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ORIGINAL ARTICLE

Multimorbidity, Depressive Symptoms, and Self-Reported Health in Older Adults: a Secondary Analysis of the Sabe Bogota Study

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ABSTRACT

Background: Multimorbidity and depressive symptoms (DSs) are common in older adults. Self-rated health (SRH) allows detection of elderly adults with a high burden of multimorbidity plus depression. The aim of this study was to test the association of groups of multimorbidity and DS on SRH in Colombian older adults. **Methods:** We conducted a cross-sectional study in 2012 in Bogotá, Colombia, called "Salud, Bienestar y Envejecimiento" (Health, Well-being, and Aging), including 2000 community-dwelling adults 60 years of age or older. SRH was assessed with the question "How would you rate your health?" giving five possible answers. DSs were rated using the 15-question version of the geriatric depression scale, and multimorbidity was defined as having two or more chronic diseases. A logistic regression model was used to identify the association between grouped DS and multimorbidity with SRH. **Results:** Groups were distributed as follows: 678 with no DS/no multimorbidity (33.9%), 808 with only multimorbidity (40%), 128 with DS only (6.4%), and 386 with DS/multimorbidity (19.3%). An association of fair/poor SRH with DS/multimorbidity group was found (odds ratio 5.5; 95% confidence interval 3.86-7.95, $p < 0.001$) when compared to subjects without any of those conditions. **Conclusion:** There was an incremental association between DS and multimorbidity with SRH. An older adult referring to his or her own health with a negative connotation should alert to a higher burden of diseases, including DS. (REV INVES CLIN. 2018;70:192-97)

Key words: Multimorbidity. Depressive symptoms. Self-reported health. Older adults.

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INTRODUCTION

The demographic composition of the population has been changing dramatically in the past few decades, resulting in an aged society[1]. It is expected that by 2100, there will be 50-times more older adults as there are currently[2,3]. Chronic diseases are more frequently found in older adults and usually in the form of more than one disease rather than an isolated illness; this condition - having more than one chronic disease - is generally referred to as multimorbidity[4,5]. Multimorbidity takes into account the relative importance of the concurring conditions and their interactions (including complications and medication intake), instead of the nature of a single health condition. However, mental health problems are left out, including in this construct only those with an "organic" origin[6]. Another common condition in older adults is the presence of depressive symptoms (DSs) which worsen an already complex scenario[7] not only by its very own nature but also by interacting with other geriatric conditions such as frailty and sarcopenia[8], increasing the risk of mortality, among other risks, without a proper treatment[7,8].

Self-reported health (SRH) is a valuable measure of overall health status in older adults9. There is evidence that a negative SRH perception (i.e., rating own health as fair or poor) predicts mortality in older adults[10]. Likewise, some studies point to the fact that older adults with DS also have a negative SRH perception[11,12]. It has been shown that the clinical course of chronic diseases changes negatively in patients with DS; therefore, the early diagnosis of DS could reduce the frequency of negative outcomes[13]. Thus, the aim of this study was to test whether there was an incremental association of groups of multimorbidity and DS with SRH in Colombian older adults.

MATERIALS AND METHODS

Study design, setting, and sampling

This is a secondary analysis from the "Salud, Bienestar y Envejecimiento" Bogota (SABE-B) (Health, Wellbeing, and Aging) study, a cross-sectional study conducted in the capital of Colombia in 2012. The SABE-B had a probabilistic sampling scheme in multistages neighborhood clusters that interviewed a total of 2000 community-dwelling adults aged 60 years and older[14] representative of both rural and urban areas of the city of Bogota. Full objectives and methods can be found elsewhere[15].

SRH

Regarding the dependent variable, SRH was measured as a single question: "How would you rate your health?" Five possible answers were given: "excellent", "very good", "good", "fair", or "poor". To reflect positive versus negative SRH, the variable was compacted into two categories: excellent/very good/good (positive) and fair/poor (negative)[16].

Depression symptoms and multimorbidity

Multimorbidity was defined as having two or more diseases from the chronic diseases group list, available in the questionnaire (excluding DS)[4,5,17]. Chronic diseases included in the primary study were as follows: hypertension, diabetes, cancer, chronic obstructive pulmonary disease, heart attack, heart failure, stroke, arthritis or osteoarthritis, osteoporosis, gastroesophageal reflux disease, gastritis, or ulcer. The disease was considered present if the answer to the following question was "yes": "has a doctor or a nurse ever told you that you suffered from...?" For practical purposes in this analysis, the answers were grouped into two categories: "no-multimorbidity" and "multimorbidity". The variable DS was evaluated in the interviews using the 15-question version of the geriatric depression scale (GDS-15) validated in Colombian older adults. The GDS-15 is one of the more widely used tools to assess depression both in clinical and research settings; in addition, there was a validated version of this tool for our target population[16,18]. The association with multimorbidity and DS was tested by grouping both conditions into four categories: 0: without DS/without multimorbidity (reference group), 1: without DS/with multimorbidity, 2: with DS/without multimorbidity, and 3: with DS/with multimorbidity.

To adjust in the multivariate models, confounding variables were considered. These included age in years, gender (female and male), education in years attending school, and marital status (the answers were grouped in two categories: "having a partner" and "not having a partner"). Socioeconomic status in

Colombia is measured using six categories from 1 - the lowest to 6 - the highest, according to the Departamento Administrativo Nacional de Estadística; for this study, we grouped the six strata into three groups: 1-2 in "lower", 3-4 in "middle", and 5-6 in "upper". Finally, regarding the exposure to violence, we considered "exposure to violence" and "no exposure to violence". Variables on health status were included as follows: cognitive impairment (mini-mental state examination with a score ≤ 13 out of 19 points possible)[19], uncompensated sensory deficit (self-reported visual deficit), self-reported pain, and self-reported unintentional weight loss in the past 12 months ("In the past 12 months, have you lost weight without having followed any type of diet?"). Physical function was defined according to the Barthel activities of daily living index, self-reported falls in the past 12 months, and hospitalizations in the past 12 months. Other variables investigated were smoking status (never smoked, former smoker, and current smoker), binge drinking (defined as 5 or more drinks in a row for men and 4 or more drinks for women, on at least 1 occasion during the past 2 weeks)[20,21], polypharmacy (defined as five or more drugs)[22], and body mass index.

Statistical analysis

Categorical variables and continuous variables were used, represented by frequencies/percentages and means/standard deviations (SD), respectively. Then, bivariate models were used to recognize which independent variables were associated with SRH, depending on the significance level or p value ($p < 0.05$). Chi-square tests were used for categorical variables and t-test was employed for continuous variables. Finally, for the multivariate analysis, unadjusted and adjusted logistic models were estimated for all significant variables ($p ≤ 0.05$) in the bivariate analysis. Odds ratios (OR) along with 95% confidence intervals (95% CI) were reported. To assess the fraction of the variance that represents DS/multimorbidity of SRH, Nagelkerke pseudo-squared R is reported for both models. Analysis was performed using STATA 14.0 statistical software.

Ethical issues

The research protocol was reviewed and approved by the Institutional Review Board at Pontificia Universidad Javeriana. All study participants signed informed consent.

RESULTS

A total of 2000 respondents 60 years of age or older were included in the study. Participants had a mean age of 71.1 years with an SD of 8.05; 63.4% were women, and the majority had a low socioeconomic status (51.9%). A total of 945 (47.35%) subjects had an excellent/very good/good SRH, in contrast to 1055 older adults (52.7%) rating their health as fair/poor (Table 1).

In the bivariate analysis, the mean age was higher for the subgroup with fair/poor SRH (72.3 vs. 69.8). Fewer men reported fair/poor SRH (33.6%) in comparison with women (66.3%), with a significant difference ($p = 0.004$). Except for having a partner and the smoking status, the rest of the variables were significantly different between the groups according to SRH. The group without multimorbidity or DS had a higher frequency of excellent/very good/good SRH (n = 478, 50.5%), followed by the multimorbidity only group (n = 357, 37.7%), the DS only group (n = 53, 5.6%), and those with both multimorbidity and DS (n = 57, 6%) ($p < 0.001$) (Table 1).

In the multivariate analysis, there was an incremental association of negative SRH with groups of DS/multimorbidity, both for the unadjusted and adjusted models. The group that had the greatest association with a negative SRH was multimorbidity and DS, showing an OR of 13.79 (95% CI 9.95-19.1) without adjustment, and after the adjustment of 5.59 (95% CI 3.89-8.04, p < 0.001). The pseudo-squared R for the unadjusted model was of 0.12, while for the adjusted was of 0.21 (Table 2).

DISCUSSION

The aim of this study was to analyze the association between multimorbidity and depression symptoms with self-reported health using data of a cross-sectional population-based study of older adults in Bogota, Colombia. Data showed an independent and incremental association between health-related problems (multimorbidity and DS) with the probability of

Table 1. General description of the sample and bivariate analysis of continuous variables comparing groups of self-rated health (excellent/very good/good and fair/poor).

Variable	Total (n = 2000)	Self-rated health		p value
		Excellent/ very good/good (n = 945; 47.25%)	Fair/poor (n = 1,055; 52.75%)	
Age, mean (SD)	71.1 (8.05)	69.8 (7.7)	72.3 (8.1)	< 0.001
Gender, n (%)				
Women	1,268 (63.4)	568 (60.1)	700 (66.3)	0.004
Men	732 (36.6)	377 (39.8)	355 (33.6)	
Years in school, mean (SD)	4.3 (3.1)	4.89 (3.19)	3.85 (2.94)	< 0.001
Has a partner, n (%)	982 (49.1)	485 (51.3)	497 (47.1)	0.06
Socioeconomic status, n (%)				
Low	1,038 (51.9)	446 (47.2)	592 (56.1)	< 0.001
Middle	897 (44.8)	448 (47.4)	449 (42.5)	
Upper	65 (3.2)	51 (5.4)	14 (1.3)	
Violence exposure, n (%)	752 (37.6)	292 (30.9)	460 (43.6)	< 0.001
Cognitive impairment, n (%)	252 (12.6)	70 (7.4)	182 (17.2)	< 0.001
Uncompensated sensory deficit, n (%)	740 (37)	287 (30.3)	453 (42.9)	< 0.001
Pain, n (%)	937 (46.8)	269 (28.4)	668 (63.3)	< 0.001
Weight loss, n (%)	545 (27.2)	194 (20.5)	351 (33.2)	< 0.001
Disability, n (%)	661 (33)	149 (15.7)	512 (48.5)	< 0.001
Recent falls n (%)	569 (28.4)	227 (24)	342 (32.4)	< 0.001
Recent hospitalizations, n (%)	315 (15.7)	87 (9.2)	228 (21.6)	< 0.001
Smoking status, n (%)				
Never smoked	1107 (55.2)	523 (55.3)	584 (55.3)	0.517
Current smoker	766 (38.3)	356 (37.6)	410 (38.8)	
Former smoker	127 (6.3)	66 (6.9)	61 (5.7)	
Binge drinking, n (%)	179 (8.9)	113 (11.9)	66 (6.2)	< 0.001
Polypharmacy, n (%)	548 (27.4)	172 (18.2)	376 (35.6)	< 0.001
Body mass index, mean (SD)	27.5 (4.1)	27.2 (4.1)	27.7 (4.6)	0.008
Multimorbidity/depressive symptoms, n (%)				
None	678 (33.9)	478 (50.5)	200 (18.9)	< 0.001
Multimorbidity only	808 (40.4)	357 (37.7)	451 (42.7)	
Depressive symptoms only	128 (6.4)	53 (5.6)	75 (7.1)	
Both	386 (19.3)	57 (6)	329 (31.2)	

n: number, SD: standard deviation.

Table 2. Unadjusted and adjusted logistic regression models with poor/fair self-rated health category as the dependent with groups of depressive symptoms/multimorbidity as the independent variable of interest.

		Unadjusted, OR (95%CI) R2 0.12	*p* value	Adjusted*, OR (95% CI) R2 0.21	*p* value
Poor/fair self-rated health	No multimorbidity nor depressive symptoms (reference category)				
	Only multimorbidity	3.01 (2.43-3.74)	< 0.001	1.75 (1.36-2.23)	< 0.001
	Only depressive symptoms	3.38 (2.29-4.98)	< 0.001	2.27 (1.49-3.46)	< 0.001
	Multimorbidity and depressive symptoms	13.79 (9.95-19.1)	< 0.001	5.59 (3.89-8.04)	< 0.001

*Adjusted for: age, gender, years in school, socioeconomic status, violence exposure, cognitive impairment, uncompensated sensory deficit, pain, weight loss, disability, recent falls, recent hospitalizations, binge drinking, polypharmacy, and body mass index. OR: odds ratio, CI: confidence interval.

reporting a negative SRH. Given these results, it is important to consider the association between these three variables since it has the potential to increase complications and adverse outcomes in older adults. For instance, following what Gallo et al. stated[7], "Mortality in the primary care of older patients is increased when multimorbidity is linked to DS". Thus, the identification of DS may contribute to improve global diagnosis of DS earlier and reduce the potential complications of this disease and multimorbidity in the older adult afflicted by both. Moreover, a longitudinal study added evidence that supports a possible causal relation between DS and SRH, where DSs are not only conjoined with the lowest SRH but also with odds of better SRH perception after a 2-year period of follow-up[23]. Finally, SRH displays a rise in the risk of mortality when it is categorized as negative[10].

When it comes to primary care practice, older adults usually do not report affective symptoms; therefore, DSs are frequently underdiagnosed and undertreated[9]. Whenever an older adult attends a medical consultation, one of the first questions posed by the physician is "How do you feel?" A negative answer would imply that something is wrong that could represent the presence of problems of the whole body, and also from the affective sphere, just as this SRH question has shown to behave in epidemiologic studies. Therefore, a negative SRH may reflect DS or multimorbidity (or both), an answer that commonly prompts the physician to take action on multimorbidity frequently overlooking affective disorders such as DS.

This study has some strengths: it is the first study documenting the association in a Latin-American country in a large dataset including a representative sample of a large capital city. There are some limitations too: the lack of the possibility of establishing causality, due to its cross-sectional nature. On the other hand, self-reported variables could represent recall bias. It is important to clarify that the category "without multimorbidity", includes people with a single disease and that may be enough to compromise their quality of life and generate a fair or poor SRH. It is important to stress that when doing secondary analysis of large epidemiologic studies such as SABE-Bogotá, variables are limited to those already available in the dataset; for example, not having hypothyroidism in the list of chronic diseases could limit the interpretation of our results, although this entity has shown to be associated with DS. Moreover, a frequent limitation of epidemiologic studies is the lack of confirmation of diagnosis; in this case, there was no clinical confirmation of DS with a reference standard.

Finally, the study showed an increasing association between a poor SRH and the presence of DS and multimorbidity, while half of older adults without these two entities had a positive SRH. Having simple tools such as SRH to assess older adults could aid in improving the care of this already complex group of individuals.

ACKNOWLEDGMENTS

REFERENCES

1. United Nations, World Assembly on Aging. A Neglected Area in the Field of Population and Human Rights: aging and the Aged. New York: United Nations; 1983.
2. Lee R. The demographic transition: three centuries of fundamental change. J Econ Perspect. 2003;17:167-90.
3. Omran AR. The epidemiologic transition. A theory of the epidemiology of population change. Milbank Mem Fund Q. 1971; 49:509-38.
4. van den Akker M, Buntinx F, Metsemakers JF, Roos S, Knottnerus JA. Multimorbidity in general practice: prevalence, incidence, and determinants of co-occurring chronic and recurrent diseases. J Clin Epidemiol. 1998;51:367-75.
5. Valderas JM, Starfield B, Sibbald B, Salisbury C, Roland M. Defining comorbidity: implications for understanding health and health services. Ann Fam Med. 2009;7:357-63.
6. Cesari M, Pérez-Zepeda MU, Marzetti E. Frailty and multimorbidity: different ways of thinking about geriatrics. J Am Med Dir Assoc. 2017;18:361-4.
7. Gallo JJ, Hwang S, Joo JH, et al. Multimorbidity, depression, and mortality in primary care: randomized clinical trial of an evidence-based depression care management program on mortality risk. J Gen Intern Med. 2016;31:380-6.
8. Samper-Ternent R, Reyes-Ortiz C, Ottenbacher KJ, et al. Frailty and sarcopenia in Bogotá: results from the SABE Bogotá Study. Aging Clin Exp Res. 2017;29:265-72.
9. Pérez-Zepeda MU, Belanger E, Zunzunegui MV, Phillips S, Ylli A, Guralnik J. Assessing the Validity of Self-Rated Health with the Short Physical Performance Battery: a Cross-Sectional Analysis of the International Mobility in Aging Study. PLoS One. 2016; 11:e0153855.
10. Moreno X, Huerta M, Albala C. Global self-rated health and mortality in older people. Gac Sanit. 2014;28:246-52.
11. Ambresin G, Chondros P, Dowrick C, Herrman H, Gunn JM. Self-rated health and long-term prognosis of depression. Ann Fam Med. 2014;12:57-65.
12. Chang-Quan H, Xue-Mei Z, Bi-Rong D, Zhen-Chan L, Ji-Rong Y, Qing-Xiu L. Health status and risk for depression among the elderly: a meta-analysis of published literature. Age Ageing. 2010;39:23-30.
13. Palladino R, Tayu Lee J, Ashworth M, Triassi M, Millett C. Associations between multimorbidity, healthcare utilisation and health status: evidence from 16 European countries. Age Ageing. 2016;45:431-5.
14. Samper-Ternent R. Personas con 60 y más años residentes de Bogotá. Análisis de la Encuesta SABE Bogotá 2012. 1st ed. Bogotá: Universidad Javeriana Ediciones; 2012.
15. Albala C, Lebrão ML, León Díaz EM, et al. The health, well-being, and aging ("SABE") survey: methodology applied and profile of the study population. Rev Panam Salud Publica. 2005;17:307-22.
16. Yesavage JA, Brink TL, Rose TL, et al. Development and validation of a geriatric depression screening scale: a preliminary report. J Psychiatr Res. 1982-1983;17:37-49.
17. Huntley AL, Johnson R, Purdy S, Valderas JM, Salisbury C. Measures of multimorbidity and morbidity burden for use in primary care and community settings: a systematic review and guide. Ann Fam Med. 2012;10:134-41.
18. Bacca AM, González A, Uribe-Rodríguez AF. Validación de la escala de depresión de yesavage en adultos mayores colombianos. Pensamiento Psicol. 2004;1:53-63.
19. Borda MG, Ruiz C, Gutierrez S, Ortiz A, Samper-Ternent R, Cano-Gutierrez C. Relación entre deterioro cognitivo y actividades instrumentales de la vida diaria: estudio SABE-Bogotá, Colombia. Acta Neurol Colomb. 2016;32:27-34.
20. Wechsler H, Davenport A, Dowdall G, Moeykens B, Castillo S. Health and behavioral consequences of binge drinking in college. A national survey of students at 140 campuses. JAMA. 1994; 272:1672-7.
21. O'Malley PM, Bachman JG, Johnston LD. Period, age, and cohort effects on substance use among American youth, 1976-82. Am J Public Health. 1984;74:682-8.
22. Bjerrum L, Rosholm JU, Hallas J, Kragstrup J. Methods for estimating the occurrence of polypharmacy by means of a prescription database. Eur J Clin Pharmacol. 1997;53:7-11.
23. Han B. Depressive symptoms and self-rated health in community-dwelling older adults: a longitudinal study. J Am Geriatr Soc. 2002;50:1549-56.