

## Headache caused by caffeine withdrawal among moderate coffee drinkers switched from ordinary to decaffeinated coffee: a 12 week double blind trial

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Caffeine withdrawal could be an important but often overlooked cause of headache. A study of 205 hospital inpatients found a significantly higher caffeine consumption among patients who reported postoperative headaches than those who did not (mean consumption of caffeine 528 v 339 mg/day).<sup>1</sup> Information from controlled trials on caffeine withdrawal, however, is limited: published studies have used high doses or short observation periods or have incompletely controlled caffeine intake.<sup>2,3</sup> We report on the withdrawal effect of caffeine in healthy subjects who habitually consumed four to six cups of coffee a day. The main results of this study, which was designed to compare the effects of ordinary and decaffeinated filter coffee on blood pressure and serum cholesterol concentration, are reported elsewhere.<sup>4,5</sup>

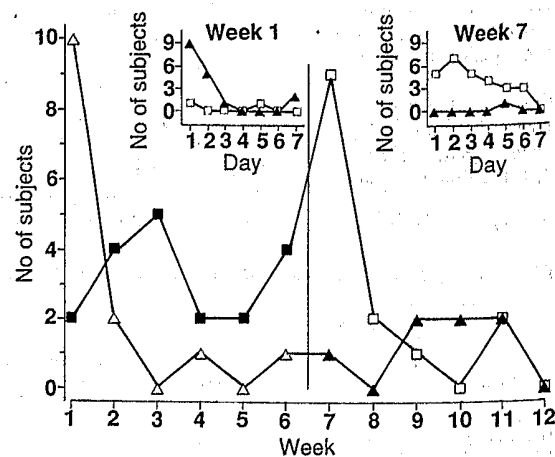
### Subjects, methods, and results

We recruited subjects through stories in local newspapers. Of 150 applicants, 45 (23 women and 22 men, aged 25 to 45) met all the criteria for eligibility: aged 17-45, apparently healthy, serum cholesterol concentration <6.7 mmol/l, systolic blood pressure <140 mm Hg, abstinence from smoking for the past year, not taking drugs or oral contraceptives, not taking a prescribed diet, not pregnant, not working night shifts, and habitually consuming four to six cups of filter coffee a day as measured by a three day dietary record. After being matched for sex, blood pressure, and age the subjects were randomly allocated to receive either five cups of coffee (84 mg caffeine/cup) each day for six weeks followed by five cups of decaffeinated

coffee (3 mg caffeine/cup) for the next six weeks (n=23) or the reverse treatment (n=22).<sup>4</sup> Blank coffee cartons were labelled with the subjects' names by two people not participating in the trial; both subjects and investigators were blind to the type of coffee being consumed.<sup>4</sup> Subjects were unaware whether they were being switched between ordinary and decaffeinated coffee.

Subjects were prohibited from consuming tea or other products containing caffeine, except for small amounts of chocolate. The mean caffeine intakes were 435 mg/day for ordinary coffee treatment and 30 mg/day for decaffeinated. Once a week subjects rated how easily they had fallen asleep the previous night, by placing a cross on a 100 mm bar scale running from with great difficulty (0) to very easily (100). Subjects recorded any sign of illness, and daily guesses about which type of coffee they were receiving.

Thirty eight of the 45 subjects did not realise when the coffee was switched to decaffeinated. Nineteen subjects recorded more complaints about headache during their first week of taking decaffeinated coffee compared with the mean number of complaints they recorded during the 11 other weeks (figure); five subjects recorded fewer complaints, and 21 showed no



Prevalence of headaches among subjects who habitually consumed four to six cups of coffee a day and were switched from ordinary to decaffeinated coffee at start of study (week 1; △) or week 7 (□). ▲, ■ Indicates consumption of ordinary coffee

change (signed rank test,  $p=0.0006$ ). The headaches started on the first or second day that the subjects took decaffeinated coffee and lasted for one to six days, with a mean duration of 2.3 days. Subjects also reported falling asleep more easily when they were consuming decaffeinated coffee (mean scores 88 v 85; paired  $t$  test mean difference 3.0, 95% confidence interval 0.2 to 5.8). Thus caffeine affected quality of sleep even in moderate coffee drinkers.

#### Comment

Our results indicate that many moderate consumers of coffee develop headaches caused by caffeine withdrawal lasting two to three days after they switch to decaffeinated coffee. The result was not influenced by subjective expectations as most subjects were unable

to recognise the switch. Thus caffeine withdrawal headache is not restricted only to high consumers. Clinicians should be aware of caffeine withdrawal as a possible cause of headaches, especially when ingestion of caffeine is erratic.

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