipids (IHCLs), hepatic glucose production (HGP), and fasting lipid oxidation were measured after 14 d of consumption of caffeinated coffee high in chlorogenic acid (C-HCA), decaffeinated coffee high in chlorogenic acid, or decaffeinated coffee with regular amounts of chlorogenic acid (D-RCA); during the last 6 d of the study, the weight-maintenance diet of subjects was supplemented with 4 g fructose.	Compared with the control diet, the high-fructose diet significantly increased IHCLs and decreased fasting lipid oxidation. All 3 coffees significantly decreased HGP. Fasting lipid oxidation increased with C-HCA and D-RCA. None of the 3 coffees significantly altered IHCLs.	Coffee consumption of <-4 cups/day attenuates hepatic insulin resistance but not the increase of IHCLs induced by fructose overfeeding.
Bhupathiraju S N et al 2013 (5) **OBJECTIVE:** To prospectively examine the association of caffeinated compared with caffeine-free beverages, including coffee, tea, sugar-sweetened beverages (SSBs), and carbonated artificially sweetened beverages (ASBs), with T2D risk.	A 22yr follow up study observed 74,749 women of 40-79 yrs from the Nurses' Health Study (NHS, 1984–2008) and 39,059 men 30-55 yrs from the Health Professionals Follow-Up Study (HPFS, 1986–2008) who were free of diabetes, cardiovascular diseases, and cancer at baseline.	In both cohorts, participants were followed biennially through validated questionnaires that obtained updated information on their medical history, lifestyle factors, and occurrence of chronic diseases. The study was approved by the Human Research Committee of Brigham and Women's Hospital in Boston.	The consumption of caffeinated and decaffeinated coffee was associated with a lower risk of T2D 8% for both caffeinated and decaffeinated coffee in the NHS and 4% for caffeinated and 7% for decaffeinated coffee in the HPFS. Only caffeinated tea was associated with a lower T2D risk among NHS participants.	Irrespective of the caffeine content, SSB intake was associated with a higher risk of T2D and coffee intake of 3 cups/day was associated with a lower risk of T2D.
Goto A et al 2010 (9) **OBJECTIVE:** To examine whether plasma levels of sex hormones and sex hormone-binding	A case-control study nested in the prospective Women's Health Study of postmenopausal 359 women of > 45 yrs.	During a median follow up of 10 years, postmenopausal women with newly diagnosed type 2 diabetes were matched with 359 controls by age, race, duration of	Caffeinated-coffee was positively associated with sex hormone-binding globulin (SHBG) but not with sex	SHBG may account for the inverse association between coffee consumption of >4cups/day and type 2 diabetes risk among postmenopausal

globulin (SHBG) may account for the inverse association between coffee consumption and type 2 diabetes risk.		follow-up, and time of blood draw.	hormones.	women.
Loopstra-Masters R C et al 2010 (16) **OBJECTIVE:** To explore the associations between caffeinated and decaffeinated coffee consumption and measures of insulin sensitivity and secretion.	The study population of 954, multi-ethnic non-diabetic, male and female adults of >50yrs from the Insulin Resistance Atherosclerosis Study (IRAS).	Multiple regression analyses were performed to examine the cross-sectional relationships between caffeinated and decaffeinated coffee intake and insulin sensitivity and acute insulin response, measured by a frequently sampled intravenous glucose tolerance test, 2 h post load glucose measured by OGTT, fasting insulin, and pro insulin to C-peptide ratios.	Caffeinated coffee intake was positively associated with insulin sensitivity and Inversely related to 2 h post load glucose in fully adjusted models. Decaffeinated coffee intake was inversely related to 2 h postload glucose and positively related to acute insulin response. Decaffeinated coffee intake was inversely related to the ratios of both intact and split pro insulin to C-peptide.	Caffeinated coffee of >2cups/d was positively related to insulin sensitivity and decaffeinated coffee was favorably related to measures of beta cell function.
Greenberg JA et al 2010 (11) **OBJECTIVE:** To assess the acute effects of decaffeinated coffee on glucose and insulin levels.	A randomized, cross-over, placebo controlled trial on 11 men was conducted to check the effects of caffeinated and decaffeinated coffee on glucose and insulin levels.	The effects of decaffeinated coffee, caffeinated coffee, and caffeine on glucose, insulin, and glucose-dependent insulinotropic polypeptide (GIP) levels during a 2-h oral glucose tolerance test (OGTT).	Within the first hour of the OGTT, glucose and insulin were higher for decaffeinated coffee than for placebo. During the whole OGTT, decaffeinated coffee yielded higher insulin than placebo and lower glucose and a higher insulin sensitivity index than caffeine.	Some types of decaffeinated coffee may acutely impair glucose metabolism but less than caffeine.

From **Table 1**, it can be inferred that the caffeine and the chlorogenic content of the coffee can help reduce the risk of Type-2 Diabetes. Several possible explanations have been put forth to explain the protective effect of coffee consumption on type 2 diabetes risk, including effects on insulin sensitivity and β cell function by varying coffee components such as magnesium, potassium, chlorogenic acid, and caffeine. Hence 2-4 cups of coffee /d can help reduce insulin resistance and protects against type 2 diabetes.

Coffee and Liver Disorders

Nonalcoholic fatty liver disease (NAFLD) is one of the most common causes of chronic liver disease. It encompasses a spectrum of conditions associated with lipid deposition in hepatocytes. It ranges from steatosis (simple fatty liver), to nonalcoholic steatohepatitis (NASH—fatty changes with inflammation and hepatocellular injury or fibrosis), to advanced fibrosis and cirrhosis. Oxidative stress, mainly caused by mitochondrial dysfunction, and proinflammatory cytokines such as tumor necrosis factor-alpha (TNF-alpha), are believed to play an important role in the progression of liver damage in NAFLD [1]. Liver fibrosis is the excessive accumulation of extracellular matrix proteins including collagen that occurs in most types of chronic liver diseases. Advanced liver fibrosis results in cirrhosis, liver failure, and portal hypertension and often requires liver transplantation [2].

Caffeine is thought to play a role in protecting against hepatic fibrosis. One mechanism, proposed by Gressner, is that caffeine plays a role in the degradation of Smad2 and Smad3 proteins, which are mediator proteins of transforming growth factor b, a profibrogenic signaling pathway. Caffeine also is thought to affect the hepatic detoxification process by activating uridine 50-diphospho-glucuronosyltransferase. Coffee consumption has been observed to have an inverse association with serum levels of aspartate aminotransferase, alanine aminotransferase, and gamma glutamyltransferase. Although the aforementioned studies provide compelling evidence to suggest that coffee is useful as an adjunct treatment of liver disease in reducing the risk of HCC, further trials would need to be performed to provide evidence for causation, to eliminate confounding variables, and to determine an acceptable standardized dose and preparation of coffee needed to see hepatoprotective effects [10].

Coffee consumption has been associated with higher adiponectin concentrations, lower concentrations of inflammatory markers, and lower levels of markers of liver damage [24**].**

Table 2: Compilation of the Studies on Protective Role of Coffee in Relation with Liver Disorders

Authors, Year of Publication	Sample Details	Methodology	Results	Conclusion
Modi A A et al 2010 (20) **OBJECTIVE:** To assess whether the caffeine consumption was associated with a lower risk of advanced liver fibrosis, particularly in patients with HCV infection.	A cohort size of 383 individuals between the age group of 18 -80 yrs inclusive of both the sexes undergoing liver biopsy completed a detailed caffeine questionnaire on 3 occasions over a 6-month period.	Caffeine intake was compared between patients with mild and advanced liver fibrosis (bridging fibrosis/cirrhosis). The patients were Controlled for age, sex, race, liver disease, body mass index, and alcohol as well as the subset with HCV infection.	Despite a modest trend, consumption of caffeine from sources other than coffee or of decaffeinated coffee was not associated with reduced liver fibrosis.	Caffeine consumption of >2 cups /d was associated with a lower risk of advanced liver fibrosis, particularly in patients with HCV infection.
Grobe Y G et al 2012 (12) **OBJECTIVE:** To investigate the antioxidant effect of coffee by measuring	A case control study at the university Hospital, Mexico City was performed. 130 patients out of which	anthropometric, metabolic ,dietary and biochemical variables of all patients were determined and compared.the presence of NAFLD was established by ultra sonography. All patients completed a	Patients with NAFLD had a higher BMI, blood glucose, homeostatsis model of assessment-insulin resistance and insulin values in comparison to patients without	A high intake of coffee has a protective effect against NAFLD however there was no significant difference in the antioxidant variables

antioxidant enzymes and lipid peroxidation markers in patients with Non-Alcoholic Liver Disease (NAFLD).	73 – NAFLD and 57-without NAFLD were included between the ages 40-45 yrs.	questionnaire in order to determine their coffee consumption.Catalase superoxide dismutase and thiobarbituric acid reactive substances were measured in all the patients.	NAFLD. On the one hand there was a significant difference in coffee intake between the groups.	analyzed.
Birerdinc A et al 2012 (3) **OBJECTIVE:** To investigate the effects of dietary behaviour in NAFLD patients.	1782 male participants of the age 70 yrs were included in the study.	Using data from four continuous cycles of NHANES, dietary intake questionnaires that list 62 nutrition components.	Of the 62 nutrient components used for the univariate analysis, 38% were significant in NAFLD with caffeine consumption being higher in the control group.	Caffeine intake of 165.19+-6.55 mg/dl is independently associated with a lower risk for NAFLD**.**
Klatsky A L et al 2006 (14) **OBJECTIVE:** To investigate whether coffee drinking is associated with lower cirrhosis risk.	330 of the population male and female were diagnosed with liver cirrhosis of <50->60 yrs.	The diagnosis of cirrhosis was confirmed by the Review of medical records and ascertained probable etiology. Also a cross-sectional analysis of baseline aspartate aminotransferase and alanine aminotransferase levels were studied by logistic regression.	Relative risks of alcoholic cirrhosis (199 subjects) for coffee drinking (vs none) were less than 1 cup per day 1 to 3 cups, and 4 or more cups. For 131 subjects with nonalcoholic cirrhosis, relative risks were less than 1 cup, 1 to 3 cups, and 4 or more cups.	Coffee with more > 4cups /d protects against cirrhosis, especially alcoholic cirrhosis.
Ruhl CE et al 2005 (23) **OBJECTIVE:** To investigate the association between chronic liver disease (CLD) and consumption of coffee and tea.	Data from 9,849 NHANES participants (mean follow-up 19 years and 9,650 participants from the separate analysis were included.	In both analyses, daily consumption was categorized as <1 cup, 1–2 cups, or >2 cups. Exclusion criteria included lack of data on coffee and tea consumption, jaundice, hepatomegaly, splenomegaly, and serum albumin >30 g/l. BMI was calculated for all participants and laboratory tests were done.	The risk of death or hospitalization from CLD was 1.4% at 20-year follow-up. The unadjusted risk of CLD at 20 years was 1.8% for those who drank <1 cup per day, 1.6% for those who drank 1–2 cups per day, and 1.1% for those who drank >2 cups per day.	The consumption of coffee of >2 cups /d is associated with a reduced risk of CLD

From **Table 2**, it can be inferred that Coffee contains various constituents like the caffeine, cafestol, and kahweol that alter the expression and activity of liver enzymes and thus protects the liver from various disorders. Coffee drinking was related to lower prevalence of high aspartate aminotransferase and alanine aminotransferase levels. Therefore drinking >2cups of coffee /d has a beneficial effect on the liver functions.

Coffee and Cancer

Breast Cancer forms in tissues of the breast. The most common type of breast cancer is ductal carcinoma, which begins in the lining of the milk ducts (thin tubes that carry milk from the lobules of the breast to the nipple). Another type of breast cancer is lobular carcinoma, which begins in the lobules (milk glands) of the breast. Hepatocellular carcinoma (hepatocellular cancer) is the most common form of liver cancer in adults. It is also sometimes called hepatoma. About 4 of 5 cancers that start in the liver are this type. Renal cell cancer is a disease in which malignant (cancer) cells are found in the lining of tubules (very small tubes) in the kidney.

Phytochemicals in coffee exhibit several anti carcinogenic properties and include the diterpenes cafestol and kahweal, which induce phase I and II enzyme activities ; polyphenols, such as flavonoids ; and chlorogenic acid, which can affect insulin and glucose response and has antioxidant properties. However, future mechanistic work is needed because coffee has many components, and effects may depend on multiple factors (Eg. the type of coffee bean, caffeinated compared with decaffeinated coffee, roasting, and brewing methods Eg. boiled unfiltered coffee contains smaller amounts of lipid-containing diterpenes than filtered coffee does). A recent cell culture study, using HepG2 and $CaCo_2$ cells indicates that the UDP glucuronosyltransferase family of genes, thought to be proteins with indirect antioxidant, cytoprotective and genoprotective capabilities, are induced by coffee, independent of caffeine content, suggesting glucuronidation as a mechanisms for the protective and antioxidant effects of coffee[5].

Cafestol and kahweol, active ingredients in the coffee oil, decrease mutagenesis and tumorigenesis in animal models. Diterpenes, found in coffee, reduce genotoxicity of carcinogens and lower DNA adduct formation. Caffeic acid and chlorogenic acid are antioxidants and have been reported to decrease DNA methylation. More subtly, caffeine stimulates glutathione –S-transferase and caffeine itself appears to be protective—affecting cell cycle, proliferation, and apoptosis [8].

Table 3: Compilation of the Studies on Protective role of Coffee on Various Types of Cancers

Authors, Year of publication	Sample Details	Methodology	Results	Conclusion
Nkondjock A et al 2006 (22) **OBJECTIVE:** To assess the association between coffee consumption and breast cancer risk among high-risk women who carry BRCA mutations.	1690 females of >30 yrs of age were included from 40 centers in 4 countries.	A matched case-control analysis on women were included with a BRCA1 or BRCA2 mutation. Average lifetime coffee consumption was estimated via a self-administered questionnaire.	BRCA carriers who habitually drank 0, 1–3, 4–5 and 6 or more were 1.00, 0.90, 0.75, 0.31 respectively. The effect was limited to consumption of caffeinated coffee.	Among women with BRCA gene mutation, coffee consumption of >6 cups /d is unlikely to be harmful and that high levels of consumption may in fact be related to reduced breast cancer risk.
Montella M et al 2007 (19) **OBJECTIVE:** To evaluate the effect of coffee on hepatocellular carcinoma(HCC).	A hospital-based case-control study was conducted in 1999–2002 with a co hort size of 412 male and females between the age group of 43-84 yrs.	The study included 185 incidents, histologically confirmed cases of HCC. Subjects were admitted to the same hospitals' networks for acute, non-neoplastic diseases unrelated to diet. Coffee and tea consumption	Compared to people who drunk <14 cups/week of coffee, the risk of HCC decreased for increasing levels of consumption for 28 cups/week.	The study supports the hypothesis of a favourable effect of coffee, though not decaffeinated coffee and tea, on the risk on HCC.

		were assessed using a validated food-frequency questionnaire.	No significant association emerged with consumption of decaffeinated coffee	
Michaud M D et al 2010 (21) **OBJECTIVE:** To examine the relation between coffee and tea intake and the risk of glioma and meningioma in a large European cohort study.	343 patients with glioma and 245 patients with meningioma included male and female of >50yrs of age were included.	Data on coffee and tea intake were collected from the EPIC cohort study for 8.5 y of follow-up in 9 countries.	A significant inverse association was observed for glioma risk among those consuming 100 mL coffee and tea per day.	An inverse association between total coffee and tea consumption and risk of glioma that was consistent with the findings of a recent study.
Lee J E et al 2010 (17) **OBJECTIVE:** To evaluate the associations between coffee, tea, milk, soda and fruit and vegetable juice intakes and renal cell cancer risk	A co hort study of 1478 participants including male and female were evaluated for the associations between coffee, and renal cell cancer risk in a pooled analysis of 13 prospective studies.	Participants completed a validated food frequency questionnaire at baseline. Renal cell cancer cases were identified during a follow-up of 7–20 years across studies.	Coffee consumption was associated with a modestly lower risk of renal cell cancer (pooled multivariate RR for 3 or more 8 oz (237 ml) cups/day versus less than one 8 oz (237 ml) cup/day.	Neither coffee nor tea consumption increases renal cell cancer risk. Instead, greater consumption of coffee and tea may be associated with a lower risk of renal cell cancer.

From **Table 3**, it is certain that the phytochemicals in coffee exhibit several anti carcinogenic properties. Diterpenes, cafestol and kahweal induce phase I and II enzyme activities and thus prevent the formation of tumors. Both kahweol and cafestol also can induce enzymes in the liver that enhance the detoxification of other potential carcinogens such as N-nitrosodimethylamine (NDMA) and 2-amino-1- methyl-6-phenylimidazopyridine (PhIP). Therefore is known to fight against breast cancer, liver cancer, renal cancer, colon cancer etc.

CONCLUSIONS

Hence it can be concluded that apart from having a stimulating effect on the central nervous system coffee contains many such components that helps in preventing diseases such as Type 2 Diabetes Mellitus, Liver Diseases such as Non Alcoholic Liver Diseases, Hepatic Carcinoma and various types of Cancers. Therefore drinking around 2-4 cups of coffee /day is very effective against Type 2 Diabetes Mellitus as the chlorogenic acid and the caffeine content helps in reducing the hepatic Insulin Resistance and also helps in the better functioning of the beta cells. Whereas liver diseases are prevented by consuming around 2 cups of coffee /day. Drinking coffee more than 6 cups/day can help against breast cancer. Therefore the currently available evidence on coffee and decreased risk of chronic diseases is largely reassuring, and suggests that, coffee is helpful in preventing them [25].

Coffee also has been found to play a significant role in the stimulation of the gall bladder and thus helps reducing the incidences of the gall bladder diseases, and similarly has a protective role against Parkinson's disease. But further researches needs to be done in these areas. Although the compilation of various studies helps us to understand the protective role of coffee in chronic diseases it also had few drawbacks such as the cup sizes in the various studies differed and also the caffeine content of various types of coffees were not accurately mentioned, as the caffeine content differs in different types of coffees such as filtered coffee, unfiltered coffee, brewed coffee, instant coffee etc. Nevertheless, irrespective of the medical therapy regarding the chronic diseases, it's the right time to recommend coffee as a preventive treatment for the same.

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