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Coffee consumption and mortality in a community study — Evans Co., Ga.*)

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With 1 figure and 3 tables

Introduction

In view of the ongoing debate about whether coffee drinking influences the development of myocardial infarction, we have identified the following points which might contribute to the clarification of this issue. 1) It appeared advantageous to study *coffee drinking habits among all residents of a total community* rather than to rely on answers to questionnaires in hospitalized patients or other selected sub-groups of the population. 2) In addition, benefits were expected from a *prospective study*, i.e. to define disease free cohorts exposed and not exposed to coffee to be followed over a certain period of time. To record the coffee-drinking habit in a retrospective fashion – after the disease has appeared – may give misleading results in view of the vague recall and changing coffee drinking patterns after a clinical event. 3) Furthermore, it is obviously of value to keep the *observation period (after recording the coffee drinking habits) as short as possible* since it cannot be assumed that individual coffee-drinking habits remain stable over long periods.

Methods

These requirements were met by the long-term epidemiological study carried out in the Southeastern part of the United States, the Evans County Study in Georgia. 1) The prevalence survey in this community was conducted in 1960–62 and the study population re-examined between 1967 and 1969. 2) At this second study of 2,530 adults (60% white, 40% black) the two examining physicians asked each person a few standardized questions concerning coffee consumption. Persons who gave a history of regularly drinking five cups of coffee or more per day were placed in the high coffee consuming group. All others were classified as low- or no coffee consumers. 3) The cohort was followed for a period of four and one-half years

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with annual questionnaires. 4) Between Juli 31, 1969 and January 1, 1974 a total of 339 deaths occurred. Completeness of follow-up was practically assured through the annual interviews, since each person was contacted either personally or by telephone on the date of his examination anniversary. This interview covered questions of intercurrent illnesses, doctor visits, medications and hospitalizations. Ascertainment of death was monitored in several ways. Regular searches were conducted at the hospitals used by this community, the death certificates accumulated in the Evans County Courthouse were reviewed periodically, the local obituary columns were screened daily, and the funeral homes contacted at regular intervals. Early in 1975 the Georgia Department of Health was asked to assist in the search of deaths which had occurred among Evans County residents outside of Evans County. A comparison of the records showed completeness in the ascertainment of deaths.

This report comprises deaths which have occurred over a four and one-half year observation period. Of 339 deaths, 130 (38 %) were confidently attributed to cardio- and cerebrovascular causes. They were confirmed by autopsy reports, hospital records, reviews by a neurologist and by a cardiologist of all available information including family and/or co-workers interviews in cases of sudden death. "Possible" cardio- and cerebrovascular deaths were classified together with all other causes of death, e.g. accidents, post-operative complications, pneumonia or cancer. The indirect method was used for age adjustment within each race sex group.

The choice of mortality as the end-point for this study was made because our cross-sectional study in 1967–69, analyzing coffee drinking in relation to coronary heart disease and stroke, had not revealed any difference in high coffee or low coffee consuming groups (1). At that time we pointed out the disadvantage of the study: by questioning a population about certain habits and correlating the answers with findings from physical examinations, laboratory studies, Ecg, etc., one automatically limits the study to survivors of the diseases under consideration. One of the manifestations of ischemic heart disease, death from myocardial infarction, sudden death and stroke death thus escape a cross-sectional study. If it were assumed that the heavy coffee drinkers all had died from ischemic heart disease or stroke prior to our survey in 1967–69, we would indeed have missed these important aspects of CHD and cerebrovascular disease (CVD).

Results

The results are best summarized in the following statements:

a) *Mortality from all causes in this total community is not significantly different for white males (WM), white females (WF), nor black males (BM) among those who gave a history of high coffee consumption (≥ 5 cups/day) and those who drank little or no coffee.* There is a suggestion of lower total mortality among black females who drink 5 + cups. However, despite statistical significance, this result must be considered tentative because of small numbers. Therefore, total mortality is not influenced by the coffee drinking habit – if anything, the group

Tab. 1. Risk of Mortality from All Causes, by Coffee Drinking, Race and Sex
Rates (%) Adjusted for Age and Smoking Habits*)

Evans County Cardiovascular Survey

| Race/Sex | | Daily Coffee Consumption | | Adjusted |
		< 5 Cups	5 + Cups	Rates (p)
White Males	PAR/Cases	556/72	94/10	
	Adj. Rates	12.95	11.29	NS
	S.M.R.	1.00	0.87	
	Approx. S.E. of S.M.R.	0.11	0.27	
White Females	PAR/Cases	639/53	134/9	
	Adj. Rates	8.29	8.91	NS
	S.M.R.	1.00	1.07	
	Approx. S.E. of S.M.R.	0.14	0.36	
Black Males	PAR/Cases	323/53	18/3	
	Adj. Rates	16.41	19.81	NS
	S.M.R.	1.00	1.21	
	Approx. S.E. of S.M.R.	0.14	0.70	
Black Females	PAR/Cases	427/52	32/1	
	Adj. Rates	12.18	3.65	02
	S.M.R.	1.00	0.30	
	Approx. S.E. of S.M.R.	0.14	0.30	

*) Indirect Method

of high coffee consumers appears slightly favored by a lower mortality in comparison to persons with low- or no coffee intake (tab. 1).

b) *Mortality from cerebrovascular disease (CVD) showed statistically significant differences among the two coffee drinking groups.* Whereas stroke deaths were found more often in white males (WM) and black males (BM) who had reported low or no coffee consumption during lifetime, white females (WF) and black females (BF) had somewhat higher age-adjusted stroke mortality rates among heavy coffee consumers than among the low- or no coffee drinking counterpart. Attention once more, however, is called to small sample sizes. There is however no suggestion of a deleterious effect attributable to coffee drinking (tab. 2).

c) *Mortality from coronary heart disease (CHD) did not show any statistically significant difference between the heavy coffee drinkers and the low- or no coffee drinking persons in three out of four race-sex groups.* WM in the five-cup-of-coffee (+) group had a slightly higher CHD mortality rate. WF in the five-cup-a-day group had a marginally lower CHD mortality than WF who did not indulge in the coffee drinking habit. CHD mortality rates for Blacks, though statistically significantly

Tab. 2. Risk of Mortality from Stroke, by Coffee Drinking, Race and Sex
Rates (%) Adjusted for Age*)
Evans County Cardiovascular Survey

Race/Sex		Daily Coffee Consumption		Adjusted
		< 5 Cups	5 + Cups	Rates (p)
White Males	PAR/Cases	608/13	102/0	
	Adj. Rates	2.14	0	0.00
	S.M.R.	1.00	0	
	Approx. S.E. of S.M.R.	0.27	–	
White Females	PAR/Cases	673/4	136/4	
	Adj. Rates	0.59	3.89	NS
	S.M.R.	1.00	6.55	
	Approx. S.E. of S.M.R.	0.50	3.27	
Black Males	PAR/Cases	334/9	18/0	
	Adj. Rates	2.69	0	0.00
	S.M.R.	1.00	0	
	Approx. S.E. of S.M.R.	0.33	–	
Black Females	PAR/Cases	446/7	32/1	
	Adj. Rates	1.57	8.43	NS
	S.M.R.	1.00	5.37	
	Approx. S.E. of S.M.R.	0.38	5.37	

*) Indirect Method

higher for those with low coffee consumption can not be seriously con-
sidered due to a small number of black high coffee consumers (tab. 3).

d) Inconsistencies in the frequency of higher and lower vascular mortality
rates among the four race-sex groups, with diverging trends in statis-
tical significance, led us to the conclusion that there is no relation be-
tween coffee drinking habits and mortality from either all causes or
from specific vascular diseases. *If one were to assume a higher CHD
death rate among heavy coffee drinkers, one would have to explain
a "protective" effect of coffee from other causes of death* since all
causes of death (total mortality) were equally distributed between high
coffee and low- or no coffee consumers in our study (tab. 1).

e) Our rigid criteria for the diagnosis of death due to CHD or stroke
(see methodology section) might have inflated the category "other
causes of death" somewhat. Thus, the theoretical possibility exists that
we may have misplaced a CHD death in the "mortality from other
causes" category. Chances are that this rare instance could have oc-
curred among the lower socio-economic group with less documentation
by either Ecg, hospital records or autopsy reports, in which case a death

due to CHD would have been lost from the CHD group and would have entered the "other causes of mortality" group. However it is not our impression that, in general, higher coffee consumption is found more frequently among the upper socio-economic group. Therefore, if this instance of misplacing a CHD-death has occurred, it would mean a case of CHD death was lost from the low- or no coffee consuming group.

Discussion

An era of intensive search into potentially dangerous properties of caffeine and/or coffee on human health has produced a large volume of articles over the past decade. Gout, hypertension, diabetes, hyperlipidemias were all at one time alleged to be associated with a detrimental effect of high coffee intake. Most of the proposed coffee-associated effects were dismissed on the basis of clinical, epidemiological and experimental studies. Two issues remained to be solved in that reports indicated that ischemic heart disease, and peptic ulcer were associated with a high coffee intake.

Tab. 3 a. Risk of Mortality from CHD, by Coffee Drinking, Race and Sex
Rates (%) Adjusted for Age*)

Evans County Cardiovascular Survey

| Race/Sex		Daily Coffee Consumption		Adjusted
		< 5 Cups	5 + Cups	Rates (p)
White Males	PAR/Cases	575/13	96/4	
	Adj. Rates	2.26	4.53	NS
	S.M.R.	1.00	2.00	
	Approx. S.E. of S.M.R.	0.28	1.00	
White Females	PAR/Cases	646/10	138/1	
	Adj. Rates	1.55	0.97	NS
	S.M.R.	1.00	0.63	
	Approx. S.E. of S.M.R.	0.32	0.63	
Black Males	PAR/Cases	337/4	19/0	
	Adj. Rates	1.19	0	0.03
	S.M.R.	1.00	0	
	Approx. S.E. of S.M.R.	0.50	–	
Black Females	PAR/Cases	441/4	34/0	
	Adj. Rates	0.91	0	0.04
	S.M.R.	1.00	0	
	Approx. S.E. of S.M.R.	0.50	–	

*) Indirect Method

Tab. 3 b. Risk of Mortality from CHD, by Coffee Drinking, Race and Sex
Rates (%) Adjusted for Age and Smoking Habits*)

Evans County Cardiovascular Survey

Race/Sex		Daily Coffee Consumption		Adjusted
		< 5 Cups	5 + Cups	Rates (p)
White Males	PAR/Cases	575/13	96/4	
	Adj. Rates	2.26	4.94	NS
	S.M.R.	1.00	2.18	
	Approx. S.E. of S.M.R.	0.27	1.09	
White Females	PAR/Cases	646/10	138/1	
	Adj. Rates	1.55	1.03	NS
	S.M.R.	1.00	0.67	
	Approx. S.E. of S.M.R.	0.32	0.67	
Black Males	PAR/Cases	337/4	19/0	
	Adj. Rates	1.19	0	0.03
	S.M.R.	1.00	0	
	Approx. S.E. of S.M.R.	0.50	–	
Black Females	PAR/Cases	441/4	34/0	
	Adj. Rates	0.91	0	0.04
	S.M.R.	1.00	0	
	Approx. S.E. of S.M.R.	0.50	–	

*) Indirect Method

1. The prospective *Framingham* Study (2) and the 1967–69 cross-sectional study in Evans County (1) did not demonstrate an increase in any of the common risk factors predisposing to ischemic heart disease among heavy coffee drinkers with the exception of cigarette smoking. Cigarette smoking was strongly correlated with heavy coffee consumption. If there was a higher CHD incidence among heavy coffee drinkers compared to no- or low-coffee consumers it could be explained on the basis of the strong correlation between the two habits, as shown earlier from the Chicago electrical workers study (3). The *Framingham* (2) – as well as the Chicago Western Electric Study (3) and the *Kaiser* Permanente Study (4) refuted an association between heavy coffee consumption, per se, and the incidence of myocardial infarction or death from ischemic heart disease. The present 4¹/₂-year mortality study from Evans County taking coffee drinking habits into consideration and adjusting for age (even without controlling for cigarette smoking), showed no statistically significant differences in CHD deaths among heavy and no- or low-coffee drinkers. These findings are in contrast to retrospective studies of hospitalized patients with myocardial infarction and a control group hospitalized for
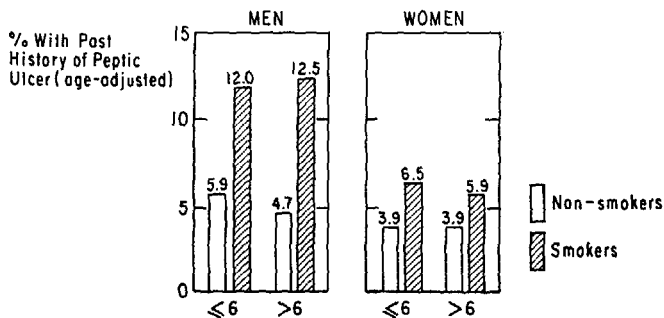
(Friedman et al., N.Engl. J.Med. 290 : 469, 1974)

Fig. 1 (see text).

a variety of diseases (5), particularly cancer, there we would expect the condition to affect the exposure.

2. The widely held opinion that peptic ulcer may be caused by high coffee consumption was challenged recently by the *Kaiser* Permanente Group study (6) (1974) in California. 2,597 patients with peptic ulcer were questioned about their coffee drinking and cigarette smoking habits. Coffee drinkers of six cups and more did not have a higher prevalence of peptic ulcer than persons who drank less than six cups/day. On the other hand, there is no association with coffee drinking habits since *non-smoking* high or low coffee consumers in both sexes practically have the same low prevalence of peptic ulcer. A highly significant difference exists only among smokers and non-smokers, regardless of whether they drink much or very little coffee (fig. 1).

Summary

Total mortality showed no association with heavy coffee consumption in the four race-sex groups of Evans County. Deaths from coronary heart disease in WM, WF and BM showed no statistically significant differences between the two coffee consuming groups. Sex differences in cerebrovascular death rates, consistent in both races, suggest the possibility for a female excess of stroke deaths among coffee drinkers, and a "protective" effect of coffee drinking among males. Thus, in an area of the United States which has been designated the "Stroke Belt", neither the cardiovascular nor the cerebrovascular death rates seem strongly nor consistently related to coffee drinking habits.

Although the number of deaths (339) is fairly large, representing a 13% mortality in this community over a four and one-half year observation period, the classification in four race-sex groups with further division into the groups with different coffee drinking habits limits each stratum to rather small numbers. In addition, 86 cases of CHD and CVD were diagnosed during lifetime already and, therefore, were excluded from the prospective mortality study. Confidently to refute or confirm the allegations of a detrimental influence of high coffee intake on ischemic heart disease one would need larger numbers. But in the light of our most important finding – that mortality from all causes is not increased in the high coffee consuming group – the finding of increased ischemic heart disease death rates with high coffee consumption would have to be compensated by a provocative, lower rate for other causes of death.

Zusammenfassung

1. Die Gesamtsterblichkeit an allen Todesursachen ist gleichmäßig auf starke und schwache Kaffeekonsumenten verteilt. Tab. 1 zeigt sogar, daß die Kaffeetrinker von 5 Tassen und mehr pro Tag unter den weißen Männern eine etwas niedrigere Sterblichkeit an allen Todesursachen haben als die wenig oder nicht Kaffee trinkenden Personen.

2. Die Apoplexie-Mortalität zeigte in diesen 4¹/₂ Jahren divergierende und schwer erklärliche Unterschiede in den vier Geschlechts- und Rasse-Untergruppen. Während weiße Männer und Neger (die die höchste Apoplexierate in diesem Teil der USA zu verzeichnen haben) in der *starken* Kaffeekonsumgruppe keinen einzigen Fall von Zerebralinfarkt oder Gehirnblutung hatten und in der wenig oder keinen Kaffee trinkenden Gruppe 2,8% bzw. 3,2% mit tödlicher Apoplexie gefunden wurden, bot das weibliche Geschlecht ein anderes Ergebnis: Weiße Frauen und Negerinnen mit Kaffeetrinkgewohnheiten von 5 Tassen und mehr pro Tag hatten ein höheres Apoplexierisiko als die wenig Kaffee trinkenden Frauen.

3. Die Myokardinfarkt-Mortalität zeigte keine statistisch signifikanten Unterschiede zwischen starken und schwachen Kaffeetrinkern in allen vier Untergruppen, nachdem die Altersberichtigung durchgeführt und die Rauchgewohnheiten mitkontrolliert wurden.

4. Die Tatsache, daß die am meisten für Apoplexie gefährdete Gruppe von Männern im Südosten der USA unter starken Kaffeetrinkern keinen Todesfall aufwies, sowie die statistisch nicht signifikanten Unterschiede in der Myokardinfarkt-Sterblichkeit zwischen stark oder wenig Kaffee trinkenden Personen in dieser prospektiven Studie, und vor allem die leicht erhöhte Gesamtsterblichkeit an allen Todesursachen bei den wenig oder keinen Kaffee trinkenden weißen Männern, stellt u. E. alle Spekulationen über einen krankheitsfördernden Einfluß des Kaffees in Frage.

5. Obwohl die Zahl der Todesfälle (n = 339) ziemlich groß ist, d. h. 13% Mortalität in dieser Gemeinde innerhalb von 4¹/₂ Jahren, ist die statistische Analyse erschwert durch vier Geschlechts- und Rassegruppen mit weiterer Unterteilung in 2 Kaffee-Konsumgruppen. Um die Behauptungen über schädliche Auswirkungen eines hohen Kaffee-Verbrauches auf das Myokard oder die Koronargefäße zu widerlegen, müßte man mit noch größerem Zahlenmaterial arbeiten. Aber im Hinblick auf unseren wichtigsten Befund – daß die Sterblichkeit an allen Todesursachen unter starken Kaffeetrinkern nicht erhöht ist – erlauben wir uns die Ansicht, daß weitere Untersuchungen zu diesem Thema eine unfruchtbare Zeitverschwendung darstellen.

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