

CAFFEINE CONSUMPTION AND DIGESTIVE, RESPIRATORY AND  
MUSCULOSKELETAL DISEASE

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## ABSTRACT

**Background:** The effects of caffeine on health have been frequently reviewed. However, much of the research focuses on specific topics such as cardiovascular disease. There is a need to consider other common diseases that may not be life-threatening but significantly impact the individual and health services. This topic was examined here by considering digestive, respiratory, and musculoskeletal disorders. Depression was also investigated as lower levels are associated with the consumption of caffeine. **Methods:** Secondary analyses of epidemiological data are reported in this paper. A representative sample of 6486 UK adults (58.0% being in paid employment; 54.4 % female 18.5% single; 65% married or cohabiting, and 15.2% divorced or widowed) completed a survey including questions on illnesses in the last year and caffeine consumption. **Results:** Initial cross-tabulations showed that caffeine consumption was not associated with digestive, respiratory or musculoskeletal diseases. Caffeine consumers were less likely to report depression in the last year. **Conclusion:** These results show no adverse effects of caffeine consumption on digestive, respiratory or musculoskeletal outcomes. Consumption of caffeine was associated with a lower incidence of depression, and this remained significant when demographic and lifestyle factors were statistically controlled.

**KEYWORDS:** Caffeine; chronic disease; digestive problems; respiratory disease; musculoskeletal disease; depression.

## INTRODUCTION

Several reviews have examined the possible health effects of caffeine.<sup>[1-4]</sup> These have often focussed on specific disease outcomes or single sources of caffeine. Wikoff et al.<sup>[5]</sup> examined the effects of caffeine on acute toxicity, cardiovascular toxicity, development and reproduction, bone and calcium effects, and mental health. The results showed that consuming up to 400 mg caffeine was not associated with cardiovascular problems, reproductive/developmental effects, adverse behavioural problems, or bone and calcium status changes.

The current study aimed to examine associations between caffeine consumption and other health outcomes that have received less attention in the literature, namely digestive, respiratory, and musculoskeletal diseases. There is limited literature on the effects of caffeine on these health outcomes. For example, an early epidemiological study.<sup>[6]</sup> found that caffeine was associated with gastrointestinal problems but was no longer significant when possible confounding factors were controlled in the analysis. This absence of an effect of caffeine on gastrointestinal symptoms was confirmed

in a recent study of office workers.<sup>[7]</sup> The literature on caffeine and respiratory function often show the beneficial effects of caffeine. For example, caffeine is widely used to treat apnoea in premature babies.<sup>[8]</sup> There is also evidence that caffeine improves lung function for up to four hours.<sup>[9]</sup> This effect suggests that caffeine can improve bronchitis, and this has been observed in a study that examined caffeine and the lifetime prevalence of chronic diseases.<sup>[10]</sup> Effects of caffeine on musculoskeletal outcomes have been widely studied. A review published in 2002,<sup>[11]</sup> indicated no overall negative effect of caffeine on bone health. Further meta-analyses,<sup>[12,13]</sup> have shown wide variability in the results. This heterogeneity may be due to genetic differences, lifestyles and different geographic locations of the samples.

The present analyses considered depression in the last year. The present analyses used a sample that was representative of the UK population,<sup>[14]</sup> and included workers from a variety of jobs and those not at work. Information about demographic and lifestyle confounders was also reported and could be adjusted for in analyses. As well as the health outcomes described

above, the present analyses also examined whether caffeine consumption was associated with reports of depression in the last year. There is support for the view that caffeine is associated with a reduced incidence of depression,<sup>[15]</sup> and there are plausible biological mechanisms for this view,<sup>[16,17]</sup> Studies have demonstrated that caffeine and reduced risk of depression can be seen with measures covering lifetime prevalence,<sup>[10]</sup> and the last few weeks.<sup>[18]</sup>

## METHODS

The sample was selected from the Bristol area of the UK electoral register and sent a survey that included questions about health, lifestyle, demographics, and caffeine consumption. The questions about health outcomes in the last year were from the Whitehall study.<sup>[19]</sup> Caffeine consumption was calculated from the amount in different types of coffee and tea. The study was carried out with the informed consent of the volunteers and the approval of the local, regional health board ethical committee.

**Table 1: Caffeine consumption and health problems.**

	No caffeine (N=490)	< 240 mg/day (N=2658)	>240 mg/day (N=3338)	p value
Respiratory problems (e.g., asthma)	12.6%	14.2%	14.2%	0.64
Digestive problems (e.g., constipation)	32.5%	29.2%	27.7%	0.08
Musculoskeletal problems (e.g., arthritis)	24.1%	23.4%	24.8%	0.48
Depression	20.2	14.3	14.6	0.003

There was no evidence that caffeine consumers had more digestive, respiratory or musculoskeletal problems than non-consumers. In contrast, caffeine consumers reported significantly lower levels of depression than non-consumers. This remained significant in a logistic regression that controlled for demographic and lifestyle variables (OR = 0.72 CI 0.56, 0.92 p = 0.01).

## DISCUSSION

The analyses conducted here show that there were no effects of caffeine consumption on digestive, respiratory or musculoskeletal outcomes. In contrast, the analyses confirmed that caffeine consumption was associated with lower levels of depression. This last result confirms previous research and gives one more confidence in the absence of effects of caffeine for the other health outcomes. The association with depression appears robust in that it has been found in meta-analyses,<sup>[15]</sup> and studies using lifetime prevalence,<sup>[10]</sup> depression in the last week,<sup>[18]</sup> and in the present study, the last year. Caffeine is an A1/A2A receptor antagonist that modulates neurotransmission,<sup>[16,17]</sup> and the metabolites of caffeine influence adenosine transmitters in the brain,<sup>[17]</sup> These mechanisms plausibly explain why caffeine may influence depression.

## Participants

The analyses were carried out on the data from 6486 participants. Characteristics of the sample are shown below:

- 54.3% female
- Mean age 48.5 years, range 18-88 years
- 54.3% working
- 18.5% single; 65% married or cohabiting; 15.2% divorced/separated/widowed
- 21.9% degree level; and 15.5% higher degree or similar professional qualification.
- The median daily caffeine consumption was 240 mg/day, with a range of 0-2040 mg.

## RESULTS

Cross-tabulations between caffeine consumption and digestive, respiratory and musculoskeletal problems are shown in Table 1, as is the incidence of depression.

## CONCLUSION

There have been many empirical studies and reviews of the effects of caffeine on health, but these often fail to use representative samples and a range of disease outcomes. The present study involved secondary analyses of a representative UK sample to examine possible associations between caffeine consumption and digestive, respiratory and musculoskeletal disease in the last year. Depression in the last year was used as a positive control, as the previous literature suggested that caffeine was reliably associated with a lower risk of depression. The results showed no evidence of adverse effects of caffeine and confirmed lower levels of depression in those who regularly consumed caffeinated beverages. Plausible mechanisms for the effects of caffeine on depression have been identified. Further research on the effects of caffeine on acute symptoms is now required to complete the profile of associations between caffeine and health outcomes.

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