



A risk table to assist health practitioners assess and prevent the onset of depression in later life

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ABSTRACT

Objective. This study aimed to develop a simple risk table of modifiable factors prospectively associated with depression in later life that could be used to guide the assessment, management and introduction of preventive strategies in clinical practice.

Methods. This retrospective cohort study included 4636 men aged 65 to 83 years living in the community who denied history of past diagnosis or treatment for depression. They self-reported information about their physical activity, weight and height, smoking history, alcohol consumption and dietary habits, as well as history of hypertension, diabetes, coronary heart disease and stroke. We calculated the body mass index (BMI) in kg/m². Three to 8 years later they were assessed with the Geriatric Depression Scale 15 (GDS-15) and those with a total score of 7 or greater were considered to display clinically significant symptoms of depression. We used binomial exponentiated log-linked general linear models to estimate the risk ratio (RR) and 95% confidence interval (95% CI) of incident depression after adjusting for age, education, marital status and prevalent medical illnesses. We calculated the probability of depression for each individual combination of risk factors and displayed the results in a risk table.

Results. Two hundred and twenty-nine men (4.5%) showed evidence of incident depression 5.7 ± 0.9 (mean ± standard deviation) years later. Measured dietary factors showed no association with incident depression. The probability of depression was the highest for older men who were underweight, overweight or obese, physically inactive, risk drinkers and smokers (12.0%, 95% CI = 7.0%, 17.1%), and the lowest for those who had all 4 healthy lifestyle markers: physically active, normal body mass, non-risk drinking and non-smoking (1.6%, 95% CI = 0.6%, 2.5%). The probability of incident depression fell between these two extremes for different combinations of lifestyle practices.

Conclusion. Four modifiable lifestyle factors can be used in combination to produce a risk table that predicts the probability of incident depression over a period of 3 to 8 years. The risk table is simple, informative and can be easily incorporated into clinical practice to guide assessment and risk reduction interventions.

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Introduction

The identification of causal risk factors associated with a given health disorder offers a unique opportunity to modify the incidence and prevalence of that disease. The introduction and systematic use of the Framingham index, for example, has led to the development of guidelines

that encourage the systematic assessment and management of relevant risk factors for cardiovascular disease, such as physical inactivity, obesity, smoking, high blood pressure, diabetes and dyslipidemia (Pearson et al., 2002). This, in turn, has contributed to decrease the incidence of cardiovascular events and mortality in the community (AIHW, 2011; Yang et al., 2012). Similarly, the identification of smoking as a risk factor for lung cancer and mortality (Doll et al., 2004) has led to changes in health promotion and policy that have resulted in decreased morbidity and mortality not only from respiratory diseases, but also from cardiovascular events (Crichtley and Capewell, 2003; Peto et al., 2000).

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Depression is another common health condition that has been associated with potentially modifiable risk factors (Almeida et al., 2007; Cassidy et al., 2004), but they are only rarely used to guide the assessment and management of people at risk. Data from a general practice-based study that included over 20,000 older Australians (Almeida et al., 2012) led to the creation of a risk matrix for depression that took into account age, gender, childhood adversity, health morbidities, lifestyle and psychosocial stress (Almeida et al., 2011a). Although that study had the merit of offering a more methodical approach to the assessment and management of people at risk of depression, its cross-sectional design and the relative complexity of the probabilistic matrix that included both modifiable and fixed factors could make its use in clinical practice challenging. Other methods of predicting the risk of depression employ factors that are difficult to modify, such as losses (e.g., death of spouse), chronic morbidities, gender, disabilities, loneliness and the presence of symptoms of anxiety and depression (Almeida, 2012; Schoevers et al., 2006; van't Veer-Tazelaar et al., 2009). Along with lifestyle factors such as smoking, alcohol use and physical activity, there is evidence that diet may also affect mental health, either directly (through the consumption of certain vitamins or omega-3 fatty acids, for example) or indirectly through adiposity (Cassidy et al., 2004; Hodge et al., 2013; Psaltopoulou et al., 2013).

The present study aimed to develop a practical and simple approach to measure the probability of depression over a period of three to eight years according to eight modifiable risk factors that have previously been associated with depression: physical inactivity, smoking, risky alcohol use, abnormal body mass and diet (excessive consumption of red meat and low of fish, as well as the additional use of salt and preferential use of full cream milk) (Almeida, 2012; Almeida et al., 2007, 2011a). Our expectation was that our data would enable us to introduce a risk table that could be used to guide the assessment and the design of preventive strategies for depression in clinical practice.

Methods

Study design and setting

Retrospective cohort study of a community representative sample of men aged 65 to 83 years living in the Perth metropolitan area, Australia.

Participants

We used the electoral roll to recruit 12,203 older men (voting is mandatory in Australia) into a study of abdominal aortic aneurysm, which served as the starting point for the Health In Men Study (HIMS). We have described details about the recruitment procedure elsewhere (Norman et al., 2009). Eligibility for the present study required availability of lifestyle data at the initial assessment (HIMS1) and of outcome data at the follow up assessment three to eight years later (HIMS2). We excluded from our analyses men who reported past treatment or diagnosis of depression or similar emotional disorder before the HIMS2 assessment (prevalent cases).

The study was conducted in accordance to the principles expressed by the Declaration of Helsinki for Human Rights. The Human Research Ethics Committee of the University of Western Australia approved the study protocol and all men provided written informed consent to participate.

Study measures: exposures (HIMS1)

During the HIMS1 assessment (1996 to 1998), men completed a questionnaire that contained information about the date of the assessment, the participant's date of birth, highest level of education attained, marital status and lifestyle practices (including questions about physical activity, smoking and alcohol use). We assessed physical activity with the following question: *In a usual week do you do any vigorous exercise that makes you breathe harder of puff and pant, such as fast walking, jogging, aerobics, vigorous swimming, vigorous cycling, tennis, football, squash, etc.?* (yes/no) Participants who answered 'yes' were then asked to estimate the total time they spent *exercising vigorously in a usual week (in minutes)*. Men who indicated that they engaged in vigorous activity for 150 min or more per week were considered physically active. We then

asked participants: *Have you ever smoked cigarettes, cigars or a pipe regularly? (yes/no)* Men who acknowledged having smoked regularly before were then asked: *When did you give up smoking? (date)*. We calculated the time free of smoking for past smokers by subtracting the reported quitting date from the date of the assessment. Men who had never smoked or who had quit for at least 5 years were classified as 'smoking free'. We chose this cutpoint because there is evidence that the risk of cardiovascular events becomes stable and approaches that of never smokers when men quit smoking for 5 or more years (Wannamethee et al., 1995).

We also asked men whether they had drunk alcohol during the last year (yes/no). Those who answered yes were then asked to indicate how many standard drinks of alcohol they consumed each day of a usual week (from Monday to Sunday). A standard drink was defined as 285 ml of full strength beer (5%) or the corresponding volume of reduced alcohol beer, one pub measure of spirits, sherry or port, or one glass of wine. We added the total number of drinks consumed during a usual week and divided the result by seven to calculate the average number of standard drinks consumed per day. Men who consumed less than four drinks per day in a usual week were considered 'safe alcohol users' (STC, 2012).

We used standard procedures to measure participant's height (to 0.5 cm) and weight (to 0.2 kg) and calculated the body mass index (BMI) in kg/m². Men were classified as underweight, normal weight, overweight or obese if their BMI was <18.5, between 18.5 and 24.9, 25 and 29.9, or ≥30 respectively. In addition, men provided information about their eating habits, including frequency of consumption of meat, fish, full cream/reduced or skimmed milk and salt. We then followed Spencer and colleagues' guidelines to rate desirable dietary behaviors as eating fish at least three times and meat less than five times weekly, not adding salt to cooked meals, and using reduced fat or skimmed milk (Spencer et al., 2005).

Finally, we asked participants: *have you ever been told by a doctor that you had a hypertension, diabetes, heart attack/angina/heart bypass surgery or angioplasty (coronary heart disease), or a stroke?* (yes/no for each question).

Outcome measure: incident clinically significant depressive symptoms (HIMS2)

Participants completed the rating of the 15-item Geriatric Depression Scale at the HIMS2 assessment (2001 to 2004) (Almeida and Almeida, 1999). We considered that men were experiencing clinically significant symptoms if they scored seven or more on the 15-item Geriatric Depression Scale (GDS-15), as lower scores are associated with poor specificity for the diagnosis of a depressive episode (Almeida and Almeida, 1999).

Statistical analyses

Data were managed and analyzed with the statistical package Stata release 12.1 (StataCorp, College Station, TX). We used descriptive statistics (mean, standard deviation of the mean [SD] and proportions) to summarize our data and the binomial exponentiated log-linked option for general linear models to estimate the risk ratio (RR), and 95% confidence interval (95% CI) of the RR, of incident depression for each exposure. We then forced all measured sociodemographic and clinical factors into a multivariate general linear model that had incident clinically significant depression as the dependent variable and lifestyle measures as the independent variables, and estimated the adjusted probability of depression for each participant using the post estimation 'predict' command of Stata. We used nonlinear combination of estimators (nlcom) to calculate the standard error of individual probability estimates and respective 95% CI. The probability estimates reported were adjusted for sociodemographic and clinical factors.

Results

Of the 12,203 men assessed during HIMS wave 1, 420 did not provide lifestyle data and another 1412 died before wave 2. Of the surviving 10,371 men, 5093 did not complete the assessment of mood at wave 2 and 642 reported history of past diagnosis or treatment of depression or similar emotional disorder (i.e. prevalent cases of depression), leaving a study sample of 4636 participants with valid outcome data. For these 4636 men, the mean (±SD) age was 71.5 ± 4.1 years and 85.9% of them were either married or living in a 'de facto' relationship at HIMS1. Less than half of the participants had completed secondary school (44.9%). Hypertension (36.4%), diabetes (8.6%), coronary heart disease (21.7%) and stroke (5.1%) were common medical conditions reported at study entry.

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