

Replacing sugary snacks with fruit, nuts and seeds at nurses' stations within a UK oncology unit: a pilot intervention study

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Abstract

Aim - This real-world service intervention study evaluated NHS staff weight and subjective happiness over a three-month period, by replacing processed, sugary foodstuffs with fruit, nuts and seeds.

Method - Forty four staff at the Primrose Oncology Unit, Bedford Hospital, volunteered to abstain from cakes, biscuits, sweets, sugary drinks and chocolates whilst at work between June 2019 and September 2019. Participants' weight and subjective happiness scores were recorded at baseline, three months (completion) and five months (post-completion). Fresh and dried fruit, and bags of raw nuts and seeds were made available to all staff (including those not participating). Participants resumed their usual diet outside of working hours. One hundred consecutive patients attending the department during the intervention were asked whether removing sugary food from public view was a positive move and whether it would have a likely influence on their future eating habits.

Results - At five months, twenty (46%) participants lost weight >1kg (average 3.01 kg), seven participants gained >1kg (average 2.23 kg), and 17 remained the same weight (T-test $p < 0.03$). Average happiness score increased from 21.65 to 23.44 (+6.6%), T-test $p < 0.04$. Amongst those who lost >1kg weight, average happiness score increased from 21.54 to 23.75 (+9.3%), $p < 0.03$. In those who gained >1 kg weight, average happiness score decreased from 22.28 to 21.43 (-3.8%), $p < 0.08$. There was a 13.1% difference in the happiness score in those losing >1kg compared to those gaining >1kg in weight $p < 0.001$. 94 (94%) patients indicated that this initiative gave a good impression and ninety seven (97%) indicated that the initiative would encourage them to reduce sugar in their own diet.

Conclusion - The results demonstrated a statistically significant reduction in weight loss and increase in mood in just under half of the participants. Whilst this level of weight loss was similar to the best designed weight loss programmes, a larger study is required to validate these results.

Keywords: Low-sugar, workplace, obesity, weight loss, subjective happiness

Abbreviations: SHS - Subjective Happiness Scale

Background

Processed sugar has a high glycaemic index (GI) as it is easily digested and absorbed triggering a prominent insulin response, which if repeated over time leads to insulin resistance and type two diabetes^{1, 2}. The appealing nature of high calorific sugary food combined with their low satiating nature means they also tend to be eaten in excess which contributes to obesity and metabolic syndrome^{2, 3}. Obesity and diabetes raises the long-term risk of poor gut health and chronic inflammation increasing the risk of chronic fatigue, low mood and degenerative disease conditions such as cancer, cardiovascular disease, dementia and stroke^{2, 3}.

Despite these obvious risks, a recent survey of NHS health care professionals reported that over half are overweight and over a quarter are living with obesity⁴. Both obesity and high sugar content-foods are associated with musculoskeletal disorders, lower mood, unhappiness, fatigue and depression which significantly contribute to sickness absence from work^{4, 5, 6, 7}.

Despite these risks, consumption growth continues to escalate especially in low and middle income countries. Since 2000 consumption has grown from 130 to 180 million tonnes in

2020⁸, and its production is contributing to poor health as well as greenhouse gas emission and deforestation^{9, 10}.

In an attempt to reduce sugar intake, NHS England introduced a voluntary reduction scheme in July 2017, recommending that NHS Trusts and retailers on NHS premises reduce the proportion of monthly sugar-sweetened beverages sales. They reported in March 2018, a reduction as a proportion of total drinks sales from 15.6% to 8.7%¹¹. However, to date, there is no information as to whether this has had any impact on consumption of sugar, wellbeing or weight reduction. In our cancer unit there is a constant availability of sweet snacks, predominantly gifted by patients, and during busy clinics these often replace balanced meals. Some argue that this display of sugary foods, together with the high proportion of overweight staff undermines the NHS' ability to give patients 'credible and effective' behavioural lifestyle advice.

The hypothesis for this intervention was that a removal of sugary foodstuffs from the field of vision on nurses' stations and replacing with fruit, nuts and seeds enables healthy snacking, resulting in weight loss and increased mood.

Methodology

This pilot intervention used quantitative methods to observe the feasibility of delivery and outcome of a real-world intervention. This project was registered with and approved by Bedford Hospital NHS Trust Research and Development Department, but classed as a practical service evaluation, hence no Ethics approval or written consent was required.

Participants: Fifty eight members of staff at the Primrose unit, Bedford Hospital were invited to participate for this 3 month nutritional intervention; 44 (75%) volunteered. The cohort consisted of 36 nurses, 2 consultants, 2 secretaries and 4 administration staff. There were 41 females and 3 males, aged 28-72 years (average age 45 years). A further 100 consecutive patients attending for treatments were asked for their views on the intervention.

Measures and outcomes: The primary endpoints were Body Mass Index (BMI) (Kg/m^2) and happiness measured with the previously validated Subjective Happiness Score (SHS)¹². As a secondary end point, patients attending the Oncology unit during the intervention period were asked anonymously for their opinion and likely influence on their eating habits.

Procedure: At baseline the Primrose Unit research department recorded staff demographics, BMI and SHS questionnaire scores. From the date of entry of the first participant (June 2019) to completion of the last participant (September 2019), all sugary foodstuffs were removed and replaced with bowls of mixed whole and dried fruit, seeds and mixed nuts. Non-participating staff were asked to voluntarily keep sugary items out of general sight. At baseline, 3 months and 5 months, participants were weighed by one of the research team and completed a SHS questionnaire.

In the final month of the intervention, 100 consecutive patients attending for treatments at the unit were asked their opinion of this intervention, specifically if they felt that removing sugary items from public display was a welcome gesture and whether seeing staff making efforts to reduce sugar intake would encourage them to do the same.

Statistical methods and analysis

The completed dataset was compiled in an excel spreadsheet then transferred for independent statistical analysis. The pre- and post-intervention weight differences datasets were analysed by the T-test as were the difference in happiness scores. The differences in participants' opinion were analysed by the chi squared test. There were no missing data and in view of the relatively small numbers in the cohort, sub-group analysis was not planned or performed. The study advisory committee predetermined that a change in weight of 1 kg was meaningful¹³.

Results

Average weight: At baseline the average was 72.12 kg, and 71.23 kg at 3 months; an average loss of 0.89 kg (T-test $p=$

0.02). The average weight at 5 months was 71.09 kg; an average loss of 1.03 kg from baseline (T-test $p= 0.01$). Twenty participants (46%) lost >1kg in weight (average 3.01 kg) as opposed to 7 (16%) participants who gained >1kg (average 2.23 kg) T-test $p< 0.03$.

Happiness score: Average happiness score increased from 21.65 to 23.44 (+6.6%), T-test $p< 0.04$). Amongst those who lost >1kg weight, average happiness score increased from 21.54 to 23.75 (+9.3%), T-test $p<0.03$. In those who gained >1 kg weight, average happiness score decreased from 22.28 to 21.43 (-3.8% T-test $p< 0.08$). There was a 13.1% difference in the happiness score in those losing >1kg compared to those gaining >1kg in weight ($p< 0.001$).

Patient opinion: 94 (94%) of patients indicated that this initiative gave a good impression; 6 (6%) were not sure or felt it did not give a good impression ($\text{Chi}^2 p<0.001$). Ninety seven (97%) indicated that the initiative would encourage them to reduce sugar in their own diet versus 3 (13%) who were not sure or felt that it would not change their behaviour ($\text{Chi}^2 p<0.001$).

Discussion

This small pilot evaluation has a number of methodological weaknesses but what it lacked in statistical strength it gained in novelty and potential importance. This was the first nutritional intervention involving hospital staff within a routine working practice. It addresses a health issue which affects hundreds of thousands of health workers every year, and demonstrated that a practical behavioural change initiative was welcomed by the majority of staff (75%), with no drop-outs or objections from non-participating staff. This implied a larger national study would be feasible.

These data clearly demonstrated a statistically significant reduction in meaningful weight similar to the best designed weight loss programmes¹⁴. A fundamental rule of behavioural change is not to dictate to people, but to encourage them to want to make the decision to change for themselves. This simple intervention did not stop staff eating what they wanted as there was no restriction to their overall food choices. The big difference was that, within their field of vision, there were healthier fruit and nuts instead of high-calorie, sugar-laden foods, which are usually readily available.

This intervention was overwhelmingly supported by patients. Surveys have repeatedly reported that patients look to health workers for guidance, and this study confirmed that this manoeuvre made patients think about their own eating habits. Although a further trial would have to establish whether this initiative objectively reduce processed sugar intake amongst patients, a reduction in intake would confer considerable benefits as several large cohort studies have linked high sugar intake with a higher risk of cancer, greater complications of treatments and worse outcomes, for several reasons³.

Sugary foods increase the risk of weight gain, already more common after cancer; increases levels of oestrogen in post-menopausal women; and increases insulin like growth factor (IGF) and other hormones such as leptin, all of which in laboratory experiments increase proliferation and markers of aggressiveness and spread of cancer cells^{2, 15, 16, 17}. Cohort studies have also reported that those who ate more than 10% of their daily calories as sugar had higher total LDL cholesterol levels further adding to the cardiac risks of herceptin and anthracycline chemotherapy drugs. Independent from obesity, high sugar intake directly increases the risk of type 2 diabetes (T2D) by overloading the insulin pathways¹. Individuals with T2D have higher serum insulin levels (hyperinsulinemia) which triggers proliferation in cancer models¹⁸, is linked to higher oxidative stress and low-grade chronic inflammation, causing epigenetic genetic damage and ongoing malignant transformation¹⁹. These laboratory findings are supported by several cohort studies which have linked diabetes with a higher risk of cancer and a higher risk of relapse post-treatment²⁰.

Patients on chemotherapy should be particularly discouraged from eating sweets and cakes as they are more prone to dental caries which contributes to the risk of osteonecrosis following consequent bisphosphonate therapy. Dental caries may also be an increased factor for bowel cancer itself as DNA codes from bacteria, commonly found in caries (*Fusobacterium*), have been detected in the genes of bowel cancer but not in normal guts²¹.

Patients receiving the new generation of targeted therapies should be particularly vigilant of their sugar intake. PD-1 inhibitors recruit the body's immunity to recognise and target cancer cells, the influence of diet and lifestyle is becoming even more important. Studies have demonstrated that better gut health is linked to significantly better response rates. Processed sugar is the preferred fuel for pro-inflammatory firmicutes bacteria whilst the healthy bacteroidetes utilise glycans from the breakdown of polyphenols, which explains why there is a reverse correlation between sugar intake and gut health²². However, whole fruit intake is associated with better gut and general health as it provides polyphenol which feed healthy bacteria^{3, 23}. Despite having between 9-14% fructose, the fibre and pulp makes fruit satiating and slows gastric emptying, thus reducing the GI³. Additionally, the polyphenols in fruit, vegetables, nuts, legumes, herbs and spices slow transportation of sugar across the gut wall by inhibition of sodium-dependent glucose transporter 1. They enhance insulin-dependent glucose uptake, activate 5' adenosine monophosphate-activated protein kinase, which explain why their regular consumption is associated with a lower risk of T2D^{3, 23, 24}. They also improve reduced gut and systemic inflammation; enhance anti-oxidant enzyme production so reduce intracellular oxidative stress; and reduce the risk of cancer and other chronic diseases including those associated with diabetes^{3, 25, 26}.

The evaluation was not robust enough to measure whether this resulted in less sickness absence, but this endpoint should be

included in a larger design. It also did not include data for those staff who did not actively participate, but who benefited from removal of sugary foods from their work areas; the evaluation committee did not receive any complaints or objections to their removal.

Government initiatives such as a sugar tax and public information campaigns may help but as individuals within the NHS, we have an opportunity to influence our staff, the patients whom we serve and the wider public. The evaluation reported in this paper is a small start, but demonstrates that a multicentre study would be feasible and if the results are confirmed, it could initiate a national cultural change attitude towards sugar in the NHS.

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Competing Interests

None declared

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