Does self-perceived oral health status have an impact on nutrient intake amongst adults at a high risk of cardiovascular disease in Northern Ireland?

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Purpose

Data from the randomised controlled trial PREDIMED observed a significant reduction in the incidence of Type 2 Diabetes Mellitus and Cardiovascular disease, the leading causes of death worldwide, in response to adoption of a Mediterranean style diet (MD)^{1,2}. Oral health status has been shown to impact dietary choice and nutritional status; older adults who wear dentures or have fewer natural teeth present tend to consume poor quality diets which are low in fibre and protein, and high in complex carbohydrates and calories³. Analysis of data from The National Diet and Nutrition Survey observed that when compared to dentulous older adults, edentulous individuals (those with no remaining natural teeth) were more likely to consume lower intakes of protein, folate, vitamin C and iron⁴. These edentulous older adults were less likely to achieve dietary guidelines for fruit and vegetable intake and non-starch polysaccharide (NSP) intake as well as reporting having difficulty eating foods such as nuts, apples, raw carrots, crusty bread and well-done steak ⁴, several of which are components of MD.

Aim

The aim of this preliminary analysis is to analyse baseline data from a 12-month pilot cluster randomised study evaluating a peer support MD intervention in Northern Ireland (NI), to investigate whether self-perceived oral health status has an impact on nutrient intake amongst adults at a high risk of cardiovascular disease in NI.

Methods

Figure 1. Overview of study design

A sample size calculation was not conducted as the pilot data generated will be used to inform the development of a larger scale trial. The primary endpoint for the study was the change in habitual Mediterranean diet score at 6 months from baseline (adoption of MD).

Participants in NI were eligible to participate if they were within a community group, were aged ≥40 years, had a Mediterranean Diet Score ≤5 and had at least one cardiovascular disease risk factor, which included having Type 2 Diabetes Mellitus and not being on any medication, being a current smoker and having hypertension (high BP) systolic BP≥140 or diastolic ≥90mmHg.

Dietary data from 4-day food diaries were entered into Nutritics and analysed using SPSS v22. Mean intake of energy and macro- and micronutrients were calculated, and ANOVAs were conducted to investigate whether mean daily intake of the nutrients differed between individuals with different self-perceived oral health status, assessed via questionnaire, at baseline.

Results

There were 31 participants in the study at baseline (female n=22; male n=9). Self-reported oral health status was initially recorded with five categories (excellent n=7, very good n=5, good n=8, fair n=8 and poor n=3), Due to small numbers and for an even distribution amongst the groups, the excellent and very good groups, and the fair and poor groups were combined (excellent or very good n=12; good n=8; fair or poor n=11). Significant differences were observed between the good and fair or poor oral health status groups for waist circumference and waist hip ratio, and between the excellent or very good and fair or poor oral health status groups for waist hip ratio (p values from Bonferroni analysis p=0.01, p=0.01, p=0.00 respectively). No other significant differences were observed.

Table 1. Baseline characteristics of study participants

Baseline Characteristic	Self-reported Oral Health Status			P value
	Excellent or Very Good	Good	Fair or Poor	
No. of participants	12	8	11	-
Age (Mean (SD))	54.75 (11.56)	58.75 (12.99)	65.18 (8.23)	0.09
Years in education (Mean (SD))	10.83 (3.71)	11.25 (4.65)	12.55 (2.88)	0.53
Intervention group (N (%))	Minimal	4 (33%)	5 (62.5%)	0.183*
	Peer Support	8 (66.7%)	3 (37.5%)	
Weight (kg) (Mean (SD))	78.64 (16.68)	70.75 (9.24)	80.98 (10.57)	0.24
BMI (kg/m ²) (Mean (SD))	30.37 (5.852)	26.31 (3.31)	29.53 (3.72)	0.16
BMI classification (N (%))	Normal	1 (8.3%)	3 (37.5%)	0.53*
	Overweight	7 (58.3%)	3 (37.5%)	
	Obese	4 (33.3%)	2 (25%)	
Waist circumference (cm) (Mean (SD))	99.51 (13.23)	88.99 (6.74) ^a	103.11 (5.61)	0.01
Hip circumference (cm) (Mean (SD))	110.44 (12.69)	104.43 (7.29)	107.72 (6.86)	0.41
Waist hip ratio (Mean (SD))	0.90 (0.08) ^b	0.85 (0.03) ^a	0.98 (0.06)	0.00
Systolic Blood pressure (mmHg) (Mean (SD))	125.58 (17.54)	125.00 (11.55)	132.18 (19.51)	0.57
Diastolic Blood pressure (mmHg) (Mean (SD))	81.92 (11.12)	79.75 (8.28)	80.27 (10.30)	0.88

P values obtained from ANOVA. *ANOVA with Bonferroni correction for comparison of the good oral health status with the fair or poor oral health status groups. ^b ANOVA with Bonferroni correction for comparison of the excellent or very good oral health status with the fair or poor oral health status groups. *P value obtained from Chi Squared test using Fishers Exact test.

Table 2. Self-reported daily nutrient and energy intakes amongst participants in the three self-reported oral health status groups

Mean Daily Energy and Nutrient Intakes	Self-reported Oral Health Status						<i>P value</i>
	Excellent or Very Good (n=12)		Good (n=8)		Fair or Poor (n=11)		
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	
Energy (kcal)	1731.67	578.65	1504.36 ^a	443.70	2181.34	562.86	0.03
Carbohydrate (g)	195.61	66.46	182.05	46.51	229.74	60.46	0.21
Fat (g)	73.26	31.36	54.07 ^a	24.01	90.03	27.95	0.04
Protein (g)	67.04	15.51	62.32	16.78	81.29	21.41	0.07
MUFA (g)	25.05	9.62	18.50 ^a	8.59	31.57	10.59	0.03
EPA (g)	1.42	1.84	3.65	3.82	4.18	3.57	0.40
DHA (g)	1.80	2.16	3.33	3.07	2.97	2.70	0.96
Carotene (ug)	1842.95	1277.37	2643.24	1812.51	2462.77	2685.23	0.64
Vitamin C (mg)	55.20	39.61	86.63	44.54	66.92	51.54	0.33

P value obtained from One-way Analysis of Variance. ^ap<0.05 analysed using One-way analysis of variance with Bonferroni correction for comparison of the good oral health status with the fair or poor oral health status groups.

Significant differences in mean intake of energy (kcal/day), total fat (g/day), and MUFA (g/day) were observed (p values from ANOVA p=0.03, p=0.04 and p=0.03 respectively) between the three self-perceived oral health groups; with post-hoc analysis demonstrating that the intake of total fat, energy and MUFA of those with fair or poor oral health were significantly higher than those with good oral health (p values from Bonferroni analysis p=0.03, p=0.04, p=0.02 respectively). No significant differences in any of the nutrients investigated were observed between those individuals with excellent or very good oral health and those with either good or fair or poor oral health (p values from Bonferroni analysis p>0.05).

Discussion

These results highlight differences in nutrient intake according to oral health status. The next stage of this research is to conduct regression modelling to adjust for confounders when investigating differences in dietary intakes amongst self-reported oral health status groups, as well as exploring oral health status as a predictor of response to the MD intervention. This information can then be used to effectively develop and tailor future interventions to improve nutritional status, whilst taking account of oral health status, amongst this population group.

1. World Health Organisation, (WHO) 2007.2. Estruch R *et al* (2013) *NEJM* 368,1279-90. 3. Moynihan PJ *et al* (2007) *J. Hum. Nutr. Diet* 20, 446–458. 4. Watson *et al* (2017) The impact of dental status on food selection and nutrient intakes in older adults: UK National Diet and Nutrition Survey 2008-2014.