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Cartwright R[1], Srikrishna S[1], Cardozo L[1], Gonzalez J[1]
1. King's College Hospital

DOES DIET COKE CAUSE OVERACTIVE BLADDER? A 4-WAY CROSSOVER TRIAL, INVESTIGATING THE EFFECT OF CARBONATED SOFT DRINKS ON OVERACTIVE BLADDER SYMPTOMS IN NORMAL VOLUNTEERS.

Hypothesis / aims of study

Consumption of carbonated soft drinks is epidemiologically independently associated with the onset of overactive bladder (OAB)[1]. Low concentrations of artificial sweeteners, found in some carbonated drinks, are also known to enhance rat detrusor muscle contractility[2]. This study aimed to investigate whether carbonated soft drinks cause OAB symptoms in normal volunteers, and to determine which drinks might be responsible.

Study design, materials and methods

20 normal volunteers were recruited from among staff at our institution. In a 4-week sequence, participants drank carbonated water, Diet Coke, caffeine free Diet Coke, or Classic Coke, as their main weekday soft drink. Participants were asked to abstain from other caffeinated or artificially sweetened drinks. Each week participants completed a 3-day bladder diary, recording the timing of each void, and the intensity of urgency at each void using the Indevus Urgency Severity Scale (IUSS)[3]. An urgency episode was defined as a void associated with a score of 3: “Severe extreme urgency discomfort that abruptly stops all activities or tasks”. Normative data were not available for the IUSS at the time of study design, and the possible effect size was unknown, so the sample size was based on pragmatic considerations rather than a formal power calculation. Frequency, nocturia, and mean urgency score data were analysed using mixed-linear regression. Urgency episode data were analysed using mixed-Poisson regression.

Results

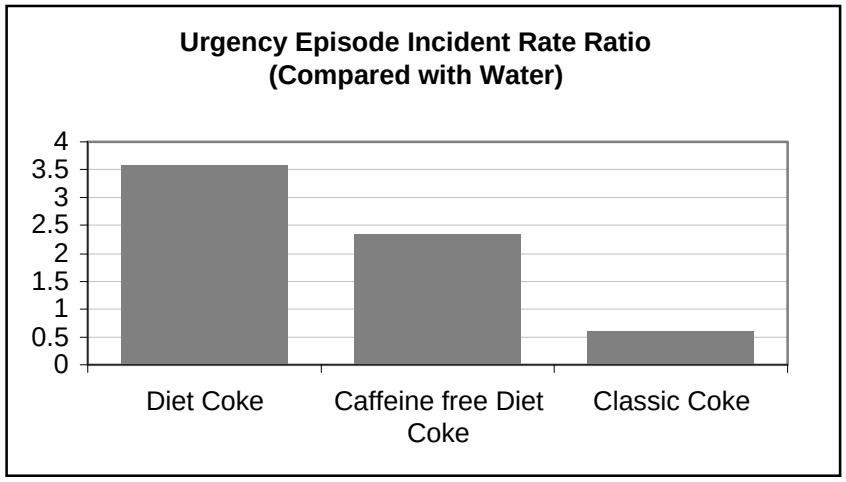
Daytime frequency was significantly increased by drinking Diet Coke or caffeine free Diet Coke compared with carbonated water, whereas frequency was unchanged with Classic Coke. Few participants reported any episodes of nocturia, but nocturic episodes were significantly increased with caffeine free Diet Coke. Mean urgency scores were very significantly higher compared to water with both Diet Coke and caffeine free Diet Coke. Classic Coke was associated with a smaller increase in mean urgency score, that did not reach significance. Both artificially sweetened drinks also increased the rate of urgency episodes, although this only reached significance for Diet Coke.

Descriptive Statistics

	Frequency		Nocturia		Urgency Score		Urgency Episodes	
	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Carbonated Water	5.72	5.42 6.02	0.19	-0.17 0.54	1.09	0.88 1.29	0.33	0.04 0.63
Diet Coke	6.29	5.45 7.13	0.15	-0.03 0.32	1.42	1.12 1.72	1.50	0.40 2.60
Caffeine free Diet Coke	6.61	5.49 7.72	0.25	-0.04 0.54	1.42	1.09 1.75	0.83	-0.46 2.13
Coke	5.47	4.50 6.45	0.57	-0.83 1.97	1.33	1.11 1.56	0.14	-0.21 0.49

Mixed-Linear Regression Analysis

	Frequency		Mean Urgency		Nocturia	
Comparison	Coef	p value	Coef	p value	Coef	p value
Diet Coke vs. Water	0.69	0.03	0.28	<0.001	0.14	0.24
Caffeine free Diet Coke vs. Water	1.00	0.01	0.30	<0.001	0.27	0.04
Classic Coke vs. Water	-0.03	0.94	0.11	0.40	0.12	0.47



Interpretation of results

Both artificially sweetened drinks cause increased urinary frequency, mean urinary urgency, and urgency episodes. In these volunteers, urgency episodes were uncommon, and the study may have been underpowered to detect the

clinically significant increase seen with decaffeinated Diet Coke. This study is the first to provide normative data for the IUSS.

Concluding message

Diet Coke and caffeine free Diet Coke produce similar increases in urgency and frequency, compared to carbonated water or Classic Coke. The previously observed epidemiological effects of carbonated soft drinks on OAB may therefore be mediated by the artificial sweeteners, rather than by caffeine.

References

1. BJU Int 2003;92(1):69-77
2. Toxicol Appl Pharmacol 2006;217(2):216-24
3. J Urol 2005;174(2):604-7

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HUMAN SUBJECTS: This study was approved by the King's College Hospital REC and followed the Declaration of Helsinki Informed consent was obtained from the patients.