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Yeast based spreads improve anxiety and stress

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ABSTRACT

Yeast based spreads (YBS) such as marmite and vegemite, made from leftover brewer's yeast extract are one of the world's richest source of B vitamins. We evaluated symptoms of depression, anxiety, stress scores (DASS) in participants who consume or do not consume YBS. 520 participants completed a survey consisting of 70–94 questions relating to the consumption of YBS, dietary and lifestyle habits and mood symptoms of DASS. Parametric analysis co-varying for gender, diet, supplement use, soy milk and alcohol consumption and history of psychiatric disorders including depression and anxiety were utilized to analyse the results. A significant improvement was noted in anxiety and stress but not depressive symptoms in those consuming YBS. Furthermore, those who consumed vitamin B12 fortified YBS showed even greater improvement in stress symptomology. Vitamin B supplementation appears to be an important additive supplementary source to improved stress and anxiety in the general adult population.

1. Introduction

The global incidence of major depressive disorder will be second only to heart disease as the leading cause of death and disability in the next 20 years (Murray & Lopez, 1997; Whitecloudfoundation., 2014). Depression and frequently associated anxiety places a significant load on the economy with the global cost of mental illness, estimated at $2.5 trillion in 2010, anticipated to increase to over $6 trillion by 2030 (Who press, 2008). People experiencing major depressive disorder typically present with sadness and/or loss of pleasure in previously enjoyed activities for at least two weeks. Typically an episode of depression is also associated with a sense of worthlessness and guilt, cognitive, sleep and appetite disturbance and often thoughts of suicide or death (Beyondblue., 2014). A major depressive disorder can present slightly differently in children and young adults with a greater propensity to agitation and aggressive outbursts (Burns & Birrell, 2014). The highest risk of completed suicide in Australia (7 per day) occurs in people between 15 and 45 years (Beyondblue, 2014). Biopsychosocial determinants of depression include genetic and biochemical factors as well as illness and significant life events and psychological trauma. Many neurochemical pathways linked to cognitive function including, glutamate and GABA neurotransmittory systems, serotonergic, noradrenergic, dopaminergic and cholinergic systems, may contribute to depression when there is an aberration of usual function (Dale, Bang-Andersen, & Sanchez, 2015; Mann, 1999; Meldrum, 2000; Niciu, Kelmendi, & Sanacora, 2012; Ressler & Nemeroff, 2000; Sullivan, Coplan, Kent, & Gorman, 1999; van Stegeren, 2008; Yadid & Friedman, 2008). B vitamins play an important role in these neurochemical pathways as significant contributors to neuronal function.

Depression and anxiety, although clinically different conditions, will often co-occur. More than half of the people diagnosed with depression will also experience symptoms of anxiety and vice versa (Beyondblue, 2014). Anxiety disorders as distinct from depression, are characterised by autonomic hyperarousal and subsequent fatigue (increasing illness risk) demonstrated in an archetypal fear response which include escape and avoidance behaviours, perception of imminent and future threat, anxiety and tension that may exist within or outside the anxiety provoking situation (Craske et al., 2009). In light of this shared vulnerability and comorbidity it may be important to be searching for simple nutritional strategies at a population health level that might improve depression and anxiety symptoms. This report investigates the potential of a rich vitamin B source to improve mood and anxiety in people who experience some symptoms of these mood states but not as replacement for the pharmacological treatment of full blown mood and anxiety disorders.

Vitamins play a major role in health and are integral for many metabolic functions within the body including correct performance of the methylation cycle, monoamine oxidase production, DNA synthesis, repair and maintenance of phospholipids, and conservation of proper cognitive function. The role of Monoamine oxidase is to inactivate neurotransmitters and a dysfunction in this role is considered to cause several psychiatric and neurological disorders, including depression.

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Likewise, medications that decrease the activity of MOA are proven antidepressants used to increase serotonin bioavailability. A deficiency of B vitamins caused by dietary inadequacy or absorption defects, could influence memory function and cognitive impairment and dementia. Vitamins that have been predominantly linked to neuronal function include vitamins B1, B3, B6, B9 and B12, and deficiencies have been linked to neurological disorders, including depression, cognitive decline, anxiety and stress.

Yeast based spreads (YBS) have long been a staple in many European, New Zealand and Australian households. The health benefits of such spreads, which include vegemite, marmite and promite have long been promoted in familiar advertising campaigns such as “Happy little vegemites”, “my mate marmite”. However the discovery of the B vitamins in the early 1900s together with the associated health benefits resulted in these spreads being included amongst the soldier’s rations during the first world war. Despite this, there are limited studies available on the effects of YBS and health outcomes. Recently, YBS were used as a complete nutrient source for yeast to efficiently grow and ferment in low level glucose solutions, effectively creating “vegemite beer” (Kerr & Schulz, 2016). In addition, people who consume a daily teaspoon of marmite, showed modulated cortical excitation and inhibition, presumably due to increased levels of the inhibitory neurotransmitter gamma-aminobutyric acid, as an effect to the high levels of vitamin B12 in marmite, hence, marmite may help regulate brain function (Smith, Wade, Penkman, & Baker, 2017).

Although much research has been done on dietary vitamin B supplementation and sources, there may be a role for researching vegemite, marmite, promite and other such YBS as they are products common to most supermarket shelves. YBS traditionally were made from the left-over products of brewer’s yeast as a by-product of beer brewing. There is paucity of data available highlighting the nutritional benefits of including YBS in the diet. These spreads are some of the richest known foods containing B vitamins. Notably, vitamin B12 is not naturally found in these spreads and added into some brands during manufacturing.

The aim of this study was to assess whether people who consumed YBS, scored showed better mood and stress levels than those people who did not consume YBS. The premise behind the study, was that YBS are high in B vitamins and that people who consume B vitamins regularly will not suffer from B vitamin deficiencies which can be a contributing factor to poor mental health. YBS are a cheap and accessible option for people looking to increase their intake of vitamin B and could be prove to be a valuable addition to the everyday diet and a significant prescriptive dosage of vitamin B. It was hypothesized that individuals consuming YBS would have better levels of depressive, anxiety and stress symptoms than people who did not consume these spreads, even after adjusting for covariates. Further, it was hypothesized that B12 enriched spreads would infer the greatest benefit above and beyond that from other YBSs.

2. Methods

2.1. Survey development

The survey was designed to determine the effect of consumption of YBS on levels of depression anxiety and stress in the community. Ethics was approved by the Victoria University human research ethics committee (HRE15-159) in July 2015. Other secondary questions included gender, age, geography, medical condition, previous or current history of depression or anxiety, diet choice, soy milk consumption, dose of YBS consumption and how often and vitamin supplementation.

2.2. Survey general questions

Questions on YBS consumption was important to determine what type of B vitamins were consumed and at what dosage they were being consumed at. Not all YBS have the same vitamin B content. For example, vegemite original, ozemite and vege-spread contain vitamin B1, B2, B3 and B9 (Table 1). Promite contains vitamin B1, B2 and B3 whilst marmite, ausiemite and mightymite contain vitamin B1, B2, B3, B9 and B12 and vegemite salt reduced (available as of December 2014) contains B1, B2, B3, B6, B9, B12 (Table 1). Participants were asked about diet choices so that the researchers could assess the impact of diet choices on B vitamin intake and account for this in the analysis. Questions relating to past mental health helped ascertain the psychological profile of the respondents and any mitigating factors that may cause them to be more susceptible to anxiety and stress. All authors had full access to all the data (including statistical reports and tables) in this study.

Table 1
Popular yeast based spreads and vitamin B content assessed in this study.

Yeast based spread brand (company)	B1	B2	B3	B6	B9	B12
Marmite (Sanitarium)	x	x	x		x	x
Vegemite original (Bega Cheese)	x	x	x		x	
Vegemite Salt Reduced (Bega Cheese)	x	x	x	x	x	x
Vegemite Cheesybite (Bega Cheese)	x	x	x	x	x	x
Vege spread (Freedom)	x	x	x		x	
Ozemite (Dick smith)	x	x	x		x	
MightyMite (Three threes)	x	x	x		x	x
AussieMite (AussieMite)	x	x	x		x	x
Promite (Master Foods)	x	x	x			

2.3. Depression, anxiety, stress scale

The depression, anxiety, stress scale (DASS) was chosen to be embedded in the questionnaire for several reasons. It was scale appropriate for clinical and non-clinical samples and provides a measure of stress which inclines to be more sub-syndromal than depression or anxiety. This scale can be used for both research and clinical purposes and was developed in Australia. This scale is much longer and includes 42 questions and is intended to take between 5 and 10 min to complete. Each question is rated on a 4-point Likert scale to determine frequency and severity of the survey subjects within the last week. Answers ranged from ‘did not apply to me at all', to ‘applied to me very much', or ‘most of the time'. The DASS42 has strong construct validity (Crawford & Henry, 2003) as well as adequate discriminant and convergent validity (Lovibond & Lovibond, 1995). DASS has adequate internal consistency, with reported Cronbach’s alpha coefficients of 0.71, 0.79 and 0.81 respectively (Brown, Chorpita, Korotitsch, & Barlow, 1997). When scoring DASS, patients with a higher score are perceived to be experiencing greater depression, anxiety and stress than those with a lower score. The format of the questions in DASS are suitable for inclusion into a questionnaire survey format and the scale is fully validated (Lovibond & Lovibond, 1995). The primary endpoint of the DASS42 is to determine degree and severity in emotional disturbances of depression, anxiety and stress. A score is given which is categorized in 5 different ranges, normal, mild, moderate, severe, extremely severe.

2.4. The yeast based spread survey

2.4.1. Subjects

All participants were recruited online. The survey was distributed via social media including twitter and facebook via sites referring to health, nutrition and mental issues etc. Participants were also recruited by advertisement around Victoria University as well as in cafes, hospitals and around the community. In addition, the survey was included in electronic emails that were sent to 6000 business owners around Melbourne, VIC Australia (e-west, e-east, e-south, e-north). Inclusion criteria included individuals who self-nominated to undertake the online survey. Exclusion criteria included those who were less than