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Analysis into potential lifestyle factors that may influence defecation frequency

William Foldys

Natural Sciences (Life and Physical Sciences), School of Biological Sciences, University of Leicester

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Abstract

This paper aims to investigate the potential lifestyle factors that may influence the frequency of defecation and the biological mechanisms behind them. Taking data from a 2022 study into defecation frequency we looked at three common lifestyle factors that may affect defecation frequency. Sleep, Caffeine Consumption and Fruit and Vegetable consumption are all commonly associated with defecation frequency, but their effects are complicated and require further study.

Keywords: Health; Biology; Gastrointestinal; Caffeine Consumption; Sleep; Diet

1. Introduction

Data from a 'Study into the frequency of defecation of twelve 20-22-year-old males' [1] has shown us trends in defecation rates such as how sleep significantly affects rates of defecating, and how body mass can predict yearly defecation rates. There were surprisingly no significant findings for caffeine consumption or fruit and vegetables eaten per day, despite knowledge of caffeine's irritation affect on the bowels and human experience of drinking caffeine [2], and fruit and vegetables high fibre content, known to encourage the passage of faeces [3]. This paper hopes to add an explanation and further potential investigation into these trends.

2. Discussion

2.1 Monthly Trends

The monthly trends reinforce how variable our bowel habits can be, impacted by a range of lifestyle factors or even environmental factors. For example, subject number 6, who defecated half as much in December than July, has a chronic illness named ulcerative colitis. A main symptom of the disease is a need to empty your bowels frequently [4]. This huge change in defecation rates could potentially be impacted by increased symptoms of this disease. Even subjects with no known illnesses still had a large variability. Potential causes may

include changes to sleep patterns or changes to diet.

2.2 Sleep

The trends on sleep and defecation from the previous study [1], show a remarkable difference between those that slept less than 7 hours and those that slept 7 hours or more. Those that slept 7 hours or more defecated on average 189% more frequently. Lack of sleep has been linked to several diseases, from mental disorders such as depression and anxiety to cancer and heart disease as well as a wide range of evidence linking poor sleep to many gastrointestinal disorders such as IBS, or even colon cancer [5]. The most relevant is a recent study into the association of insomnia and constipation. Overall a strong correlation between insomnia and constipation was found [6]. None of our subjects however are clinically constipated (Constipation is defined as having fewer than three bowel movements a week [7]). However, the study does suggest a strong sleep and enteric nervous system link. Lack of sleep is known to cause an upregulation of the immune system [8], therefore it is likely poor sleep may cause a variety of gastrointestinal disorders by creating microscopic inflammation in the bowels [9].

2.3 Caffeine

Anecdotally coffee has been largely associated with the urgent need to defecate, however, this was found to be caused by either caffeinated or non-caffeinated coffee, with at least a third of the population experiencing this as soon as 4 minutes after drinking the coffee, suggesting it is likely a property of the coffee itself, rather than the caffeine content [10]. Furthermore, studies on 40 healthy young individuals reported almost zero negative gastrointestinal symptoms when consuming a variety of coffee beverages containing 160mg of caffeine, suggesting that acute consumption of coffee or caffeine has little effect on gastrointestinal function [2]. It was anticipated that we would see a significant trend in those that consumed large amounts of caffeine regularly would have much higher defecation rates than others. This was not so obviously the case in the data from the previous study [1], with no statistical difference found with changing caffeine consumption. What the data does not reveal, however, is what their defecation rates would be like if they changed their caffeine consumption, or if potentially coffee rather than caffeine would be a strong influencer of defecation frequency.

2.4 Fruit and Vegetable Consumption

Fruit and vegetables are notoriously high in fibre, an indigestible carbohydrate. Soluble fibre, found in foods such as plums, prunes, carrots or broccoli, dissolves in water. Soluble fibre soaks up water as it passes through the digestive system, forming a gel-like substance that allows the faeces to move quicker through the digestive system and anus. Insoluble fibre found in whole-grain foods, green beans, cauliflower, and potato skins, does not dissolve in water. Insoluble fibre speeds up the passage of food through the digestive system, resulting in more regular defecation [11]. Despite this, many studies have shown that an increase in dietary fibre may have a worsening effect on constipation and that some patients have even been cured of constipation with the removal of dietary fibre [12]. This is especially true with those who suffer from IBS, as many high-fibre foods are very high in FODMAPS, (fermentable oligosaccharides, disaccharides, monosaccharides and polyols) short-chain carbohydrates that are poorly absorbed and draw fluid into the bowel, during which FODMAPs are fermented by bacteria

to produce IBS symptoms [13]. FODMAP containing foods include high fructose fruits such as apricots, peaches or plums, and vegetables such as Brussel sprouts, cauliflower or asparagus. The effect of fruit and vegetables on the digestive system is still in doubt, despite a belief amongst the population that these high fibre foods help with the passing of faeces, there is plenty of research to suggest otherwise. With a variety of contents amongst a broad food group, it is difficult to associate fruit and vegetable intake as having a simple effect on defecation frequency.

3. Conclusion

The gastrointestinal system is rather sensitive, so it is of little surprise that a large variety of lifestyle factors may be of influence on the passage of substance through it. Lack of sleep is widely known for its negative physiological effects, and its influence on the bowels is evidently negative too. It is likely a lack of sleep causes inflammation of the intestine lining as well as causing issues with the enteric nervous system, leading to potential gastrointestinal problems. The coffee-caffeine-colon relationship is largely confusing, with data showing that daily caffeine consumption had little effect on defecation frequency [1]. Previous studies have shown that drinking acute levels of coffee or caffeine did not affect gastrointestinal function despite reports of a third of the population having experienced coffee induced defecation. The consumption of fruit and vegetables has a wide range of influences on gastrointestinal function depending on the contents of the food. Contents such as fibre or fermentable sugars have been highly linked with gastrointestinal illnesses [14], as well as the same fibre content having a positive effect on the easy passage of faeces. It is difficult to conclude from this study that any dietary factors have a significant direct effect on defecation frequency, and further research into how changing the variables may influence defecation frequency of the same subject.

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