In progress paper for presentation at 2014 PAA

Examining links between depression and body composition among older adults: Results from the World Health Organization's Study on global AGEing and adult health (SAGE) Wave 1.

MA Liebert[1], WJ Olson[1], HH McClure[1,2], TE Gildner[1], and N Naidoo[3]. [1]Department of Anthropology, University of Oregon, Eugene, OR; [2]Center for Equity Promotion, University of Oregon, Eugene, OR; [3]World Health Organization, Geneva, Switzerland.

EXTENDED ABSTRACT

INTRODUCTION

Recent epidemiological studies have identified depression as an important public health issue, affecting approximately 121 million people globally (Üstün et al., 2004; WHO, 2008). In 2004, depression was ranked as the third leading cause of disease worldwide based on disability adjusted life years (DALYs) and is projected to be the primary source of disease burden by 2030 (WHO, 2008). Research suggests that depression has manifested as a global health concern due to its relatively high lifetime prevalence, the substantial disability it causes, and its associations with various health complications (Moussavi et al., 2007; Lépine and Briley, 2011). Depression among older adults, in particular, has emerged as a major health problem because of its increasing prevalence and damaging health consequences (Alexopoulos, 2005; Peltzer and Phaswana-Mafuya, 2013). For example, late-life depression has been associated with an increased risk for type 2 diabetes, hypertension, and frailty as well as decreased physical, cognitive, and social functioning (Blazer, 2003).

Further, current research among older adults has suggested a link between depression and modifications in body composition, including changes in abdominal fat (Brown et al., 2004). Although progress has been made in characterizing the relationship between late-life depression and body composition, recent studies have provided conflicting findings. For instance, some researchers have suggested that depression is associated with greater body mass and obesity (Han et al., 1998), while others have reported that depression is linked to reduced central fat and an increased risk for being underweight (Ho et al., 2008; Mezuk et al., 2012).

These inconsistent results are further complicated by differences in socioeconomic position, cultural factors, and demographic characteristics. Moreover, most studies examining the association between depression and body composition have exclusively focused on populations in wealthy nations, while few studies have systematically evaluated this relationship among older adults in low- and middle-income countries. Given that depression is a leading cause of disability worldwide, it is imperative that future research explores this topic in order to develop effective interventions and reduce the global disease burden.

To address these issues, the current study presents results from the World Health Organization's Study on global AGEing and adult health (SAGE), a longitudinal project designed to gather comprehensive information on the aging process among lower- and upper-middle-income countries. This paper uses SAGE data from six countries (Mexico, Ghana, India, China, South Africa, and Russian Federation) in order to: 1) examine depression prevalence (based on a symptom-based algorithm) and body composition patterns (body mass index [BMI] and waist circumference [WC]) among older adults by sex and country; and 2) investigate the relative contribution of depression classification on BMI and WC measurements by sex and country.

METHODS

SAGE Project and Study Participants

The core SAGE study collects data on respondents aged 50 years and older from nationally representative samples in six countries (Mexico, Ghana, India, China, South Africa, and Russian Federation) (Kowal et al., 2012). The present study included a total sample of 35,320 participants

(16,179 males, 19,141 females), with a mean age of 63.5 years. Sample sizes for the six countries included: 2306 (911 males, 1395 females) from Mexico, 4724 (2347 males, 2377 females) from Ghana, 7150 (3616 males, 3534 females) from India, 13,367 (6274 males, 7093 females) from China, 3840 (1637 males, 2203 females) from South Africa, and 3933 (1394 males, 2539 females) from Russian Federation.

From 2007-2010, face-to-face interviews were conducted in the six countries to collect household and individual-level data, including: demographic and socioeconomic information, health state and chronic conditions, disability, life satisfaction, depression, and health care utilization.

Body Composition Measurements

As part of the face-to-face interview, anthropometric measurements were also obtained. Height (cm) and weight (kg) were measured according to standard procedures, and body mass index (BMI; kg/m^2) was calculated. This study used established WHO cut-offs for BMI: underweight (<18.5 kg/m^2), normal (18.5-24.9 kg/m^2), overweight (25.0-29.9 kg/m^2), and obese (≥30 kg/m^2) (WHO, 2000). Since the relationships among BMI, body fat percentage, and health risk are different in Asian populations compared to other groups, we used modified BMI cut-offs for China and India: underweight (<18.5 kg/m^2), normal (18.5-22.9 kg/m^2), increased risk (23.0-27.5 kg/m^2), and higher high risk (≥27.5 kg/m^2) (WHO, 2004).

Waist circumference (WC) was also measured using standard procedures, and values were interpreted based on WHO (2011) categories: normal (≤94 cm) and increased risk (>94 cm) for males, and normal (≤80 cm) and increased risk (>80 cm) for females. Modified WC cut-offs were used for China and India; however, these revised categories only adjust the risk classifications for males: normal (≤90 cm) and increased risk (>90 cm) (IDF, 2006).

Extreme outliers were identified with interquartile ranges (IQRs) by sex and age following Larson (2006; if x<Q1-3*IQR or x>Q3+3*IQR). All analyses were conducted separately for BMI and WC, and outliers were removed before statistical tests.

Depression Measures

In accordance with SAGE protocol, depression was assessed with two methods. First, participants were asked if they had been diagnosed with depression during their lifetime. Second, a set of questions based on the World Mental Health Survey version of the Composite International Diagnostic Interview (CIDI; Kessler and Üstün, 2004) were included to assess the presence of depressive symptoms and length of duration over the past 12 months. The responses to the individual items were then used in a diagnostic algorithm to generate the diagnosis of depression based on the International Classification of Diseases (10th revision) Diagnostic Criteria for Research (ICD-10-DCR; WHO, 1993).

Statistical Analysis

Descriptive statistics for BMI and WC (as continuous variables) were calculated for males and females. Weighted prevalence estimates were calculated for depression classification (presence or absence), BMI categories (underweight, normal, overweight/increased risk, obese/higher high risk), and WC categories (normal, increased risk) by sex. Pearson's chi-square tests were used to compare depression classification between males and females, and independent-samples t-tests (two-tailed) were conducted to measure sex differences in continuous BMI and WC measurements. A series of multiple linear regressions were used to estimate the relative association of depression classification on BMI and WC measures while controlling for several key variables (age, smoking behavior, drinking patterns, marital status, and income). All analyses were conducted separately by country and performed using SPSS 21.0. Results were considered statistically significant at $P < 0.05$.

PRELIMINARY RESULTS

Depression Prevalence by Sex and Country

With all countries combined, 8.2% of males and 10.6% of females were classified as depressed; sex differences in depression prevalence were significant (P = 0.016). There were also substantial differences by sex and country in depression classification. Depression prevalence ranged from 1.6% in Chinese males to 17.6% in Indian males, and 2.5% in Chinese females to 22.9% in Mexican females.

Body Composition Measures by Sex and Country

Overall, males had a mean BMI of 23.47 (4.69), ranging from 20.18 (3.75) among Indian males to 27.45 (6.09) among South African males. Results indicate major differences between countries in prevalence of underweight (from 0.5% in Mexican males to 40.0% in Indian males) and obesity/higher high risk (from 4.3% in Indian males to 37.3% in South African males). Males had a mean WC of 85.41 (12.73) cm, ranging from 81.74 (10.42) cm in Indian males to 98.70 (11.33) cm in Mexican males. There was also substantial variation between countries in the prevalence of increased risk WC (17.5% in males from Ghana to 62.1% in Mexican males).

Females (with all countries combined) had a mean BMI of 25.27 (6.00), ranging from 20.97 (4.66) among Indian females to 30.20 (7.25) among South African females. There were also major differences between countries in prevalence of underweight (from 0.7% in Mexican females to 37.8% in Indian females) and obesity/higher high risk (from 8.8% in Indian females to 51.0% in South African females). Overall, females had a mean WC of 86.88 (14.09) cm, ranging from 81.33 (12.25) cm in Indian females to 96.11(12.98) cm in Mexican females. Females also displayed variability in prevalence of increased risk WC (52.1% in Indian females to 79.9% in South African females).

Independent samples t-tests identified a significant sex difference in BMI across all countries (P < 0.001), with females displaying higher levels than males. For WC, females in Ghana and South Africa had significantly higher levels than males (P < 0.001), whereas males had significantly higher levels than females (P < 0.001) in Mexico.

Associations between Depression and Body Composition Measures by Sex and Country

Linear regressions were used to estimate the effects of depression classification on variation in BMI and WC levels for males and females in each country (while controlling for key variables). With males from all countries combined, depression was a significant predictor of BMI (β = -0.43; P = 0.030), indicating that depression diagnosis was associated with decreased BMI levels among males. Depression was not a significant predictor of BMI and WC for males when examined by country. For females overall, depression was not a significant predictor of BMI and WC. When analyzed by country, depression was a significant predictor of BMI (β = 5.34; P = 0.002) and WC (β = 9.65; P = 0.045) for South African females, demonstrating that depression diagnosis was associated with increased BMI and WC levels. The BMI and WC regression models were non-significant for females in the remaining countries.

PRELIMINARY DISCUSSION POINTS

Depression has recently emerged as one of the leading contributors to the burden of illness among older adults. While current research has identified an important association between late-life depression and changes in body composition, the results are conflicting; in some studies, depression increases risk for being underweight, while in other studies it has been linked to obesity. Further, limited research has examined these patterns among older adults in low- and middle-income countries, thereby restricting our understanding of the global burden of depression. The present study investigates these issues with data from the World Health Organization's Study on global AGEing and adult health (SAGE).

Our findings identified substantial variation in depression prevalence by sex and country. Unsurprisingly, depression was more prevalent among females than males. There were also major differences in depression classification by country; Chinese males and females had the lowest prevalence levels, whereas Indian males and Mexican females displayed the highest prevalence. These findings illustrate the global distribution of depression, while highlighting the variability across cultures

in the symptomatic expression and manifestation of this disorder. Given that depression among older adults is often underdiagnosed, this study offers important baseline data on depression prevalence by using a symptom-based diagnostic tool.

Variation by sex and country was also evident in prevalence of underweight (0.5% in Mexican males to 40.0% in Indian males) and obesity/higher high risk (from 4.3% in Indian males to 51.0% in South African females) when using BMI as a measure of body composition. There were also substantial differences between countries in the prevalence of increased risk WC, ranging from 17.5% in Indian males to 79.9% in South African females. These findings provide evidence of the global prevalence of obesity levels, particularly among aging populations in Mexico and South Africa. However, our study further emphasizes that some populations continue to experience health burdens associated with malnutrition. It is imperative that future research addresses issues associated with the spectrum of body composition, from underweight to obesity, particularly among aging populations who encounter additional health complications.

Moreover, the present study identified significant differences in the relationship between depression and body composition by sex and country. With all countries combined, depression diagnosis was negatively related to BMI levels for males. These results are consistent with previous studies demonstrating that depression is linked to reduced body mass and increased risk of being underweight, while also suggesting that these risks may be particularly important for males. Among South African females, depression diagnosis was positively associated with BMI and WC levels, indicating that females from this population who are depressed may experience increased risks for being obese.

This study is a first step in documenting cross-cultural differences in depression and its association with body composition among older males and females. Overall, these findings highlight the complex links between late-life depression and changes in body composition and demonstrate that depression does not have a simple, homogenous effect on health. As the global burden of depression increases throughout the world, particularly among aging populations, it is important that future research investigates these issues in order to develop effective health care policies and to improve the quality of life of older adults.

FUNDING

NIH NIA Interagency Agreement YA1323-08-CN-0020); NIH R01-AG034479; University of Oregon.

REFERENCES CITED

Alexopoulos GS. 2005. Depression in the elderly. Lancet 365: 1961-70.

Blazer DG. 2003. Depression in late life: Review and commentary. J Gerontol A Biol Sci Med Sci 58: 249-65.

Brown et al. 2004. Association of depression with medical illness: Does cortisol play a role? Biol Psychiatry 55:1-9.

Han TS et al. 1998. Quality of life in relation to overweight and body fat distribution. Am J Public Health 88: 1814-20.

Ho et al. 2008. Body mass index, waist circumference, waist-hip ratio and depressive symptoms in Chinese elderly: A population-based study. Int J Geriatr Psych 23: 401-8.

IDF [International Diabetes Federation]. 2006. The IDF consensus worldwide definition of the metabolic syndrome.

Kessler RC, Üstün TB. 2004. The World Mental Health (WMH) Survey initiative version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI) Int J Ment Psych Res 13: 93-121.

Kowal P et al. 2012. Data Resource Profile: The WHO Study on global AGEing and adult health (SAGE). Int J Epidemiol 41: 1639.

Larson MG. 2006. Descriptive statistics and graphical displays. Circulation 114: 76-81.

Lépine JP, Briley M. 2011. The increasing burden of depression. Neuropsych Dis Treat 7(Suppl): 3-7.

Mezuk B et al. 2012. Depression and body composition among older adults. Aging Ment Health 16: 167-72.

Moussavi S et al. 2007. Depression, chronic disease, and decrements in health: Results from the World Health Surveys. Lancet 370: 851-8.

Peltzer K, Phaswana-Mafuya N. 2013 Depression and associated factors in older adults in South Africa. Glob Health Action 6: 18871.

Üstün et al. 2004. Global burden of depressive disorders in the year 2000. Br J Psychiatry 184: 386-92.

WHO [World Health Organization]. 1993. The ICD-10 classification of mental and behavioural disorders: Diagnostic criteria for research (DCR-10). Geneva: World Health Organization.

WHO [World Health Organization]. 2000. Obesity: Preventing and Managing the Global Epidemic. Geneva: World Health Organization.

WHO [World Health Organization]. 2008. The Global Burden of Disease: 2004 Update. Geneva: World Health Organization.

WHO [World Health Organization]. 2004. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet 363: 157-63.