Exploring the relationship between dietary patterns, eating behaviour and fat taste detection thresholds

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Abstract

Background: Dietary pattern analysis provides a unique opportunity to explore combinations of food intake in conjunction with factors known to affect dietary intake. Fat taste sensitivity is an emerging correlate of dietary intake and, when impaired, has a proposed role in the dysregulation of dietary intake and eating behaviours.

Aim: To investigate dietary patterns, eating behaviours and fat taste detection thresholds in a group of New Zealand European women aged 19-45 years and identify associations between these factors.

Methods: Fifty post-menarche, pre-menopausal New Zealand European (NZE) women, (18-40 years) completed a partially validated, semi-quantiative 220-item food frequency questionnaire and a validated Three-factor eating questionnaire. Height and weight were measured to calculate body mass index (BMI) (kg/m^2) and a bioeletrical impedence analysis (BIA) was completed to measure body fat percentage (BF%). During sensory testing protocol participants were exposed to increasing concentrations of ultra-heat treatment (UHT) milk/oleic acid (OA) solutions using the three alternative forced choice method (3-AFC). A naïve OA detection threshold was determined at the point where the participant identified the OA solution correctly three times at the same concentration. Dietary patterns were determined using principal component factor analysis. Associations between dietary pattern scores, taste sensitivity, eating behaviour and baseline characteristics were investigated.

Results: Three dietary patterns were identified: 'unhealthy', 'healthy' and 'snacking'. Most women had low eating behaviour scores for cognitive restraint (90%) and disinhibition (74%). Hunger scores were comparatively higher, only 40% had low scores. Twenty-three participants (46%) were classified as hypersensitive and 54% were hyposensitive to OA taste. 'Unhealthy' pattern scores were inversely associated with cognitive restraint (r=.391, P=.005) and positively associated with age (r=.297, P=.036). 'Healthy' pattern scores were positively associated with cognitive restraint (r=.418, P=.003), OA taste detection thresholds (r=0.446, P=.001) and BMI (r=.325, P=.021). Women with low 'snacking' pattern scores were significantly older (31.7 years (24.7, 40.4)) than those with moderate scores (24.0 years (22.0, 28.1)) (P=.037). No relationship was found between OA taste detection thresholds and eating behaviour.

Conclusion: Participants in this study showed a significant link between habitual dietary intake and measures for eating behaviour and fat taste sensitivity. Both 'healthy' and 'unhealthy' dietary patterns were associated with one, or both, of these factors. An unexpected positive association between the 'healthy' dietary pattern and fat taste sensitivity indicates a need for further investigation to better understand this relationship. Findings from the current study support the use of dietary patterns to better represent habitual intake in future research investigating fat taste sensitivity or eating behaviour.

Key words: Habitual intake, dietary intake, fat taste sensitivity, cognitive restraint, disinhibition, hunger

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Abbreviation List

3-AFC	Three Alternative Forced Choice
5-HT	5-hydroxytryptamine
AMDR	Acceptable Macronutrient Distribution Range
AMPM	Automated Multiple Pass Method
ATP	Adenosine Triphosphate
BF%	Body Fat Percentage
BIA	Bioelectrical Impedance Analysis
BMI	Body Mass Index
CVD	Cardiovascular Disease
DASH	Dietary Approaches to Stop Hypertension
DEBQ	Dutch Eating Behaviour Questionnaire
DFE	Daily Frequency Equivalent
EDTA	Ethylenediaminetetraacetic acid
EXPLORE	Examining The Predictors Linking Obesity Related Elements
FFA	Free Fatty Acid
FFQ	Food Frequency Questionnaire
GPCR	G-Protein-Coupled Receptor
GPR120	G-Protein Receptor 120
ICC	Intra-class Correlation
LCFA	Long Chain Fatty Acid
MOH	Ministry of Health
NZE	New Zealand European
NZW-FFQ	New Zealand Women's Food Frequency Questionnaire

OA	Oleic acid
TEI	Total Energy Intake
TFEQ	Three-factor Eating Questionnaire
TRC	Taste Receptor Cell
UHT	Ultra Heat Treatment
WHO	World Health Organisation