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CONSUMO ALIMENTAR E DEPRESSÃO EM ADULTOS BRASILEIROS – RESULTADOS DA PESQUISA NACIONAL DE SAÚDE DE 2013

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CONSUMO ALIMENTAR E DEPRESSÃO EM ADULTOS BRASILEIROS –
RESULTADOS DA PESQUISA NACIONAL DE SAÚDE DE 2013

Dissertação apresentada ao Programa de Pós-Graduação em Ciências da Saúde da Faculdade de Medicina da Universidade Federal de Uberlândia, como requisito parcial para obtenção do título de Mestre em Ciências da Saúde.

Área de concentração: Ciências da Saúde

Orientadora: Profª Drª Catarina Machado Azeredo

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FOLHA DE APROVAÇÃO

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Presidente da banca (Orientador): Profª Drª Catarina Machado Azeredo

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Aos meus pais Sinomar (in memorian) e Rosana, que dignamente me apresentaram à importância da família e ao caminho da educação, dedicação e persistência, essa vitória também é de vocês! Ao meu esposo Sídney pelo apoio incondicional em todos os momentos.

AGRADECIMENTOS

RESUMO

Introdução: Recentemente, tem havido grande interesse acerca do efeito da dieta em questões relacionadas à saúde mental. Resultados indicam papel preventivo de alimentos como frutas e hortaliças na ocorrência da depressão, enquanto alimentos ricos em açúcares e gorduras aumentariam o risco da doença. Apesar disso, os estudos ainda são escassos e os resultados controversos. **Objetivo:** Avaliar a associação entre consumo alimentar e depressão em adultos brasileiros. **Material e Métodos:** Estudo transversal utilizando dados dos 46.785 adultos entrevistados na Pesquisa Nacional de Saúde de 2013. O consumo regular (>=5 vezes por semana) de frutas, hortaliças, refrigerantes, doces e a substituição de refeições por lanches foram as exposições de interesse. A depressão maior e a depressão menor, avaliadas pelo instrumento Patient Health Questionnaire - 9, foram os desfechos. Foram calculadas as prevalências e os intervalos de confiança 95% da depressão em função de co-variáveis socioeconômicas, demográficas e marcadores de consumo alimentar. Modelos de regressão multinomial simples e múltiplos, ajustados por variáveis de confusão, foram realizados para obtenção dos *odds ratios (OR)* bruto e OR ajustados, respectivamente. **Resultados:** Indivíduos com consumo regular de doces tiveram probabilidade de 42,0% maior de apresentar depressão maior (OR=1,42; IC95%=1,24-1,62). O consumo de doces se associou à depressão maior para ambos os sexos (homens: OR =1,47; IC95%=1,12-1,93; mulheres: OR=1,40; IC95%=1,19-1,63), enquanto o consumo regular de refrigerantes e a substituição regular de refeições por lanches se associou à depressão maior somente entre mulheres (OR=1,17; IC95%=1,01-1,63 e OR=1,28; IC95%=1,01-1,64, respectivamente). Aqueles que consumiam feijão regularmente tiveram probabilidade 18% menor de apresentar depressão maior na população geral (OR=0,82; IC95%=0,73-0,93) e entre as mulheres. Entre os homens, aqueles que consumiam regularmente hortaliças tiveram probabilidade 27% menor de apresentar depressão maior (OR=0,73; IC95%=0,57-0,93). **Conclusão:** Há indicação de um possível papel da alimentação na depressão, sendo o consumo regular de doces e a substituição regular das refeições por lanches associados à maior probabilidade de depressão e o consumo regular de feijão associado à menor probabilidade. Estudos longitudinais e que explorem os mecanismos dessas associações são necessários antes que sejam realizadas recomendações em saúde pública.

Palavras chave: Depressão. Consumo Alimentar. Epidemiologia. Epidemiologia Nutricional.

ABSTRACT

Introduction: Recently, there has been great interest in the effect of diet on mental health issues. Results indicate the preventive role of foods such as fruits and vegetables in the occurrence of depression, while foods high in sugars and fats would increase the risk of disease. Despite this, studies are still scarce and controversial results.

Objective: Evaluating the association between dietary intake and depression in Brazilian adults.

Material and Methods: A cross-sectional study using data from 46.785 adults interviewed in the National Health Survey in 2013. The regular consumption (≥5x/week) of fruits, vegetables, soft drinks, sweets and the meal for snack replacement were the exhibitions of interest. The Major depression and minor depression, as measured by the Patient Health Questionnaire – 9 instrument, were the outcomes. The prevalence and 95% confidence intervals of depression were calculated as a function of socioeconomic, demographic and food consumption markers. Simple and multiple multinomial regression models, adjusted for confounding variables, were performed to obtain adjusted odds ratios (OR) and adjusted OR, respectively.

Results: Individuals with regular sweets consumption were 42.0% more likely to present major depression (OR=1.42; 95% CI=1.24-1.62). The sweets consumption was associated with major depression for both genders (men: OR=1.47; 95% CI=1.12-1.93; women: OR=1.40; 95% CI=1.19-1.63); While to the soft drinks regular consumption and regular replacement of meals for snacks, was associated with major depression only among women (OR=1.17; 95% CI=1.01-1.63 and OR=1.28; 95% CI=1.01-1.64, respectively). Those who consumed beans regularly had likely 18% less to present major depression in the general population (OR=0.82; 95% CI=0.73-0.93) and among women. Among men, those who regularly consumed vegetables, had 27% lower probability of presenting major depression (OR=0.73; 95% CI=0.57-0.93).

Conclusion: There is an indication of a possible role of food in depression: being regular sweets consumption and regular replacement of meals for snacks associated with higher probability of depression, and regular consumption of beans associated with less probability. Longitudinal studies exploring the mechanisms of these associations are necessary before recommendations are made in public health.

Keywords: Depression. Food Consumption. Epidemiology. Nutritional Epidemiology.

LISTA DE TABELAS

LISTA DE AVREVIATURAS E SÍMBOLOS

CNS	Conselho Nacional de Saúde
CONEP	Comissão Nacional de Ética em Pesquisa
HR	Hazard Ratio
IC	Intervalo de Confiança
IBGE	Instituto Brasileiro de Geografia e Estatística
OMS	Organização Mundial da Saúde
OR	Odds Ratio
PNS	Pesquisa Nacional de Saúde
SIPD	Sistema Integrado de Pesquisas Domiciliares

SUMÁRIO

1 INTRODUÇÃO

Atualmente a depressão é caracterizada como um problema de saúde publica e com o passar dos anos sua prevalência vem crescendo cada vez mais. Estudo mostram que desde o ano de 1990 o diagnóstico desta doença cresceu em cerca de 37%, e a probabilidade de um indivíduo apresentar a doença ao longo da vida é de 15 a 20% (MOUSSAVI et al., 2007; MURRAY et al., 2012).

Este aumento na prevalência de depressão tem sido atribuído principalmente às mudanças para um estilo de vida moderno e o convívio em um ambiente que favorece ao estresse e depressão, como por exemplo, a urbanização acelerada, desigualdades sociais, sedentarismo, privação de sono e mudanças dietéticas (HIDAKA, 2012).

A depressão é um forte preditor da qualidade dietética do indivíduo, estudo de Opie et al. (2015) evidencia que uma baixa qualidade dietética está associada a escores mais elevados de sintomatologia depressiva. Os sistemas orgânicos que influenciam as escolhas alimentares e os sintomas depressivos estão altamente interligados, ou seja, a alimentação ativa as vias hormonais, neurotransmissoras e vias de sinalização que modulam funções cerebrais como apetite, sono, consumo de energia, mecanismos de recompensa, função cognitiva e humor. Essas mudanças modulam novamente o comportamento alimentar, que cronicamente podem resultar em distúrbios afetivos, estresse, demência e depressão (OPIE et al., 2015).

Diante dessas observações tem sido sugerido que alimentos com efeitos antioxidantes e anti-inflamatórios produziriam neuroproteção, auxiliando na regulação do eixo hipotálamo-hipófise-adrenocortical o qual é responsável pelo mecanismo da depressão (SANCHES-VILLEGAS; MARTÍNEZ-GONZÁLEZ, 2013; KODYDKOVÁ et al., 2009; FORD; ERLINGER, 2014). Nesse sentido, as frutas e hortaliças, por serem ricas nesses nutrientes poderiam ter um papel na redução da depressão. Em contrapartida os alimentos ricos em açúcares simples, gorduras trans e gorduras saturadas estariam relacionados à maior probabilidade de ocorrência da doença, acredita -se que esse fenômeno possa ocorrer devido às disfunções endoteliais e inflações que os maus hábitos alimentares podem acarretar, além de levar a baixos níveis do fator neurotrófico derivados do cérebro e hipoglicemia devido à produção exagerada de insulina – influenciando nos níveis hormonais e estado de humor do indivíduo (SANCHES-VILLEGAS et al., 2012; FUNG et al., 2001; HAMER; CHIDA, 2009; SEM; DUMAN; SANACORA, 2008; CALDER et al.; 2008).

Embora a depressão seja uma doença comum nos dias atuais, ainda são escassos e inconsistentes dos estudos que avaliaram a associação do consumo alimentar e a depressão na população brasileira. Desta forma, o desenvolvimento do presente estudo foi justificado pela investigação dessa associação entre os brasileiros entrevistados na Pesquisa Nacional de Saúde (PNS) para que os resultados sirvam de subsídio para a elaboração de medidas educativas, corretivas e assistenciais para melhoria da qualidade da alimentação e para a prevenção da depressão, a fim de melhorar a qualidade de vida desses indivíduos e seu convívio na sociedade.

2 REFERENCIAL TEÓRICO

2.1 Depressão

A depressão é uma doença comum na atualidade e tem característica crônica e recorrente na nossa sociedade. Está frequentemente associada a incapacidades funcionais e comprometimento da saúde física como um todo. Os indivíduos deprimidos apresentam limitação na execução de suas atividades e também no seu bem-estar (MUELLER et al., 1999; WULSIN; VAILLANT; WELLS, 1999).

A depressão por ser um problema multifatorial tem consequência na saúde em geral, e acarreta em diversas doenças clínicas (WORLD PSYCHIATRIC ASSOCIATION 1997). Isso se dá porque muitas vezes, os pacientes deprimidos não recebem tratamentos suficientemente adequados e específicos para o seu problema, acarretando no aumento da morbimortalidade, sendo que em cerca de 70% dos casos poderiam ter ser prevenidas com o tratamento correto (DOCHERTY, 1997).

Estudos sobre a prevalência de depressão em vários países ocidentais evidenciaram que a depressão é um transtorno bastante frequente, acredita-se que a prevalência anual na população em geral varie entre 3 e 11%, além da doença acometer 2 a 3 vezes mais mulheres do que homens (JENKINS et al., 1997; KESSLER et al., 2003).

No Brasil, estudos de base populacional sobre a prevalência de depressão e outros transtornos mentais são relativamente escassos (ANDRADE et al., 2012; INTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA, 2009; STOPA et al., 2015). A Pesquisa Nacional por Amostras de Domicílios de 2008 é um dos poucos estudos englobando uma amostra representativa da população brasileira, e esta identificou uma prevalência de 4,1% de autorrelato de diagnóstico de depressão (IBGE, 2009).

Apesar de prevalente, a depressão é uma doença subdiagnosticada. Isso ocorre porque o diagnóstico de depressão demanda a avaliação de especialista no assunto (médico psiquiatra), sendo que em alguns casos as pessoas com sintomas depressivos não chegam a ter acesso a esse profissional devido à dificuldade de acesso ao serviço de saúde. Acredita-se que em torno de 30% a 60% dos casos de depressão não são detectados pelo médico clínico (KESSLER et al., 2009; FLECKet al., 2009; WARAICH et al., 2004).

2.2 Alimentação e Depressão

Dentre os fatores de risco para a depressão destaca-se a baixa qualidade dietética, sendo assim a alimentação e tida como um forte preditor para o surgimento da depressão (OPIE et al., 2015). Isso se explica porque existe alta interligação entre os mecanismos responsáveis pelo desenvolvimento da depressão e os mecanismos envolvidos nas escolhas alimentares, fazendo com que esses se interajam e cronicamente levem a ocorrência de distúrbios afetivos e de humor como a depressão. (OPIE et al., 2015).

Estudos sugerem que alimentos como as frutas e hortaliças reduziriam o risco de ocorrência de depressão, isso ocorre por esses alimentos serem ricos em compostos antioxidantes e anti-inflamatórios, produzindo assim neuroproteção e auxiliando na regulação do eixo hipotálamo-hipófise-adrenocortical − responsável pelo mecanismo da depressão (SANCHES-VILLEGAS; MARTÍNEZ-GONZÁLEZ, 2013; KODYDKOVÁ et al., 2009; FORD; ERLINGER, 2014). Em contrapartida alimentos ricos em açúcares simples, gorduras trans e gorduras saturadas levariam a uma maior probabilidade de ocorrência da doença devido às disfunções endoteliais e inflações causadas pelo consumo desses alimentos (SANCHES-VILLEGAS et al., 2012; FUNG et al., 2001; HAMER; CHIDA, 2009).

De uma forma geral alguns estudos observaram que indivíduos que apresentavam consumo regular de frutas e hortaliças tiveram menor relato de sintomas depressivos (BISHWAJIT et al., 2017; KINGBURY et al., 2015), enquanto indivíduos com elevado consumo de refrigerantes, doces, açúcares simples e *fast foods*, apresentaram escores mais elevados da doença (BURROWS et al., 2017; PASKULIN et al., 2017).

Nesse sentido algumas pesquisas avaliaram a relação de marcadores de consumo alimentar não saudável e a depressão, em um desses estudos foi avaliada a dependência alimentar de doces e refrigerantes e diferentes graus de depressão, e como resultados mostraram que a dependência alimentar se associou 6,6, 13,2 e 15,6 maior probabilidade de depressão moderada, grave e muito grave, respectivamente, sem associação para depressão leve (BURROWS et al., 2017). O estudo de Ruiz-Cabello et al. (2017), também traz resultados a respeito da relação entre o consumo de bebidas açucaradas e a depressão, mostrando em seu estudo que há associação entre essas duas variáveis.

Outros estudos identificaram a relação do consumo de *fast foods* e alimentos processados e a depressão, como é o caso dos estudos de Sanches-Villegas e Martinéz-Gonzáles (2013), que mostrou que aqueles indivíduos com consumo regular de *fast foods* tinham 36% maior probabilidade de desenvolver depressão (HR=1,36; IC95%=1,02-1,81); e do estudo de Akbaraly et al. (2009) que identificou associação positiva entre o alto consumo de alimentos processados e a depressão (OR=1,58; IC95%=1,11-2,23).

Em relação ao consumo de marcadores de consumo alimentar saudável, existe ainda inconsistência nos resultados das associações, alguns estudos trazem associações positivas e outros não. Em estudo desenvolvido em três países da Ásia (Bangladesh, Índia e Nepal) que avaliou o consumo de frutas e hortaliças e a depressão, mostrou associação somente em um país e ainda assim, somente para o consumo de frutas (OR=3,10; IC=1,57-6,10) (BISHWAJIT et al., 2017). Outras duas coortes não encontraram associação entre o consumo de alimentos saudáveis e depressão (BOTS et al., 2008; EINVIK et al., 2010).

Ao contrário desses achados, pesquisadores Canadenses avaliaram a qualidade da dieta e de outros hábitos de vida e a saúde mental, e mostraram que o consumo regular de frutas e hortaliças se associou inversamente a ocorrência de sintomas depressivos (KINGSBURY et al.,2015). Em um estudo no Brasil com gestantes, Paskulin et al. (2017) observou a associação entre o baixo consumo de frutas e a ocorrência de sintomas depressivos (OR=1,43; IC95%=1,04-1,95), assim como Merrill, Penny e Steven (2008) que verificaram uma associação positiva entre uma alimentação rica em vitaminas e minerais e pobre em gorduras e a menor ocorrência de sintomas depressivos.

É importante ressaltar que a literatura evidencia que a relação entre escolhas alimentares e a depressão pode ocorrer de forma bidirecional, ou seja, a alimentação levando a ocorrência de depressão, e a própria depressão levando a piores escolhas alimentares, sendo necessário então, o desenvolvimento de mais estudos, a fim de verificar de forma mais consistente essa associação (OPIE et al., 2015).

3 OBJETIVOS

3.1 Objetivo Geral

Avaliar a associação entre o consumo alimentar e a depressão em adultos brasileiros.

3.2 Objetivos Específicos

Identificar a prevalência de depressão maior e menor entre adultos brasileiros;

Descrever o consumo de alimentos marcadores de alimentação saudável e não saudável entre brasileiros;

Avaliar a associação entre o consumo alimentar e a depressão entre adultos brasileiros, de acordo com o sexo.

**Artigo 1 "Consumo alimentar e depressão em adultos brasileiros–
Resultados da Pesquisa Nacional de Saúde de 2013"**

ABSTRACT

To evaluate the association between food consumption and depression in Brazilian adults. Cross-sectional study. As exposure, markers of healthy and unhealthy food consumption were used and as a result, depression. The prevalence and 95% confidence intervals of depression were calculated as a co-variables function of socioeconomic, demographic, and food consumption markers. Simple multinomial regression models were performed to obtain crude odds ratios (OR) and fitted models to obtain adjusted OR. We used data from the Brazilian National Health Survey (PNS) of 46,785 Brazilian adults interviewed in 2013. Individuals with regular consumption of sweets were 42.0% more likely to present depression (OR=1.42, 95% CI=1.24-1.62). In the analyses by gender, it was observed the association between sweet consumption and depression for both genders (men: OR=1.47; 95% CI=1.12-1.93, women: OR=1.40; 95% CI=1.19-1.63); for the consumption of soft drinks and replacement of meals for snacks, it was observed only among women (OR=1.17; 95% CI = 1.01-1.63 and OR=1.28, 95% CI=1.01-1.64). Those who consumed beans regularly were 18% less likely to present depression (OR=0.82; 95% CI=0.73-0.93); among women, this value was 21.0% (OR=0.79; 95% CI=0.68-0.91); for men, those who regularly consumed vegetables were 27% less likely to present depression (OR=0.73; 95% CI=0.57-0.93). There is an indication of a possible role of food in depression, being the regular consumption of sweets associated with the greater probability of the disease and the consumption of beans associated with less probability. Longitudinal studies exploring the mechanisms of these associations are necessary before recommendations are made in public health.

Keywords: Depression, Food Consumption, Epidemiology, Nutritional Epidemiology.

INTRODUCTION

Currently, depression is a public health problem, with severe depression reaching an overall prevalence of 4.7%[1]. A study carried out by the World Health Organization (WHO) in 60 countries has showed that, during the life, the probability of a person develop the disease is 15 to 20%[2]; moreover, between the years 1990 and 2012, there was a 37% increase in prevalence of this disease[3]. In Brazil, population-based studies on the prevalence of depression and other mental disorders are relatively scarce[4,5,6]. The 2008 National Survey of Household Samples - one of the few studies covering a representative sample of the Brazilian population - identified a prevalence of 4.1% of self-reported diagnosis of depression[5].

The increase in the prevalence of depression has been explained by the adoption of a modern lifestyle, represented by the sedentarism, sleep deprivation and dietary changes, as well as the fact of living in a stressful environment, such as, environments where the urbanization occurred at an accelerated pace and which are the locus of social inequalities[7,8].

Studies show that low dietary quality is a strong predictor of depression[9,10,11]. One possible explanation for this relationship is the existence of high interconnection between the organic systems that influence food choices and those other ones which trigger depressive symptoms, that is, the feeding actives the hormonal pathways, neurotransmitter pathways and signaling that modulate cerebral functions such as appetite, sleep, energy consumption, reward mechanisms, cognitive function and mood. These changes modulate again the eating behavior, which can chronically result in affective and mood disorders, stress, depression and dementia[12].

Studies suggest that foods with antioxidant and anti-inflammatory effects would produce neuro-protection, aiding in the regulation of the hypothalamic-pituitary-adrenocortical axis which is responsible for the mechanism of depression[13,14,15]. In this sense, fruits and vegetables, being rich in these nutrients, could play a role in reducing depression. On the other hand, other studies demonstrate that foods rich in simple sugars, trans-fats and saturated fats would be related to a higher probability of occurrence of depression. It is belived that this phenomenon it can occur due to the endothelial dysfunctions and the inflations that poor eating habits can cause, in addition to lead to low levels of the brain derived neurotrophic factor and hypoglycemia due to exaggerated insulin production - influencing the individual's hormonal levels and mood.[16,17,18, 19,20]

Some studies observed that individuals with regular fruit and vegetables consumption had a lower incidence of depressive symptoms[21,22], whereas individuals with high consumption of soft drinks, sweets, simple sugars and fast foods had higher depression scores[13,23,24]. Despite that, two other studies have failed at observing the association between healthy food intake and depression[25,26], indicating that there is no consensus in the literature.

Considering the scarcity of studies on the subject in the literature and the lack of consistency in the associations, the present study has aimed to evaluate the association between food consumption and depression in Brazilian adults.

METHODS

The present study is cross-sectional. We used data from the Brazilian National Health Survey (PNS) of 2013, which comprised a representative sample of residents of private households in Brazil. The sample studied by the PNS is a sub-sample of the Master Sample of the Integrated Household Survey System - SIPD from IBGE, whose geographic coverage is made up of the census sector from the Geographic Operational Base of the Demographic Census 2010, except for those with very small numbers of households and special sectors such as barracks and long-term institutions. The sample size was calculated to enable the estimation of precise prevalence rates and 95% confidence interval for the behaviours of interest, taking into account also the clustered sample in multiple stages. The sample size also considered 20% of non-response rate, and aimed to warrant a two-sided significant level of 5% and a statistical power of 80%. The methodology used for sampling, as well as the form of data collection are described, in greater detail, in the PNS report[27].

For the analysis of this study, it was selected adult individuals aged between 20 and 59 years old who have answered the questionnaire of the Selected Resident of the PNS, therefore comprising a population of 46,785 individuals.

The major and minor depression was considered as dependent variables, using the Patient Health Questionnaire - 9 (PHQ-9)[28], already translated into Portuguese and validated for the Brazilian population[29]. This instrument allows classifying individuals with major depression, minor depression or without depression. PHQ-9 evaluates the following symptoms: depressed mood, anhedonia (loss of interest or pleasure in doing things), sleep problems, fatigue or lack of energy, appetite change, guilt or uselessness, feeling, concentration problems, slow or restless feeling, and suicidal thoughts. The frequency of each symptom in the last two weeks was classified as 0-3, corresponding to the "any day" (0), "less than half the days" (1), "more than half of the days" (2) and "almost every day "(3), respectively.

The individual was classified as having major depression when they had five or more symptoms, at least one being depressed or anhedonia, and that each symptom had occurred at least "more than half of the days", except for the "suicidal thinking" symptom, for which any of the answers were accepted except "any day". Those with 2 to 4 frequent symptoms in at least, more than half of the days were classified as having a minor depression, except for suicidal thoughts, and at least one of the symptoms should be depressed mood or anhedonia.

The independent variables of the study were healthy and unhealthy food consumption markers, created from questions about the frequency of food consumption on weekdays. Among the healthy foods, the beans consumption, vegetables (raw and cooked) consumption, fruits and natural fruit juices were evaluated. Among the unhealthy foods, the soft drinks or artificial juice consumption was evaluated; sweets (cake or pie, sweets, chocolates, candies, cookies or sweet biscuits) consumption and the substitution of lunch or dinner for sandwiches, snacks or pizzas. It was considered regular consumption, the consumption of a certain food at least five times a week[30].

The consumption of fruits, vegetables, natural fruit juice and soft drinks or artificial juice was also evaluated in weekly frequency, to create this variable the frequency of daily consumption was multiplied by the frequency of weekly consumption, generating the total consumption of the week (that varied between 0 and 21 times a week). For this analysis, consumption was classified as ≤7x/week and >7x/week.

It was included in the modal, as variables of adjustment: the marital status (whether living with partner or not), age range (20-29 years old, 30-39 years old, 40-49 years and 50-59 years old), gender (male or female), education (incomplete Elementary School, complete Elementary School / incomplete High School, complete High School and complete Higher Education), race/color (white, black, yellow, brown and indigenous), physical activity (yes or no - created from the question: "In the last 3 months do you practice any kind of exercise or sport?"), tobacco use (yes / no - created from the question: "Do you currently smoke any kind of tobacco product?", those who answered "yes, daily" or "yes, less than daily" were classified as yes; and those who answered "do not smoke presently" were classified as not), and ingestion of alcoholic beverage (yes or no - created from the question: "How often do you usually some alcoholic beverage?", those who answered "less than once a month" or "once or more a month" were classified as yes; and those who answered "never drink" were classified as not). The practical variable of physical activity was included in the model of being able to influence the mood state of the individual, leading to reduction of depression; already the alcoholic bevearage consumption and use of tobacco, were included because they could undergo alterations in consumption according to the state of mood and presence or absence of depression.

All analyzes were performed considering the weighting for the complex sample structure, in order to represent the Brazilian population, according to the research sample. First, the socio-demographic categorization of the population was performed, with frequency values for each of the studied variables; then the prevalence and the respective 95% confidence intervals of depression were calculated as a function of all co-variables. Simple multinomial regression models were performed to obtain crude odds ratios (OR). Finally, models were adjusted for all variables to obtain adjusted OR.

All statistical analyzes were performed on Stata SE software version 13.1 (StataCorp, Texas, 2009).

The PNS project was approved by the National Research Ethics Committee (CONEP) of the National Health Council (CNS) in June 2013, under Opinion number 328.159, and this study follows the guidelines established in the Declaration of Helsinki. The PNS micro-data were made available on the IBGE website without information that could identify the evaluated individual.

RESULTS

The majority of the interviewed individuals was female (52.12%), white (46.15%), between 20 and 29 years old (34.57%) and an average level of education (41.97% with complete High School). The depression prevalence was 7.30%, with depression prevalence higher than 7.75% and depression lower than 2.64% (Table 1).

In relation to food consumption, most of the interviewees reported regular consumption of beans (71.81%) and vegetables (53.64%), for the other evaluated foods, the majority of subjects reported non-regular consumption (Table 1).

Analyzing Table 2, it can be observed that the highest depression prevalence was observed among women, with major depression being more frequent in individuals over 50 years old and with incomplete Elementary Education. In relation to food consumption markers, the major depression prevalence was slightly higher among those who had regular consumption of sweets (9.16%) and replacement of lunch or dinner for snacks (8.90%), when compared to their pairs who did not adopt these behaviors regularly (7.35% and 7.70%, respectively) (Table 2).

Individuals who reported consuming sweets 5 times or more per week were 42.0% more likely to present major depression (OR=1.42; 95% CI=1.24-1.62), and those who consumed beans regularly had 18% less likely to present depression (OR=0.82; 95% CI=0.73-0.93) (Table 3). In the analysis stratified by gender, we have observed an association between regular sweets consumption and major depression for both genders, but with a higher strength of association among men (men: OR=1.47; 95% CI=1.12-1.93; women: OR=1.40; 95% CI=1.19-1.63)- and for regular soft drinks and artificial juice consumption and regular meals (lunch and dinner) replacement for snacks, it was observed only among women, with a 17.0% and 29.0% higher probability of presenting major depression, respectively, among those who consumed regularly (OR=1.17; 95% CI=1.01-1.36 and OR=1.29; 95% CI=1, 01-164, respectively).

Regarding the markers of healthy food consumption, regular beans consumption was associated with a lower occurrence of major depression among women (OR=0.79; 95% CI=0.68-0.91), and regular vegetables consumption is associated with less occurrence of depression in men (OR=0.73; 95% CI=0.57-0.93) (Table 3).

Table 4 shows a complementary data of the consumption of fruits, vegetables, natural fruit juice and soft drinks or artificial juice evaluation. In this analysis, it was possible to observe that in the general population and among the women, the higher soft drinks or artificial juices consumption was associated with higher probability of major depression (General population: OR=1.23; 95% CI=1.06-1.43 / Women: OR=1.28; 95% CI=1.07-1.54) (Table 4).

DISCUSSION

Our study indicates that regular sweets consumption and consumption of more than seven times a week of soft drink are associated with a greater probability of major depression in Brazilian adults, and the association stratified by gender was more consistent among women. In addition, regular beans consumption indicated protection from major depression in the general population and among women, and regular vegetables consumption among men also indicated protection.

A similar result was observed by Paskulin (2017)[24], in which individuals with eating patterns rich in sugary foods were almost twice as likely to have depressive symptoms when compared to individuals with a varied food pattern (rich in grains such as beans, cereals , tubers, fruits and vegetables) (OR=1.91; 95% CI=1.19-3.07).

Bean consumption in Brazil represents a traditional pattern of consumption, present in most Brazilian tables, and is associated with lower industrial processing, besides supplying considerable amounts of fiber and micronutrients (iron, potassium and magnesium) that are important for individuals health[31].

A study that has evaluated the food dependence of sweets, soft drinks and different degrees of depression observed stronger associations than our study[23]. The dependence of these foods was associated with 6.6, 13.2 and 15.6 higher probability of moderate, severe and very severe depression, respectively, with no association for mild depression[23]. As this study used food dependence to evaluate feeding and our study used regular food consumption, it was expected that the strength of the association found in our study would be lower.

Consumption of soft drinks was associated with depression among women in our study, when we evaluated regular consumption and when we verified the total weekly consumption, an association was observed among women and in the general population. Which are results similar to those found in the study by Ruiz-Cabello (2017)[32], that has shown an association between the consumption of sugary drinks and the occurrence of depression.

Regarding the consumption of snacks in substitution of the main meals, two other studies have observed similar results to ours for depression. Sanchez-Villegas & Martínez-González verified the relationship between regular fast foods consumption and depression (HR=1.36; 95%

CI=1.02-1.81)[13]. While Akbaraly et al. observed the positive association between high consumption of processed foods and depression (OR=1.58; 95% CI=1.11-2.23)[9].

Not only the excess consumption of unhealthy foods can lead to the occurrence of depression, but also the reduction of consumption of this type of food can protect against the occurrence of this disease, as shown in other studies[9,10,33]. This is because food markers of unhealthy eating habits cause endothelial dysfunctions and inflations that can lead to the occurrence of depression. In contrast, the decrease in the consumption of these kinds of food can reduce the inflammatory process, therefore reducing the risk of the disease[16,17,18].

When stratified by gender, we observed that among women, the association was maintained for the sweets consumption, soft drinks consumption and for the substitution of meals for snacks. For men, it happened only for the sweets consumption. The results of the Camilleri's study (2014)[34] has also showed differences in the associations between dietary intake and depression between men and women, with an association between energy-dense snacking and depressive symptoms only among women (OR=1.81; 95% CI=1.45-2.26). In a study carried out with men in Finland, it was observed that those who presented a western diet pattern represented by the consumption of fast foods and fatty foods were 41% more likely to present depressive symptomatology[35].

In our study, the vegetables consumption was only associated with a lower occurrence of depression among men, fruit consumption and natural fruit juice were not associated with depression. A study carried out in three Asian countries (Bangladesh, India and Nepal) has shown a similar result, with association only in one country and yet only for fruit consumption (OR=3.10; CI = 1.57-6.10)[21]. Two other cohorts found no association between healthy food consumption and depression[26,33]. In contrast, Canadian researchers have evaluated the quality of diet and other lifestyle habits and mental health, and then it was shown that regular consumption of fruits and vegetables was inversely associated with the occurrence of depressive symptoms[22]. Paskulin et al. (2017), in a study carried out in Brazil with pregnant women, observed the association between low fruit consumption and the occurrence of depressive symptoms (OR=1.43; 95% CI=1.04-1.95)[24], as well as the study by Merrill et al. (2008) found a positive association between a diet rich in vitamins and minerals and low in fat and the occurrence of depressive symptoms[10]. It is important to emphasize the literature shows that the relationship between dietary choices and depression can occur in a bidirectional way, that is, food leading to the occurrence of depression, and depression itself leading to worse food choices[12].

In our study, a prevalence of depression at some stage of life of 7.3% was observed. This result is somewhat higher than the overall prevalence of depression reported by the systematic review of Ferrari (2013)[1]. In a population-based study conducted in Brazil in 2008, a prevalence of depression in some stage of life of 4.1% was observed, which is lower than those ones shown in our

study[5]. Experts on the subject bring depression, as being a frequent and often underdiagnosed illness, this is because the diagnosis of depression requires an expert judgment (psychiatrist) and many people may not get access to this professional because of the difficulty in accessing the health service, and also to social factors involving depression[36,37,38].

The diagnosis of depression was more prevalent among women with low education and over 50 years of age. Although the explanation for these results is not within the scope of our study, they can be justified by the hormonal alterations experienced by women and that may influence the occurrence of depression[35], and the other findings related to socioeconomic and demographic characteristics, such as education and range age, can be explained due to the association of depression and worse living standards as well as education[39], and the increase of the biological predisposition with advancing age[40].

Despite all the contributions of the present study in relation to the topic addressed, there are still some important limitations that need to be considered. As the research was of a transversal nature, it does not allow causal inference of the associations. Moreover, since the association between depression and food consumption seems to occur bi-directionally and the fact that for some foods, the food consumption was measured only by weekly frequency rather than daily frequency and quantity consumed, it might not have been possible to identify more precisely differences, which may have contributed to the non-association between some variables of interest in the study and depression. Last, but not the least, information on food consumption has been self-reported, so there is still a possibility of error. Although analyzes have been adjusted for the confounding variables, due to the observational nature of our study, we can not exclude the possibility that some unmeasured and lifestyle-related confounding variables may affect the results obtained.

In contrast to the limitations, this study is one of the few that evaluated the association between healthy and unhealthy food consumption markers and depression in a Brazilian population sample. In addition, the use of PHQ-9, which is a validated instrument for the Brazilian population for the diagnosis of depression, minimizes the possibility of classification errors of individuals regarding the status of depression. Thus, the found results compose important evidence about the possible role of diet in depression. Our results suggest that nutritional aspects should be considered in both prevention and care in depression.

The soft drinks consumption and replacement of meals by snacks in adult women and the sweets consumption in adults of both genders were associated with a higher probability of occurrence of depression in this study, and regular beans consumption showed protection of this disease among women. However, the need for further studies with a longitudinal design is reinforced in order to better identify the direction of the association between food consumption and

depression, and studies that evaluate the mechanisms involved in this association, in order to provide scientific support for planning of public health policies in the area.

REFERENCES

1. Ferrari AJ, Somerville AJ, Baxter AJ, et al. (2013). Global variation in the prevalence and incidence of major depressive disorder: a systematic review of the epidemiological literature. *Psychol Med* **43**, 471–481.

2. Moussavi S, Chatterji S, Verdes E, et al. (2012). Depression, chronic diseases, and decrements in health: results from the World Health Surveys. *Lancet* **370,** 851–858.

3. Murray CJ, Vos T, Lozano R, et al. (2012). Disability-adjusted life years [DALYs] for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the global burden of disease study 2010. *Lancet* **380**, 2197–2223.

4. Andrade LH, Wang YP, Andreoni S, et al. (2012). Mental disorders in megacities: findings from the São Paulo Megacity mental health survey, Brazil. *PLoS One* 7, 31879-31890.

5. Brazilian Institute of Geography and Statistics (2009). *National Sample Household Survey 2008: Basic methodological notes, special research on smoking and supplementary health research and internet access and cellular mobile phone possession for personal use.* Rio de Janeiro, Brazil.

6. Stopa SR, Malta DC, Oliveira MM, et al. (2015). Prevalence of self-reported depression in Brazil: 2013 National Health Survey results. *Rev Bras Epidemiol* **18**, 170–180.

7. Hidaka BH (2012). Depression as a disease of modernity: explanations for increasing prevalence. *J Affect Disord* **140**, 205–114.

8. Bhugra D, Mastrogianni A (2004). Globalisation and mental disorders - Overview with relation to depression. *Br J Psychiatr* **184**, 10–20.

9. Akbaraly TN, Brunner EJ, Ferrie JE, et al.(2009). Dietary pattern and depressive symptoms in middle age. *Br J Psychiatr* **195**, 408-413.

10. Merrill, RM, Penny TMS, Steven GA (2008). Coronary Health Improvement Project (CHIP) is associated with improved nutrient intake and decreased depression. *Nutrition* **24**, 314-321.

11. García-Toro M, Ibarra O, Gili M, et al. (2012). Four hygienic-dietary recommendations as add-on treatment in depression: a randomized-controlled trial. *J Affect. Disord* **140**, 200-203.

12. Opie RS, O'Neil A, Itsiopoulos C, Jacka FN (2015). The impact of whole-of-diet interventions on depression and anxiety: a systematic review of randomised controlled trials. *Public Health Nutr* **18**, 2074-2093.

13. Sanchez-Villegas A, Martínez-González MA (2013). Diet, a new target to prevent depression?. *BMC Med* **11**, 1-4.

14. Kodydková J, Vávrová L, Zeman M, et al. (2009). Antioxidative enzymes and increased oxidative stress in depressive women. *Clin Biochem* **42**, 1368–1374.

15. Ford DE, Erlinger TP (2012). Depression and C-reactive protein in US adults: data from the third national health and nutrition examination survey. *Arch Intern Med* **164**, 1010–1014.

16. Sánchez-Villegas A, Toledo E, de Irala J, et al. (2012). Fast-food and commercial baked goods consumption and the risk of depression. *Public Health Nutr* **15**, 424–432.

17. Fung TT, Rimm EB, Spiegelman D, et al. (2001). Association between dietary patterns and plasma biomarkers of obesity and cardiovascular disease risk. *Am J Clin Nutr* **73**, 61–67.

18. Hamer M, Chida Y (2009). Associations of very high C-reactive protein concentration with psychosocial and cardiovascular risk factors in an ageing population. *Atherosclerosis* **206**,599–603.

19. Sen S, Duman R, Sanacora G (2008). Serum Brain-Derived Neurotrophic Factor, Depression, and Antidepressant Medications: MetaAnalyses and Implications. *Biol Psychiatr* **64**, 527–532.

20. Calder PC, Ahluwalia N, Brouns F, et al. (2011). Dietary factors and low-grade infammation in relation to overweight and obesity. *Br J Nutr* **106**, S5–78.

21. Bishwajit G, O'Leary DP, Ghosh S, et al. (2017). Association between depression and fruit and vegetable consumption among adults in South Asia. *BMC Psychiatry* **17**, 1-9.

22. Kingsbury M, Dupuis G, Jacka F, et al. (2015). Associations between fruit and vegetable consumption and depressive symptoms: evidence from a national Canadian longitudinal survey. *J Epidemiol Community Health* **0**, 1-7.

23. Burrows T, Hides L, Brown R, et al. (2017). Differences in Dietary Preferences, Personality and Mental Health in Australian Adults with and without Food Addiction. *Nutrients* **9**, 285-297.

24. Paskulin JTA, Drehmer M, Olinto MT, et al. (2017). Association between dietary patterns and mental disorders in pregnant women in Southern Brazil. *Rev Bras Psiquiatr* **39**, 208-215.

25. Gougeon L, Payette H, Morais JA, et al. (2017). A prospective evaluation of the depression–nutrient intake reverse causality hypothesis in a cohort of community-dwelling older Canadians. *Br J Nutr* **117**, 1032-1041.

26. Bots S, Tijhuis M, Giampoali S, et al. (2008). Lifestyle-and diet-related factors in late-life depression—a 5-year follow-up of elderly European men: the FINE study. *Int J Geriatr Psychiatry* **23**, 478-484.

27. Brazilian Institute of Geography and Statistics (2014). *National Health Survey 2013: Perception of health status, life styles and chronic diseases – Brazil, Major Regions and Federation Units*. Rio de Janeiro, Brazil.

28. Kroenke K, Spitzer RL, Williams JB (2001). The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med* **16**, 606-613.

29.   Santos IS, Tavares BF, Munhoz TN, et al. (2013). Sensitivity and specificity of the Patient Health Questionnaire-9 (PHQ-9) among adults from the general population. *Cad Saude Publica* **29**, 1533-1543.

30.   Jaime PC, Stopa SR, Oliveira TP, Vieira ML, Szwarcwald CL, Malta DC (2015). Prevalence and sociodemographic distribution of healthy eating markers, National Health Survey, Brazil 2013. *Epidemiol Serv Saúde* **24**, 267-276.

31.   de Castro IRR, Cardoso LO, Engstrom EM, et al. (2008). Surveillance of risk factors for non-communicable diseases among adolescents: the experience in Rio de Janeiro, Brazil. *Cad Saude Publica* **24**, 2279–2288.

32.   Ruiz-Cabello P, Soriano Maldonado A, Delgado-Fernandez M, et al. (2017). Association of dietary habits with psychosocial outcomes in women with fibromyalgia: The al-Andalus Project. *J Acad Nutr Diet* **117**, 422-432.

33.   Einvik G, Ekeberg O, Lavik JG, et al. (2010). The influence of long-term awareness of hyperlipidemia and of 3 years of dietary counseling on depression, anxiety, and quality of life. *J Psychosom Res* **68**, 567-572.

34.   Camilleri GM, Méjean C, Kesse-Guyot E, et al. (2014). The associations between emotional eating and consumption of energy-dense snack foods are modified by sex and depressive symptomatology. *J Nutr* **144**, 1264-1273.

35.   Ruusunen A, Lehto SM, Mursu J, et al. (2014). Dietary patterns are associated with the prevale nce of elevated depressive symptoms and the risk of getting a hospital discharge diagnosis of depression in middle-aged or older Finnish men. *J Affect Disord* **159**, 1-6.

36.   Waraich P, Goldner EM, Somers JM, et al. (2004). Prevalence and incidence studies of mood disorders: a systematic review of the literature. *Can J Psychiatry* **49**, 124-138.

37.   Kessler RC, Berglund P, Demler O, et al. (2003). The epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication (NCS-R). *JAMA* **89**, 3095-3105.

38.   Fleck MP, Berlim MT, Lafer B, et al. (2009). Review of the guidelines of the Brazilian Medical Association for the treatment of depression. *Rev Bras Psiquiatr* **31**, S7–17.

39.   Cunha RV, Bastos GAN, Del Duca GF (2012). Prevalence of depression and associated factors in a low income community of Porto Alegre, Rio Grande do Sul. *Rev Bras Epidemiol (online)* **15**,346-354.

40.   Lima MS, Béria JU, Tomasi E, Conceição AT, Mari JJ (1996). Stressful life events and minor psychiatric disorders: an estimate of the population attributable fraction in a Brazilian community-based study. *Ing J Psychiatry Med* **26**,213-224.

Table 1. Socioeconomic, demographic, consumption and depression characteristics among Brazilian adults. PNS 2013.

Variables	%	CI 95%
Gender		
Male	47.87	
Female	52.12	
Age		
20 to 29 years old	34.57	34.12 – 35.03
30 to 39 years old	25.90	25.41 – 26.40
40 to 49 years old	22.05	21.55 – 22.57
50 to 59 years old	17.45	16.95 – 17.97
Education		
Incomplete Elementary School	12.27	11.73 – 12.83
Complete Elementary School	29.20	28.40 – 30.01
Complete High School	41.97	41.16 – 42.80
Complete Higher Education	16.56	15.75 – 17.37
Race / Color		
White	46.15	45.29 – 47.01
Black	9.19	8.70 – 9.70
Yellow	0.88	0.74 – 1.05
Brown	43.28	42.42 – 44.14
Indigenous	0.48	0.39 – 0.58
Lives with spouse		
Yes	63.29	62.51 – 64.07
No	36.70	35.92 – 37.48
Tobacco use		
Yes	15.57	14.89 – 16.06
No	84.52	83.93 – 85.10
Alcoholic beverage intake		
Yes	44.55	43.66 – 45.43
No	55.44	54.56 – 56.33
Physical activity practice		
Yes	33.13	32.25 – 34.01
No	66.86	65.98 – 67.74

Depression Diagnosis		
Yes	7.30	6.87 – 7.77
No	92.69	92.22 – 93.12
Depression Degree		
Without depression	89.60	89.08 – 90.09
Minor depression	2.64	2.40 – 2.90
Major Depression	7.75	7.33 – 8.19
Regular beans consumption*	71.81	71.03 – 71.58
Regular vegetables consumption*	53.64	52.82 – 54.45
Regular fruit consumption*	38.50	37.65 – 39.36
Regular natural juice consumption*	24.86	24.15 – 25.59
Regular soft drinks / artificial juice consumption*	25.71	24.92 – 26.52
Regular sweets consumption*	22.04	21.29 – 22.79
Regular meals for snacks replacement*	6.54	6.10 – 7.02

*Regular consumption corresponds to consumption ≥5 times/week.

Table 2. Prevalence of degrees of depression according to socioeconomic, demographic and food markers consumption characteristics. 2013 PNS.

Variable	Degree of depression (95% CI)					
	General Population		Gender			
			Male		Female	
	Minor depression	Major depression	Minor depression	Major depression	Minor depression	Major depression
Gender						
Male	1.66 (1.39–1.97)	4.37 (3.93-4.86)				
Female	3.54 (3.16-3.96)	10.85 (10.19-11.56)				
Age						
20 to 29 years old	2.76 (2.31-3.28)	5.68 (5.04-6.40)	1.58 (1.12-2.24)	3.13 (2.46-3.98)	3.90 (3.18-4.78)	8.17 (7.12-9.37)
30 to 39 years old	2.44 (2.06-2.89)	7.47 (6.79-8.21)	1.56 (1.14-2.13)	4.04 (3.28-4.97)	3.24 (2.68-3.91)	10.56 (9.53-11.69)
40 to 49 years old	2.70 (2.19-3.31)	9.39 (8.48-10.37)	1.86 (1.31-2.65)	4.86 (3.92-6.00)	3.41 (2.64-4.38)	13.26 (11.82-14.84)
50 to 59 years old	2.63 (2.13-3.24)	10.20 (9.19-11.31)	1.71 (1.22-2.38)	6.81 (5.50-8.42)	3.47 (2.65-4.52)	13.30 (11.76-15.01)
Education						
Incomplete Elementary School	2.69 (2.09-3.45)	12.20 (10.92-13.62)	2.44 (1.63-3.64)	6.60 (5.41-8.03)	2.92 (2.14-3.97)	17.34 (15.23-19.69)
Complete Elementary School	2.70 (2.24-3.26)	9.93 (9.05-10.89)	1.49 (1.05-2.11)	5.99 (5.02-7.12)	4.01 (3.25-4.95)	14.17 (12.75-15.72)
Complete High School	2.69 (2.43-3.09)	5.98 (5.45-6.56)	1.62 (1.25-2.11)	3.04 (2.48-3.73)	3.64 (3.11-4.25)	8.61 (7.76-9.53)

Complete Higher Education	2.36 (1.82-3.05)	5.09 (4.36-5.92)	1.48 (0.94-2.31)	2.80 (1.97-3.97)	3.02 (2.20-4.14)	6.81 (5.78-8.01)
Race / Color						
White	2.41 (2.07-2.79)	7.43 (6.82-8.09)	1.50 (1.15-1.96)	4.43 (3.75-5.23)	3.22 (2.68-3.86)	10.13 (9.17-11.17)
Black	3.14 (2.29-4.30)	8.63 (7.39-10.05)	2.33 (1.19-4.50)	5.16 (3.67-7.21)	3.99 (2.96-5.37)	12.23 (10.33-14.43)
Yellow	0.91 (0.27-0.30)	7.18 (4.31-11.74)	0.82 (0.20-3.34)	3.39 (1.23-8.99)	0.98 (0.17-5.29)	9.83 (5.41-17.19)
Brown	2.80 (2.46-3.19)	7.87 (7.28-8.50)	1.69 (1.36-2.10)	4.12 (3.54-5.79)	3.83 (3.28-4.46)	11.32 (10.38-12.34)
Indigenous	3.51 (1.29-9.23)	11.98 (7.13-19.44)	0.91 (0.26-3.10)	6.73 (2.23-18.82)	5.61(1.83-15.88)	16.02 (8.91-27.09)
Lives with spouse						
Yes	2.64 (2.26-3.09)	8.49 (7.82-9.20)	1.74 (1.40-2.18)	3.85 (3.33-4.44)	3.54 (3.00-3.97)	10.50 (9.63-11.43)
No	2.64 (2.33-2.99)	7.33 (6.79-7.89)	1.51 (1.16-1.97)	5.27 (4.45-6.22)	3.69 (3.04-4.47)	11.48 (10.47-12.57)
Tobacco use						
Yes	2.64 (2.10-3.30)	11.53 (10.33-12.85)	2.03 (1.46-2.83)	6.36 (5.32-7.59)	3.59 (2.64-4.88)	19.71 (17.25-22.41)
No	2.64 (2.38-2.93)	7.06 (6.64-7.50)	1.57 (1.28-1.91)	3.88 (3.39-4.44)	3.53 (3.14-3.97)	9.70 (9.08-10.37)
Alcoholic beverage intake						
Yes	2.92 (2.61-3.28)	9.27 (8.66-9.93)	1.48 (1.14-1.92)	3.49 (3.00-4.06)	3.66 (2.95-4.55)	9.93 (8.93-11.03)
No	2.28 (1,93-2.69)	5.86 (5.37-6.38)	1.91 (1.52-2.41)	5.63 (4.83-6.56)	3.48 (3.06-3.96)	11.28 (10.45-12.16)
Physical activity practice						
Yes	2.16 (1.78-2.62)	5.27 (4.71-5.89)	1.31 (0.94-1.83)	2.66 (2.16-3.28)	3.27 (2.66-4.02)	8.67 (7.63-9.85)
No	2.87(2.57-3.22)	8.98 (8.44-9.55)	1.88 (1.54-2.30)	5.48 (4.83-6.20)	3.64 (3.18-4.17)	11.68 (10.92-12.49)

Regular beans consumption						
no	3.21 (2.77-3.72)	8.54 (7.79-9.34)	1.63 (1.19-2.23)	4.12 (3.35-5.06)	4.22 (3.57-4.99)	11.38 (10.29-12.56)
yes	2.41 (2.13-2.73)	7.44 (6.96-7.96)	1.67 (1.36-2.04)	4.45 (3.92-5.04)	3.20 (2.74-3.73)	10.60 (9.79-11.47)
Regular vegetable consumption						
no	2.62 (2.29-3.01)	8.13 (7.55-8.76)	1.93 (1.53-2.43)	5.16 (4.46-5.96)	3.41 (2.87-4.05)	11.50 (10.58-12.49)
yes	2.65 (2.32-3.03)	7.42 (6.87-8.01)	1.37 (1.06-1.77)	3.54 (3.01-4.16)	3.63 (3.12-4.22)	10.39 (9.51-11.34)
Regular fruit consumption						
no	2.64 (2.31-3.01)	0.78 (0.72-0.83)	1.75 (1.41-2.18)	4.76 (4.19-5.40)	3.62 (3.08-4.26)	11.22 (10.34-12.17)
yes	2.64 (2.31-3.01)	0.76 (0.70-0.83)	1.46 (1.11-1.91)	3.56 (2.92-4.34)	3.43 (2.95-3.99)	10.39 (9.49-11.37)
Regular natural juice consumption						
no	0.27 (0.24-0.30)	0.80 (0.75-0.86)	1.67 (1.37-2.05)	4.63 (4.09-5.24)	3.71 (3.24-4.24)	11.28 (10.51-12.09)
yes	0.23 (0.19-0.28)	0.67 (0.60-0.75)	1.61 (1.15-2.21)	3.57 (2.88-4.41)	3.04 (2.47-3.72)	9.62 (8.48-10.88)
Regular soft drinks / artificial juice consumption						
no	2.55 (2.28-2.84)	7.76 (7.27-8.29)	1.74 (1.41-2.15)	4.38 (3.84-4.99)	3.22 (2.84-3.65)	10.61 (9.87-11.40)
yes	2.90 (2.39-3.52)	7.71 (7.01-8.48)	1.45 (1.09-1.94)	4.35 (3.60-5.25)	4.62 (3.64-5.84)	11.69 (10.45-13.04)

Regular sweets consumption						
no	2.37 (2.12-2.64)	7.35 (6.89-7.85)	1.53 (1.24-1.89)	4.12 (3.64-4.66)	3.17 (2.81-3.56)	10.45 (9.70-11.24)
yes	3.60 (2.94-4.40)	9.16 (8.27-10.14)	2.16 (1.59-2.93)	5.37 (4.28-6.70)	4.75 (3.70-6.08)	12.18 (10.82-13.67)
Regular meal for snack replacement						
no	2.60 (2.35-2.88)	7.70 (7.26-8.16)	1.63 (1.36-1.96)	4.39 (3.93-4.90)	3.51 (3.11-3.95)	10.78 (10.09-11.51)
yes	3.12 (2.28-4.24)	8.49 (6.99-10.26)	2.07 (1.20-4.54)	4.07 (2.46-6.67)	3.92 (2.69-5.68)	11.85 (9.72-14.38)

Table 3. Association between markers of eating habits (healthy and unhealthy) and depression in Brazilian adults. 2013 PNS.

Variable	General population		Men		Women	
	Minor depression	**Major depression**	**Minor depression**	**Major depression**	**Minor depression**	**Major depression**
	OR (95% CI)*		OR (95% CI) †		OR (95% CI) †	
Regular beans consumption						
<5x/week	1.00	1.00	1.00	1.00	1.00	1.00
≥5x/week	0.75 (0.61-0.92)	0.82 (0.73-0.93)	0.94 (0.64-1.38)	0.95 (0.73-1.23)	0.69 (0.54-0.90)	0.79 (0.68-0.91)
Regular vegetable consumption						
<5x/week	1.00	1.00	1.00	1.00	1.00	1.00
≥5x/week	0.98 (0.80-1.20)	0.89 (0.79-1.00)	0.73 (0.51-1.05)	0.73 (0.57-0.93)	1.13 (0.89-1.45)	0.96 (0.84-1.10)
Regular fruit consumption						
<5x/week	1.00	1.00	1.00	1.00	1.00	1.00
≥5x/week	0.96 (0.79-1.18)	0.97 (0.86-1.09)	0.86 (0.61-1.22)	0.80 (0.61-1.04)	1.00 (0.78-1.29)	1.03 (0.90-1.18)
Regular natural juice consumption						
<5x/week	1.00	1.00	1.00	1.00	1.00	1.00
≥5x/week	0.86 (0.69-1.07)	0.87 (0.76-1.00)	0.98 (0.65-1.48)	0.80 (0.61-1.05)	0.81 (0.62-1.05)	0.90 (0.77-1.05)
Regular soft drinks						

/artificial juice consumption						
<5x/week	1.00	1.00	1.00	1.00	1.00	1.00
≥5x/week	1.21 (0.96-1.53)	1.13 (0.99-1.28)	0.84 (0.57-1.23)	1.06 (0.83-1.36)	1.44 (1.10-1.89)	1.17 (1.01-1.36)
Regular sweets consumption						
<5x/week	1.00	1.00	1.00	1.00	1.00	1.00
≥5x/week	1.58 (1.24-2.02)	1.42 (1.24-1.62)	1.49 (1.02-2.19)	1.47 (1.12-1.93)	1.61 (1.19-2.17)	1.40 (1.19-1.63)
Regular meal for snack replacement						
<5x/week	1.00	1.00	1.00	1.00	1.00	1.00
≥5x/week	1.23 (0.87-1.73)	1.22 (0.97-1.53)	1.35 (0.74-2.47)	1.05 (0.61-1.82)	1.19 (0.78-1.80)	1.29 (1.01-1.64)

* Model adjusted by age, sex, race/color, education, living with spouse, physical activity, alcohol consumption and tobacco use.

† Model adjusted by age, race/color, education, living with spouse, physical activity, alcohol consumption and tobacco use.

Table 4. Association between weekly vegetables, fruits, fruit juice and soft drinks/artificial juice consumption and depression in Brazilian adults. 2013 PNS.

Variable	General		Men		Women	
	Minor depression	Major depression	Minor depression	Major depression	Minor depression	Major depression
	OR (95% CI)*		OR (95% CI) †			
Vegetables consumption						
≤7x/week	1.00	1.00	1.00	1.00	1.00	1.00
>7x/week	0.95 (0.75-1.19)	0.93 (0.81-1.07)	0.82 (0.54-1.02)	1.01 (0.75-1.35)	0.99 (0.76-1.30)	0.90 (0.76-1.06)
Fruit consumption						
≤7x/week	1.00	1.00	1.00	1.00	1.00	1.00
>7x/week	1.15 (0.93-1.42)	1.13 (0.99-1.28)	0.97 (0.65-1.43)	1.03 (0.76-1.39)	1.22 (0.94-1.58)	1.15 (0.99-1.34)
Natural juice consumption						
≤7x/week	1.00	1.00	1.00	1.00	1.00	1.00
>7x/week	0.95 (0.72-1.25)	1.03 (0.88-1.21)	0.98 (0.65-1.49)	0.90 (0.66-1.22)	0.94 (0.66-1.33)	1.10 (0.92-1.32)
Soft drinks /artificial juice consumption						
≤7x/week	1.00	1.00	1.00	1.00	1.00	1.00
>7x/week	1.12 (0.85-1.49)	1.23 (1.06-1.43)	0.86 (0.56-1.34)	1.14 (0.87-1.50)	1.26 (0.90-1.78)	1.28 (1.07-1.54)

*Model adjusted by age, sex, race/color, education, living with spouse, physical activity, alcohol consumption and tobacco use.

†Model adjusted by age, race/color, education, living with spouse, physical activity, alcohol consumption and tobacco use.

REFERÊNCIAS

AKBARALY, T. N. et al. Dietary pattern and depressive symptoms in middle age. **The British Journal Psychiatry**, London, v. 195, n. 5, p. 408-413, 2009. https://doi.org/10.1192/bjp.bp.108.058925

ANDRADE, L. H. et al. Mental disorders in megacities: findings from the São Paulo Megacity mental health survey, Brazil. **PLoS One**, San Francisco, v. 7, n. 2, p. 31879-3189, 2012. https://doi.org/10.1371/journal.pone.0031879

BISHWAJIT, G. et al. Association between depression and fruit and vegetable consumption among adults in South Asia. **BMC Psychiatry**,London, v. 17, n. 15, p. 1:9, 2017.

BOTS,S. et al. Lifestyle-and diet-related factors in late-life depression—a 5-year follow-up of elderly European men: the FINE study. **International Journal of Geriatric Psychiatry**, Chichester, Sussex, England, v. 23, n. 5, p. 478-484, 2008. https://doi.org/10.1002/gps.1919

BURROWS, T. et al. Differences in Dietary Preferences, Personality and Mental Health in Australian Adults with and without Food Addiction. **Nutrients**, Basel, Switzerland, v. 9, n. 3, p. 285-297, 2017. https://doi.org/10.3390/nu9030285

CALDER, P. C. Dietary factors and low-grade infammation in relation to overweight and obesity. **British Journal of Nutrition**, Cambridge University Press, v. 106, n. 3, p. S5-78, 2011. https://doi.org/10.1017/S0007114511005460

DOCHERTY, J. P. Barriers to the diagnosis of depression in primary care. **Jounal of Clinical Psychiatry**, Memphis, Tenn, v. 58, n. 1, p. 5-10, 1997.

EINVIK, G. et al. The influence of long-term awareness of hyperlipidemia and of 3 years of dietary counseling on depression, anxiety, and quality of life. **Journal of Psychosomatic Research**, London, v. 68, n. 6, p. 567-572, 2010. https://doi.org/10.1016/j.jpsychores.2009.11.004

FLECK, M. P. et al. Review of the guidelines of the Brazilian Medical Association for the treatment of depression. **Revista Brasileira de Psiquiatria**, São Paulo, v. 31, n. 1, p. 7–17, 2009. https://doi.org/10.1590/S1516-44462009000500003

FORD, D. E.; ERLINGER, T. P. Depression and C-reactive protein in US adults: data from the third national health and nutrition examination survey. **Archives of Internal Medicine**, Chicago, v. 164, n. 9, p. 1010–1014, 2004. https://doi.org/10.1001/archinte.164.9.1010

FUNG, T. T. et al. Association between dietary patterns and plasma biomarkers of obesity and cardiovascular disease risk. **The American Jounal of Clinical Nutrition**, Bethesda, v. 73, n. 1, p. 61–67, 2001. https://doi.org/10.1093/ajcn/73.1.61

HAMER M, CHIDA Y. Associations of very high C-reactive protein concentration with psychosocial and cardiovascular risk factors in an ageing population. **Atherosclerosis**, [S.I.] v. 206, n. 2, p. 599–603, 2009. https://doi.org/10.1016/j.atherosclerosis.2009.02.032

HIDAKA, B. H. Depression as a disease of modernity: Explanations for increasing prevalence. **Journal of Affective Disorders**, Amsterdam, v. 140, n. 3, p. 205-214, 2012. https://doi.org/10.1016/j.jad.2011.12.036

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA - IBGE. **Pesquisa nacional por amostra de domicílios 2008**: notas metodológicas pesquisa básica, pesquisa especial de tabagismo e pesquisas suplementares de saúde e acesso à internet e posse de telefone móvel celular para uso pessoal. Rio de Janeiro [s. n.]: IBGE, 2009.

JENKINS, R. et al. The National Psychiatric Morbidity surveys of Great Britain--initial findings from the household survey. **Psychological Medicine**, London, v. 27, n. 4, p. 775-789, 1997. https://doi.org/10.1017/S0033291797005308

KESSLER, R. C. et al. The epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication (NCS-R). **JAMA**, Chicago, v. 289, n. 23, p. 3095-3105, 2003. https://doi.org/10.1001/jama.289.23.3095

KINGSBURY, M. et al. Associations between fruit and vegetable consumption and depressive symptoms: evidence from a national Canadian longitudinal survey. **Journal of Epidemiology and Community Health**, London, v. 70, n. 2, p. 1-7, 2015.

KODYDKOVÁ, J. et al. Antioxidative enzymes and increased oxidative stress in depressive women. **Clinical Biochemitry**, Toronto, v. 42, n. 13-14, p. 1368–1374, 2009. https://doi.org/10.1016/j.clinbiochem.2009.06.006

MERRILL, R. M.; PENNY, T. M. S.; STEVEN, G. A. Coronary Health Improvement Project (CHIP) is associated with improved nutrient intake and decreased depression. **Nutrition**, Burbank, v. 24, n. 4, p. 314-321, 2008. https://doi.org/10.1016/j.nut.2007.12.011

MOUSSAVI, S. et al. Depression, chronic diseases, and decrements in health: results from the World Health Surveys. **Lancet**, London, v. 370, n. 9590, p. 851–858, 2007. https://doi.org/10.1016/S0140-6736(07)61415-9

MUELLER, T. I. et al. Recurrence after recovery from major depressive disorder during 15 years of observational follow-up. **The American Journal of Psychiatry**, Arlington, v. 156, n. 7, p. 1000-1006, 1999.

MURRAY, C. J. et al. Disability-adjusted life years [DALYs] for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the global burden of disease study 2010. **Lancet**, London, v. 380, n. 9859, p. 2197–2223, 2012. https://doi.org/10.1016/S0140-6736(12)61689-4

OPIE, R. S. et al. The impact of whole-of-diet interventions on depression and anxiety: a systematic review of randomised controlled trials. **Public Health Nutrition**, Wallingford, v. 18, n. 11, p. 2074-2093, 2015. https://doi.org/10.1017/S1368980014002614

PASKULIN, J. T. A. et al. Association between dietary patterns and mental disorders in pregnant women in Southern Brazil. **Revista Brasileira de Psiquiatria**, São Paulo, v. 39, n. 3, p. 208-215, 2017. https://doi.org/10.1590/1516-4446-2016-2016

RUIZ-CABELLO, P. et al. Association of dietary habits with psychosocial outcomes in women with fibromyalgia: The al-Andalus Project. **Jounal of the Academy of Nutrition and Dietetics**, New York v. 117, n. 3, p. 422-432, 2017. https://doi.org/10.1016/j.jand.2016.09.023

SANCHEZ-VILLEGAS, A.; MARTÍNEZ-GONZÁLEZ, M. A. Diet, a new target to prevent depression?. **BMC Medicine**, London, v. 11, n. 3, p. 1-4, 2013. https://doi.org/10.1186/1741-7015-11-3

SÁNCHEZ-VILLEGAS, A. et al. Fast-food and commercial baked goods consumption and the risk of depression. **Public Health Nutrition**, Wallingford, v. 15, n. 3, p. 424–432, 2012. https://doi.org/10.1017/S1368980011001856

SEN, S.; DUMAN, R.; SANACORA, G. Serum Brain-Derived Neurotrophic Factor, Depression, and Antidepressant Medications: MetaAnalyses and Implications. **Biological Psychiatry**, London, v. 64, n. 6, p. 527-532, 2008. https://doi.org/10.1016/j.biopsych.2008.05.005

STOPA, S. R. et al. Prevalência do autorrelato de depressão no Brasil: resultados da Pesquisa Nacional de Saúde, 2013. **Revista Brasileira de Epidemiologia**, São Paulo, v. 18, n. 2, p. 170–180, 2015. https://doi.org/10.1590/1980-5497201500060015

WARAICH, P. et al. Prevalence and incidence studies of mood disorders: a systematic review of the literature. **The Canadian Jounal of Psychiatry**, Ottawa, v. 49, n. 2, p. 124-138, 2004. https://doi.org/10.1177/070674370404900208

WORLD PSYCHIATRIC ASSOCIATION - WPA. **Educational program on depressive disorders**. Overview and fundamental aspects. New York [s. n.]: WPA, 1997.

WULSIN, L. R.; VAILLANT, G. E.; WELLS, V. E. A systematic review of the mortality of depression. **Psychosomatic Medicine**, Baltimore, v. 61, n. 6, p. 6-17, 1999. https://doi.org/10.1097/00006842-199901000-00003

DECLARAÇÃO

Declaramos para os devidos fins que KAMILLA TAVARES DE SOUSA, aluno do Programa de Pós-graduação em Ciências da Saúde da Faculdade de Medicina, da Universidade Federal de Uberlândia, recebeu orientações sobre as normas da ABNT, NBR 6023 referente à preparação de referências, NBR 10520, referente à apresentação de citações e NBR 14724 referente à apresentação de Trabalhos acadêmicos para elaboração da sua Dissertação de Mestrado titulada "CONSUMO ALIMENTAR E DEPRESSÃO EM ADULTOS BRASILEIROS – RESULTADOS DA PESQUISA NACIONAL DE SAÚDE DE 2013".

Uberlândia, 26 de fevereiro de 2018.

Atenciosamente,

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