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Review

You are what you eat: The impact of diet on overactive bladder and lower urinary tract symptoms

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ABSTRACT

Overactive bladder (OAB) is a clinical syndrome describing the symptom complex of urgency, with or without urgency incontinence and is usually associated with frequency and nocturia. The symptoms associated with OAB are common and whilst not life threatening are known to have a significant impact on the quality of life (QoL).

There is increasing evidence that diet may have a significant role in the development of OAB symptoms. Whilst fluid in-take is known to affect lower urinary tract function the effects of caffeine, carbonated drinks and artificial sweeteners are less well understood.

Consequently the aim of this paper is to review the evidence and investigate the effect of diet on lower urinary tract function and dysfunction.

Contents

1. Introduction

Overactive bladder (OAB) is the term used to describe the symptom complex of urinary urgency, usually accompanied by frequency and nocturia, with or without urgency urinary incontinence, in the absence of urinary tract infection or other obvious pathology [1].

Overactive bladder is a common and debilitating condition that is known to have a significant impact on quality of life (QoL). Epidemiological studies from North America have reported a prevalence of OAB in women of 16.9% and the prevalence is known to increase with age, rising to 30.9% in those over the age of 65 years [2]. In addition data from Europe [3] have shown the overall prevalence in men and women over the age of 40 years to be 16.6%. When

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considering the symptoms associated with OAB frequency was most commonly reported (85%) and 54% of subjects complained of urgency with 36% complaining of urgency incontinence.

The symptoms of OAB are thought to be due to involuntary contractions of the detrusor muscle during the filling phase of the micturition cycle. These involuntary contractions are termed detrusor overactivity [1] and are mediated by acetylcholine-induced stimulation of bladder muscarinic receptors [4]. However it is important to remember that OAB is not synonymous with detrusor overactivity as the former is a symptom based diagnosis whilst the latter is a urodynamic diagnosis [5]. It has been estimated that 64% of patients with OAB have urodynamically proven detrusor overactivity and that 83% of patients with detrusor overactivity have symptoms suggestive of OAB [6].

2. The effect of diet on overactive bladder

The majority of patients who complain of symptoms suggestive of OAB will benefit from a conservative approach as well as bladder retraining in the first instance. Whilst there are considerable data supporting the use of behavioral modifications, including weight loss and fluid management, more recently there is an increasing body of evidence investigating the effect of diet on lower urinary tract symptoms. The aim of this paper is to critically appraise the available evidence and to examine the association of dietary factors with lower urinary tract symptoms and OAB.

3. Weight

There is now considerable evidence supporting the association of obesity and urinary incontinence. The Nurse's Health Study, which included 83,355 women aged 37–54 years, has demonstrated an association between increasing body mass index (BMI) and urinary incontinence. Women with a BMI $\geq 30\,kg/m^2$ were found to have 3.1 times the risk of severe incontinence compared to those women with a BMI of 22–24 kg/m^2 (95% CI: 2.91–3.30) [7].

These data are also supported by the 1946 British Birth Cohort study [8] which has followed a cohort of 1201 women annually since their birth in 1946. An analysis of those women aged 48–54 years has demonstrated that an earlier onset of obesity is associated with an increased risk of urinary incontinence in middle age. Those women who were found to be obese since the age of 20 years were more likely to report severe incontinence than women whose BMI remained below 25 kg/m^2 (OR 2.3; 95% CI: 1.36–3.93) or who became overweight at 43 years (OR 1.85; 95% CI: 0.97–3.51). In addition the Study of Women's Health Across the Nation (SWAN) study [9] in the United States and the MRC Incontinence study [10] in the United Kingdom have also shown that higher BMI and greater weight gain are associated with an increased risk of urinary incontinence. Whilst increased intra-abdominal pressure increases the risk of stress urinary incontinence evidence from 1333 women in the British Cohort study [11] and from Korea in the KNHNES (Korean National Health and Nutrition Examination Survey) [12] study have demonstrated that central adiposity correlates with urgency urinary incontinence.

Whilst longitudinal epidemiological studies have clearly demonstrated the association between body weight and urinary incontinence there is also evidence from interventional studies that have demonstrated weight loss may lead to an improvement in symptoms of incontinence [13].

Consequently the evidence would suggest that the overweight are more likely to complain of symptoms of urinary incontinence and weight loss should be encouraged in those who are overweight. This is supported by recent reports by National Institute for Health and Care Excellence (NICE) [14] in the United Kingdom and the current International Consultation on Incontinence (ICI) Guidelines [15].

4. Smoking

The effect of smoking on lower urinary tract function has now been investigated in a number of large epidemiological studies. The EPINCONT [16] (Norwegian Epidemiology of Incontinence in the County of Nord-Trondelag) included 27,936 women and demonstrated that former and current smoking was associated with incontinence although only for those women who smoked >20 cigarettes per day although severe incontinence was associated with all smokers regardless of number smoked. Other modifiable risk factors identified included body weight, low levels of physical activity and tea consumption.

Conflicting evidence has been reported in a large Italian study of 5488 subjects which showed no effect of smoking on urinary incontinence although there was an increased risk with increased BMI in women. In addition there was no such association with alcohol or caffeine consumption [17].

Whilst smoking has been shown to be an independent risk factor for urinary incontinence in some cross-sectional studies [7,16] others have shown no such relationship [18]. The majority of longitudinal studies have not shown a significant association between smoking and incontinence although the UK MRC study in Leicestershire did demonstrate that current smoking was a risk factor. Consequently these conflicting data suggest that smoking is probably not a modifiable risk factor for urinary incontinence.

5. Diet

One of the largest studies to assess the effects of diet on lower urinary tract function is the Leicester MRC study [10]. This prospective cohort study collected data from 7046 community dwelling women to investigate the role of diet and lifestyle on urinary symptoms. Using a multivariate model to identify the onset of overactive bladder symptoms there was a significant association with obesity, smoking and the consumption of carbonated drinks. Conversely there was a reduced risk with higher consumption of vegetables, bread and chicken. On addition obesity and carbonated drinks were also associated with an increased risk of stress incontinence whilst consumption of bread was protective.

A further large population based study in 2060 women has been reported based on the Boston Area Community Health Survey (2002–2005) [19]. Overall a greater energy intake was significantly associated with urinary incontinence and also increased severity of incontinence. Whilst there were no associations with intake of carbohydrate, protein or fat the ratio of saturated fat to polyunsaturated fat was positively associated with incontinence. A further analysis in this cohort of patients has also shown that increased saturated fat was associated with post micturition symptoms and high protein intake was associated with storage symptoms and nocturia. However there were no consistent associations with carbohydrate monounsaturated or polyunsaturated fat intakes [20]. These results would suggest that decreasing dietary fat may account for some of the benefits of weight loss in women with urinary symptoms and dietary manipulation may be useful as a form of conservative management in these patients.

6. Phytoestrogens

Whilst there is now considerable evidence to suggest that systemic hormone replacement therapy may worsen incontinence [21] there is little evidence to assess the effect of dietary oestrogens. The longitudinal relationship of dietary phytoestrogen intake