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Research report

Dietary patterns are associated with the prevalence of elevated depressive symptoms and the risk of getting a hospital discharge diagnosis of depression in middle-aged or older Finnish men



Anu Ruusunen^{a,b,*}, Soili M Lehto^c, Jaakko Mursu^a, Tommi Tolmunen^{b,c},
Tomi-Pekka Tuomainen^a, Jussi Kauhanen^a, Sari Voutilainen^a

^a University of Eastern Finland, Kuopio Campus, Institute of Public Health and Clinical Nutrition, P.O. Box 1627, FI-70211 Kuopio, Finland

^b Department of Psychiatry, Kuopio University Hospital, Kuopio, Finland

^c Department of Psychiatry, Institute of Clinical Medicine, University of Eastern Finland, Kuopio, Finland

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ABSTRACT

Background: Previous studies assessing the role of dietary factors in depression have mainly focused on nutrients, while the association between dietary patterns and depression is less studied.

Objective: The aim was to assess the role of dietary patterns in depression in both cross-sectional and prospective analyses.

Design: The study population consisted of 1003 Finnish middle-aged or older men from the Kuopio Ischemic Heart Disease Risk Factor Study. Food consumption was assessed by food frequency questionnaire in 1991–1993 and dietary patterns from 25 predefined food groups were extracted by factor analysis. Depressive symptoms were assessed with the self-administered Human Population Laboratory Depression Scale, cut-off point of five or more indicating elevated depressive symptoms.

Results: Altogether 72 (7.2%) subjects had elevated depressive symptoms. Three dietary patterns were identified: “prudent”, “Western” and “mixed”. In cross-sectional analysis, after adjustments for age, examination year, BMI, smoking, alcohol consumption, education, marital status, leisure-time physical activity, history of mental illness and cardiovascular disease the prudent dietary pattern was associated with a 25% lower prevalence of elevated depressive symptoms (OR: 0.75; 95% CI: 0.57, 0.99; $P=0.036$), whereas the Western dietary pattern was associated with increased prevalence of elevated depressive symptoms (OR: 1.41; 95% CI: 1.08, 1.84; $P=0.011$). In the prospective analysis (16.5 follow-up years), the prudent dietary pattern was inversely associated with the risk of getting a hospital discharge diagnosis of depression (HR: 0.66; 95% CI 0.47, 0.93; $P=0.018$).

Conclusions: Adherence to healthy dietary pattern is associated with lower risk of getting a hospital discharge diagnosis of depression.

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1. Introduction

Diet modifications could offer a feasible means for prevention of depression, a growing global health challenge. Even though

inadequate intakes of nutrients such as folate (Tolmunen et al., 2004) or omega-3 fatty acids (Colangelo et al., 2009) may increase the risk of depression, there is a lack of evidence-based primary prevention studies based on dietary modifications (Jacka et al., 2010).

Recent studies concerning the association between dietary patterns and depression have mainly provided consistent findings. A prospective study with more than 10,000 Spanish adults showed that the Mediterranean dietary pattern was related to a decreased risk of depressive episodes (Sanchez-Villegas et al., 2009). Similarly, a healthy whole food pattern was associated with a 26% lower risk of elevated depressive symptoms in middle-aged British subjects (Akbaraly et al., 2009). In addition, in the same study, a dietary pattern high in processed foods was related to a 58%

Abbreviations: BDNF, brain-derived neurotrophic factor; CVD, cardiovascular disease; CI, confidence interval; FFQ, food frequency questionnaire; HPL, Human Population Laboratory; HR, hazard ratio; ICD, International Classification of Diseases; KIHDS, the Kuopio Ischemic Heart Disease Risk Factor study; LTPA, leisure-time physical activity; OR, odds ratio; SES, socio-economic status; SD, standard deviation

* Corresponding author at: Department of Psychiatry, Kuopio University Hospital, P.O. Box 100, FI-70029 KYS, Finland. Tel.: +358 407085221; fax: +358 17 162 936.

E-mail address: anu.ruusunen@uef.fi (A. Ruusunen).

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increased risk of elevated depressive symptoms. With regards to cross-sectional studies, healthy dietary patterns have been associated with decreased likelihood of depression in Norwegian (Jacka et al., 2011) and Australian women (Jacka et al., 2010) and in Japanese employees (Nanri et al., 2010). In contrast, snack dietary pattern and animal food pattern were both associated with higher likelihood of depressive symptoms in Chinese population (Weng et al., 2012) while Western diet was related to poorer mental health status in Australian women (Jacka et al., 2010) and Australian adolescents (Oddy et al., 2009). On the contrary, neither healthy nor Western dietary pattern was related to depression among middle-aged Japanese (Sugawara et al., 2012).

The only randomized controlled trial conducted so far, the PREDIMED Study (Sanchez-Villegas et al., 2013), showed that Mediterranean diet supplemented with nuts provided extra benefit in the prevention of depression compared to low-fat control diet, but this effect was statistically significant only for the subjects with type 2 diabetes after median 5.4-years of intervention. A recent meta-analysis, the first published on the subject, concluded that high intake of vegetables, fruits, fish and whole-grains may be associated with a reduced risk of depression, but no associations were detected between Western dietary pattern and depression (Lai et al., 2014). However, more randomized controlled trials and cohort studies are needed (Lai et al., 2014). In addition, the Norwegian study (Jacka et al., 2011) is the only study conducted in Northern Europe, and dietary patterns and eating habits vary between countries. Therefore, our aim was to study in both cross-sectional and prospective settings whether dietary patterns are associated with the prevalence of elevated depressive symptoms or the risk of getting a hospital discharge diagnosis of depression in middle-aged or older Finnish men.

2. Subjects and methods

2.1. Study population

The Kuopio Ischemic Heart Disease Risk Factor (KIHD) study is an ongoing population-based cohort study designed to investigate risk factors for cardiovascular diseases (CVD) and other chronic diseases in middle-aged or older men from Eastern Finland (Salonen, 1988). The study population consists of a stratified balanced one third random sample of men aged 42, 48, 54 or 60 years living in the city of Kuopio or one of the six neighboring rural communities. The baseline examinations were carried out between 1984 and 1989 and out of potential 3235 men 2682 (82.9%) participated.

Those men in the KIHD cohort who had been studied between January 1987 and December 1989 and who had undergone ultrasound examination of the right and left carotid arteries at baseline, a total of 1229 men eligible, were asked to participate in the 4-y examination. Out of them, 52 could not participate because of death, severe illness or relocation, and 139 could not be contacted or refused to participate. The sample of this study consists of those men who participated in the 4-y examination, 1038 men (88% of those eligible) who were examined between March 1991 and December 1993. For the present analyses, we excluded subjects with missing information on food consumption ($n=11$) or depressive symptoms ($n=32$). Eight subjects had missing information of both food consumption and depressive symptoms, leaving 1003 subjects available for the analyses. Study subjects were 46–65 years old at the 4-year examinations. A 4-year examination was used as a baseline as not all needed variables were available at KIHD baseline. No differences were observed in background characteristics (age, education, marital status, depression scores, BMI, alcohol use, and smoking) between

the men participating at KIHD baseline and at the 4-year follow-up (data not shown).

The subjects gave written informed consent. The KIHD study protocol was approved by the Research Ethics Committee of the University of Kuopio.

2.2. Assessment of food consumption

An instructed food frequency questionnaire (FFQ) designed for the KIHD cohort was used to assess the consumption of different foods in the 4-y examination. Study subjects were asked about their frequency of consumption of 25 food and beverage groups during the previous 12 months. There were six possible frequency categories: never or more seldom than once a month, once or twice a month, once a week, couple of times a week, almost every day, once a day or more often. For those food items that were considered to be frequently consumed, the usage was inquired as numbers of portions per day/week (e.g., coffee, tea). All completed FFQs were checked by a nutritionist and unclear or missing responses were clarified. The foods were grouped to reflect typical Finnish meals.

2.3. Assessment of depressive symptoms and depression

Depressive symptoms were assessed with the self-administered Human Population Laboratory (HPL) depression scale at the 4-y follow-up (Kaplan et al., 1987). The scale included questions regarding mood disturbance, negative self-concept, loss of energy, problems with eating and sleeping, trouble with concentration, and psychomotor retardation or agitation. The HPL depression score was generated by assigning one point for each true or false answer indicative of depression. For some items, the response “often” or “never”, whichever was appropriate, was assigned one point. The range of the HPL depression scale is 0–18. The HPL depression score was developed especially for screening general populations (Kaplan et al., 1987); conceptually, it resembles other brief symptom checklists such as the Centre for Epidemiological Studies Depression Scale (Roberts and Okeefe 1981; Roberts, 1981). A cut-off of five or more points has earlier been used to define clinically significant depression (Kaplan et al., 1987; Roberts and Okeefe, 1981; Tolmunen et al., 2003). In this study we classified these subjects as “depressed”. Cronbach’s alpha for the HPL depression scale was 0.71 for the whole study population and 0.64 for the study population after exclusion of the subjects with a previous psychiatric disorder.

In prospective analyses we used a hospital discharge diagnosis of depression diagnosed by a physician as an outcome. The information was obtained by computer linkage to the national hospital discharge register. Diagnoses were made according to International Classification of Diseases (ICD) criteria. The category of depressive disorders included diagnoses of major depression (ICD-9: 2961-, ICD-10: F32.1-3, F33.1-3), a depressive, otherwise unspecified disorder (ICD-9: 2968 A, ICD-10: F32.9, F33.9), chronic depression (ICD-8: 300.41, ICD-9: 3004 A, ICD-10: F34.1) and adjustment disorder with depressive symptoms (ICD-9: 3090 A).

2.4. Collection of covariate data

Study subjects completed questionnaires assessing their background, marital status and education, as previously described (Salonen et al., 1992). Smoking status (never, past or current smoking), the type (cigarettes, cigars) and the amount smoked per day were assessed using questionnaires. Alcohol consumption (grams/week) was assessed with a structured quantity-frequency method using the Nordic Alcohol Consumption Inventory for drinking behavior over the previous 12 months (Kauhanen et al.,

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