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THE JOURNAL OF LATIN AMERICAN GERIATRIC MEDICINE ORIGINAL ARTICLE

Prognostic factors in non-cardiac surgery in the elderly

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Abstract

Background: *Aging has increased the surgical need for elders. We still lack evidence about prognostic factors in geriatric surgical patients.* **Objective:** *The objective of this study is to associate pre-operative variables with post-operative morbimortality.* **Methods:** *A observational, descriptive, cross-sectional study included patients 65 years and older who underwent non-cardiac surgery. We measured baseline characteristics, type of surgery, comorbidity, vasoactive medications, prescription drugs, laboratory results, and geriatric syndromes.* **Statistical Analysis:** *We used SPSS-20.0. Quantitative variables were analyzed by T-student, qualitative by Chi-square.* **Results:** *Between July 2013 and June 2014, we included 120 patients 65 years and older who underwent non-cardiac surgery. The mean age was 78.5 years. 47.5% procedures were scheduled. Acute kidney injury, depression, falls, sore ulcers, and fecal incontinence were associated with poor prognosis. The main post-operative complication was delirium.* **Conclusions:** *Elder surgical patients are complex. Some conditions may be compensated as part of pre-operative evaluation to improve outcomes. Age by itself it is not related to a poor prognosis.* (J Lat Am Geriat Med. 2018;4:3-7)

Key words: *Aged. Surgery. Pre-operative care.*

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INTRODUCTION

Demographic and epidemiologic changes in the past decades have led us to an aged society. In México, 9.2% of its population has 60 years or more, and 15% of elders are above 80 years old. It is expected that in 2050, the 28% of Mexican population will be 65 years or older[1]. Aging is a universal phenomenon, for example, in 2025, the Brazilian will have 15% or their population over 65 years[2]. In the United States, elders will double their number between 2010 and 2050[3].

These changes will force the professionals in the operating room to face elders with surgical needs, including major procedures and emergent surgery[4,5]. In the 1980's, only the 19% of the total surgical procedures corresponded to 65 years or older, compared to 38% in the beginning of the 21st century[6]. Almost half of the elders will need a surgical procedure at some point in their lives[7]. The most frequent procedures are cholecystectomy, hernioplasty, knee and hip replacement, cataract, and hemodynamic procedures[8]. Nevertheless, in these facts, clinical trials in perioperative medicine usually do not include elders, and as a consequence, they are usually underrepresented in clinical guidelines and prognostic scales[9], leaving the clinician and surgical team with lack of evidence regarding the decision-making model. Due to this phenomena, physicians need to ask themselves if the recommendations for younger people could be applied to geriatric population[10].

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There are also controversies among the role of age in the prognosis of surgical procedures in the elderly. It is well known that younger people with comorbidities and a poor functional status are in worse health conditions than an older patient with no chronic conditions; nevertheless, age by itself is still the main reason to withhold surgical treatment in this population[11].

Some papers found comorbidity as one of the most important prognostic factors in surgical aged patients[4,9]. Cognitive impairment has also been associated to a higher incidence of complications, particularly delirium, which presents at least 4 times more frequently compared with patients with normal cognition. It has also been associated to poor functional status after discharge[12,13]. Most authors agree that the most important prognostic factors are prior functional status, dependence, and frailty[3,14,15]. The aim of the study was to associate pre-operative factors to morbidity and mortality in the post-operative period in geriatric patients who underwent non-cardiac surgery.

METHODS

We developed a prospective, observational, descriptive, cross-sectional study between June 2014 and July 2015. The study took place in the Regional Hospital of the Institute of Security and Social Services and for State Workers, León, which is a third level concentration hospital which receives patients from three different states in Mexico. The sample size was decided by convenience. Inclusion criteria: patients 65 years and older who underwent non-cardiac surgery were included in the study. Exclusion criteria were ambulatory surgery and patients who denied signing informed consent.

All of the included patients signed an informed consent according to Helsinki Statement. The Hospital Ethics Committee approved the study with the registration number 428-2014.

The main objective of our study was to associate pre-operative variables with the presence of complications and mortality in the post-operative period. Secondary objectives were to know the prevalence of geriatric syndromes in elder surgical patients and to find the most frequent post-operative complications in this surgical population. All the patients who met inclusion criteria and arrived to the surgical ward were asked to sign informed consent and if so were included. Data were obtained from the patient's file and the geriatric variables through direct interview with the patient or family members. We measured baseline and demographic characteristics (age and gender), comorbidity, medications, laboratory tests (hemogram, creatinine, ionogram, coagulation profile, and glucose), pre-operative electrocardiogram, pre-operative transfusions, and need of vasoactive drugs; the American Society of Anesthesiology (ASA) and American Heart Association (AHA) risk scales were assigned by the internal medicine service, type of surgery (urgent or scheduled), surgical specialty, and geriatric syndromes: dependence, malnutrition, frailty, sore ulcers, falls, fecal and urinary incontinence, visual impairment, depression, hearing impairment, gait disturbances, sleep disturbances, and cognitive impairment. The authors defined the geriatric syndromes as follows: Dependent patient if he or she needed assistance in 2 or more of basic daily activities, frailty using Fried Criteria, an malnutrition using MNA scale below 17. Visual and hearing impairment, gait and sleep disturbances, and falls were asked to the patient or main caregiver through the direct question: "Do you have visual or hearing problems?" and "Do you find difficult to walk without assistance?" We considered depression if he or she had five or more positive items in the Yesavage Depression Scale.

We searched in patients' chart for post-operative complications including delirium, healthcare-associated pneumonia, sore ulcers, acute renal failure, surgical site infection, mechanical ventilation, urinary tract infection, hypovolemic shock, and death.

Statistical analyses

We used IBM SPPS 20.0 software. Qualitative variables were analyzed with Chi-square test, quantitative through T-student. We considered statistical significance with $p < 0.05$ with 95% confidence intervals.

RESULTS

We included 120 patients aged 65 years and older who underwent non-cardiac surgery. The mean age was 78.5 years ± 7.6, ranging from 65 to 95 years, 62.5% of the patients were female, and 52.5 % of the surgeries were urgent o emergent. The main surgical specialties were general surgery (30.6%), followed by orthopedic (23.3%), neurosurgery (13.3%), and the rest corresponded to vascular surgery, oncology, urology, and cardiothoracic surgery (9.2, 8.3, 5.8, and 4.2%), respectively. The main comorbidities are shown in table 1.

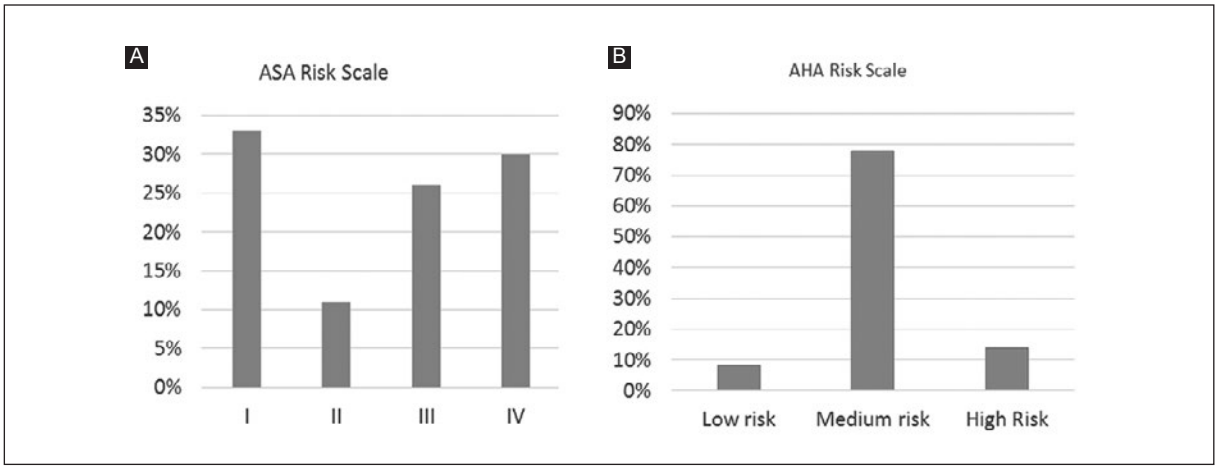

Figure 1. *Pre-operative risk scales* **A.** *The American Society of Anesthesiology Risk Scale*[17]. **B.** *The American Heart Association Pre-operative Risk Scale.*[18]

Table 1. Comorbidities

Comorbidity	N (%)
Hypertension	89 (74.2)
Diabetes	49 (40.8)
Frailty	59 (49.2)
Heart failure	47 (39.2)
Chronic obstructive pulmonary disease	32 (26.7)
Osteoarthritis	26 (21.7)
Hypothyroidism	10 (8.3)

The mean length of stay was 11.35 days ± 8.25 standard deviation (SD), ranging from 1 to 34 days. Emergent and urgent surgery length of stay was 13.44 days ± 8.36 SD, compared to 9.04 ± 7.63 SD in scheduled procedures (p = 0.003; 95% confidence interval [CI]= –7.301 to –1.57).

Most patients used chronic medications with a range from 1 to 15, mean of 4.2 ± 2.72 per week. 38.3% of the patients used from 3 to 5 drugs/week, the 23.3% 6–10 drugs/week, and 3.3% more than 10. Only 10% of the patients reported to use β blockers. The ASA risk scale and the AHA risk scale are shown in figure 1.

The most prevalent geriatric syndromes were visual impairment 89.2%, depression 66.6%, hearing impairment 60.6%, gait disturbances 58%, falls 58.8%, urinary incontinence 56.6%, sleep disturbances 44.6%, fecal incontinence 18.6 %, and cognitive impairment 12.3%.

We found that 53.3% of the patients (n = 63) developed post-operative complications. The most frequent were delirium 18.3%, healthcare-associated pneumonia 8.3%, acute renal failure 6.6%, sore ulcers 4.1%, hypovolemic shock 4.1%, surgical site infection 4.1%, urinary tract infection 2.5%, and mechanical ventilation 2.5%. A total of 8 patients died in the post-operative period, all of them of complications from in-hospital infections.

Regarding concomitant prescription drugs, we found that the patients who used β-blockers had a lower rate of complications (non-complicated n = 11 vs. complicated 3; p = 0.001. 95% CI = 0.380–0.760). There were no medications associated to an increased morbidity or mortality.

Table 2 reports the main pre-operative variables associated to post-operative morbidity. The rest analyzed variables shown non-significant results, including age (p = 0.523; 95% CI = 0.767-1.68). Variables associated to post-operative mortality are described in table 3.

DISCUSSION

We found that age by itself it is not related to post-operative morbidity or mortality. These findings are similar to other authors' results[4,9]. Other published papers found that a low urinary output was associated to major complications after non-cardiac surgery, which is consistent with our findings[5]. Another prognostic factor described in some trials was the AHA and ASA risk scales, both predicted poor outcomes after surgery in high-risk elders, and we also found that this pre-operative high-risk profile developed more complications.

Table 2. Pre-operative variables associated to post-operative complications

Pre-operative condition	No complicated n (%)	Complicated n (%)	p	95% CI
Left ventricular hypertrophy	21 (77.8)	6 (22.8)	0.001	1.02-1.54
Serum albumin < 3	101 (98.1)	2 (1.9)	0.003	1.39-1.98
Pre-operative acute renal failure	26 (68.4)	12 (31.6)	0.011	1.28-8.60
Malnutrition	30 (71.4)	12 (28.6)	0.033	1.16-1.85
Depression	61 (76.2)	19 (23.8)	0.030	1.16-1.28
Cognitive impairment	11 (84.6)	2 (15.4)	0.032	1.01-1.97
Falls	25 (35.7)	46 (64.3)	0.004	1.38-6.22
Pre-operative delirium	4 (11.4)	31 (88.6)	<0.005	3.94-37.76
Fecal incontinence	6 (27.3)	16 (72.7)	0.044	1.03-7.69

CI: confidence interval

Table 3. Pre-operative variables associated to increased mortality

Preoperative Condition	Survived n (%)	Died n (%)	p	95% CI
Urgent or emergent surgery	54 (77.8)	14 (8.4)	0.003	1.7-36.315
Vasoactive drugs	8 (61.5)	5 (38.5)	0.005	1.517-19.613
Pre-operative delirium	23 (65.7)	12 (34.3)	<0.005	1.13-1.85
Pre-operative acute renal failure	29 (76.3)	9 (23.7)	0.023	1.133-9.759
Falls	55 (78.6)	15 (21.4)	0.002	1.702-104.9
Impaired basic ADL[Ω]	83 (83.8)	16 (16.2)	0.048	1.016-1.231
Fecal incontinence	15 (68.2)	7 (31.8)	0.005	1.492-14.273

[Ω]Activities of daily living, CI: confidence interval

Other variables related to a poor outcomes in geriatric medicine are depression, and surgical procedures are not the exception. Our findings are consistent to those reported by Williams and colleagues[16].

As to cognitive impairment, it is considered as major risk factor for post-operative delirium[13], but in our study, we found no association between theses two factors. Another important risk factors associated to post-operative complication were fecal incontinence, falls, and urgent surgery. Furthermore, dependence was an important predictive condition, which is concordant with the World Health Organization report on health and aging in 2015[19].

The main limitations of our study are the sample size, and on the other hand, the clinical decision was made by surgical and internal medicine teams, without geriatric council. Moreover, the last one is that there is an important number of administrative situations which influences prognosis, for example, human and economic resources in a public hospital of the developing world. Our main strengths are the heterogeneity of surgical procedures in our study, which is similar to real-world scenarios. The other one is that we included geriatric syndromes as prognostic factors, and this allowed us to know the prevalence and geriatric conditions of our surgical population.

CONCLUSION

The geriatric patient faces surgical needs very often, and this population has particular needs and conditions which influence the prognosis after major

procedures. Age should not be considered as a factor to develop or withhold a surgery; instead, we should consider functional status, dependence, and geriatric syndromes as the cornerstone for the decision-making model. We consider that modifiable risk factors should be treated or corrected through all the perioperative period. Nutrition, cognitive impairment, preoperative delirium, depression, dependence, and falls are risk factors for morbidity and mortality in the surgical elders. This study allows us to take a look to the surgical epidemiological full picture, so in the future, we may develop a more accurate way to predict poor outcomes in the surgical geriatric patient.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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THE JOURNAL OF LATIN AMERICAN GERIATRIC MEDICINE ORIGINAL ARTICLE

Frailty and its associations with geriatric syndromes, among older adults in Western Mexico

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Abstract

Background: *Demographic aging has led to an increase in the prevalence of different diseases, including the so-called geriatric syndromes (GS). Frailty is a clinical syndrome characterized by a lack of effective response to stressors due to a decline in physiological reserve, and their presence was associated with negative outcomes. The association between GS and the status of frailty is not yet clear. However, an effective strategy for the diagnosis of GS is the comprehensive geriatric assessment (CGA).* **Objectives:** *The objective of this study is to determine the prevalence of frailty and its associations between GS in outpatient older adults in Western Mexican older adults.* **Methods:** *A cross-sectional study in participants aged 60 or older recruited between September 2016 and April 2017. Participants underwent a CGA, with which the diagnosis of frailty and GS was obtained. A multivariate linear regression analysis was determined to establish the association between CGA scores (disability, cognitive impairment, depression, and malnutrition) and frailty scores (FS).* **Results:** *We included 112 subjects; mean age was 79 years (standard deviation = ± 8), women accounted for 62%. Overall, 33% were frailty. After adjustment, linear regression analyzes showed that baseline CGA model explained 56% of the variance in the dependent variable (FS) (p <0.005).* **Conclusions:** *This study showed that the prevalence of frailty is higher in Western Mexican elders. The combination of CGA scores can explain the 56% of the variation in the dependent variable (FS). This result suggests that the CGA can provide relevant information of health in the Western Mexican older adults.* (J Lat Am Geriat Med. 2018;4:8-12)

Key words: *Frailty. Geriatric Syndrome. Mexico. Older Adult.*

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INTRODUCTION

The worldwide aging population is increasing, and it is predicted that by 2050, one in five people will be aged 60 years or more in developing countries[1,2]. This demographic evolution may be associated with an increase in the prevalence of geriatric syndromes (GS)[3-5]. This term has commonly been used to indicate the "accumulated effect of impairments in multiple domains" that result in a particular adverse outcomes[6]. The diagnostic strategy of GS with the highest level of evidence is the performance of the compressive geriatrics assessment (CGA). This tool includes a variety of scales that assess the physical and mental health, cognitive performance, and functional abilities, as well as the nutritional status through classificatory scores[7-10].

Although there is currently no specific accepted definition of frailty, it has been conceptualized as a condition characterized by a decreased physiological reserve and poor response to stressors[11]. One way to assess frailty is through a frailty score (FS) proposed by Linda Fried[5]. The fragility has been associated with diverse and negative outcomes (institutionalization, disability, and death)[4,12-14]. It has been hypothesized that GS presence may play a role central to the development of frailty in older adults[11-15].

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This study aims to determine the prevalence of the frailty and its associations between geriatric syndromes in outpatient older adults in Western Mexico.

METHODS

Participants

This cross-sectional study included 112 participants aged 60 or older, who were consecutively recruited from geriatrics clinics of a tertiary care university-affiliated hospital in Jalisco (a 300-bed teaching hospital in the west of Mexico) between September 2016 and April 2017. Eligible participants were invited to participate in the study and provided written informed consent. All participants were subjected to the comprehensive geriatric assessment (CGA) carried out by trained medical staff. The study protocol was reviewed and approved by the Hospital Ethics Committee.

Measures

Frailty

Frailty was defined according to the five components proposed by Fried et al.[5] Weight loss was defined as self-report of recent and unintentional weight loss (≥ 10 lbs. or more) in the last year. Exhaustion was determined by two questions from the CES-D scale: "I felt that everything I did was an effort" and "I could not get going." Slowness was defined by the lowest quintile on timed 4.5 m walking test, at usual pace, adjusted for sex and height. Weakness was identified by the lowest quintile on grip strength test adjusted for sex and body mass index. Low physical activity was established according to the physical activity scale for the elderly as recommended. As proposed, participants meeting three or more criteria were classified as fragile, one or two were considered as pre-frail, and no frail if none of the criteria met[16]. The FS was summed up in a score ranging from 0 to 5, where a higher score indicates more positive criteria.

Correlates

Sociodemographic variables included age, sex, schooling, and domestic partner status. The presence of twelve chronic diseases including diabetes, hypertension, dyslipidemia, cancer, myocardial infarction, stroke, chronic obstructive pulmonary disease, cirrhosis, osteoarthritis, rheumatoid arthritis, osteoporosis, and/or chronic kidney disease. All these comorbidities were summed up in a score ranging from 0 to 12[17].

Disability for instrumental activities of daily living (IADL) was evaluated with the Lawton and Brody scale, which assesses the ability to perform eight tasks: using the telephone, transportation, shopping, handling finances, responsibility for own medications, food preparation, housekeeping, and laundry. Disability for activities of daily living (ADL) was evaluated with the Barthel Index, and participants were asked whether they required help for activities such as bathing, dressing, grooming, feeding, transfers, toilet use, walking, and climbing stairs as well as the presence or absence of fecal and/or urinary incontinence. If participants indicated that they were unable to perform at least one or more activities without help, they were considered as having IADL or ADL disability[7].

The mini-mental state examination (MMSE) (score ranging from 0 to 30) was used to assess global cognitive performance, where higher scores indicate better cognitive status. The lower score was determined with a cutoff score of < 23[8].

The nutritional risk was evaluated through the questionnaire for the detection of malnutrition in older adults (DNA). The cutoff point of ≥ 6 indicated the presence of high nutritional risk, and 0-2 points were considered for low nutritional risk[9].

The depressive symptoms were assessed using the version of the 15-item Geriatric Depression Scale. A cutoff point of > 5 indicated the presence of depressive symptoms[10].

A cutoff point of ≥ 3 drugs in simultaneous use was considered for polypharmacy[18].

Statistical analyses

Variables were described using frequencies and proportions or means and standard deviations when appropriate. For the comparison between participants with and without frailty, χ^2 test or Student's t test was used as appropriate. In order to develop an explanatory model, an unadjusted linear regression analysis was created to identify the CGA variables correlates to frailty scores. Regression diagnostics were performed to investigate any violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity (variance inflation factor and Durbin–Watson test). The choice of independent variables used in the univariate analyses was based on the review of literature and clinical judgment. In the next step, variables that were

statistically significant were included in multivariate regression models with additional adjustment for age, sex, and comorbid. The baseline for four scales was the model of the multivariate regression analysis. This included disability evaluated with ADL and IADL, cognitive function evaluated by MMSE, nutritional risk with DNA, and polypharmacy. The scores of these four scales contained in the CGA were added in a range from 0 to the highest score in each of them. For the linear regression analyses, the four scales were used as continuous variables. All statistical tests were performed using 95% confidence intervals. Statistical analyses were conducted using the Stata Statistical Package for Windows® (Stata Corp., Texas, IL., v. 14).

RESULTS

Mean of age was 79 (standard deviation [SD] = ± 5; range 60-94) and 62% of participants were women. Table 1 shows the sociodemographic and health-related characteristics of participants. Hypertension and diabetes were the most frequent chronic diseases (46% and 30%, respectively); 36% of participants reported having 1-6 years of schooling. Married partner status was present in 28% of participants.

Disability for IADL was reported by 66%, and 38% were disabled for at least one ADL. Depressive symptoms were present in 55% of participants. The mean in the DNA was 4.5 (SD = ± 3). 34% of participants were classified as high nutritional risk. The 41% of participants were classified as mild cognitive impairment.

33% of participants were classified as frailty. The most prevalent components of the frailty score were as follows: 42% reported fatigue, 35% had lowered walking speed, and 34% reported weight loss. Only 14.6% of the samples presented non-frailty components. Nevertheless, the comparison between groups showed no differences regarding cognitive impairment, depressive symptoms, disability, and malnutrition.

The univariate linear regression analyses (Table 2) showed that lower score at IADL, ADL, and MMSE and higher scores at DNA and polypharmacy were associated with higher FS. Higher baseline score for polypharmacy had a direct association with FS ($b = 0.21$, $p = 0.01$). Moreover, having low scores on the IADL scale had a negative association with FS ($b = –0.387$, $p = 0.001$). The multivariate linear regression model showed a $R^2 = 0.56$ of the total variance of FS ($p < 0.0001$). Analyses showed no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity.

Table 1. Prevalence of frailty phenotypes per the sociodemographic and clinical characteristics

Variable	Frailty		
	Not frail (%)	Pre-frail (%)	Frail (%)
Sex			
Female	10	41	49
Male	22	39	39
Age, years			
60-74	22	52	26
75-84	10	33	58
≥ 85	0	75	25
Marital status			
Married	17	35	48
Single	17	67	16
Divorced	15	54	31
Widowhood	11	35	54
Diabetes			
Yes	15	35	50
No	15	43	41
Hypertension			
Yes	12	38	50
No	21	43	36
Disability in ADL	8	19	73
Yes	19	50	31
No			
Disability in IADL	6	33	60
Yes	30	50	20
No			
MCI			
Yes	7	22	71
No	23	52	25
Depressive symptoms		38	
Yes	16	43	47
No	14		43
Malnutrition			
Yes	17	37	46
No	13	42	45
Polypharmacy			
Yes	10	40	50
No	22	37	41

IADL: instrumental activities of daily living, ADL: activities of daily living

DISCUSSION

In the present study, disability for IADL, ADL, cognitive status, malnutrition, and polypharmacy

Table 2. Coefficients for the effects of a standard deviation increase in frailty score at baseline on change in geriatric syndrome scores

Geriatric syndrome scores, per SD	β (SE), p value	β (SE), p value
	Simple regression	Multiple regression[1]
GDS	0.179 (0.027), 0.063	-
ADL	–0.223 (.005), 0.020	0.100 (0.005), 0.338
IADL	–0.445 (0.041), 0.000	–0.387 (0.053), 0.001
MMSE	–0.312 (0.23), 0.001	–0.144 (0.022), 0.12
DNA	0.208 (0.068), 0.047	0.155 (0.056), 0.068
Polypharmacy	0.211 (0.062), 0.027	0.212 (0.056), 0.016

[1]Adjusts for age, sex, and comorbid at baseline: $p < 0.0001$
IADL: instrumental activities of daily living, ADL: activities of daily living, GDS: Geriatric Depression Scale, MMSE: mini-mental state examination, SD: standard deviation, SE: standard error

evaluated by CGA scores was independently associated with FS. These results underline the relevance of considering GS in the evaluation of older adults since they could play a role for frailty developing. Our results demonstrated an independent association between scores on scales contained in the CGA (representing GS: disability for IADL and ADL, cognitive impairment, malnutrition, and polypharmacy) and FS. Thus, our study showed an association between some geriatric syndromes and frailty in outpatient older adults. In the present study, multiple linear regression analyses explained 56% of the total variance of the FS.

Remarkably, we observed that the scores of some geriatric scales had an independent association with frailty. In particular, disability, cognitive impairment, malnutrition, and polypharmacy were robustly associated with higher FS. These results are consistent with the previous work, in which the presence of GS can increase the probabilities of development of frailty[14,15].

In our study, as in other investigations, depressive symptoms were a common finding. We could hypothesize that this is a major contributor to the fatigue components in frailty phenotype[12]. However, in the present study, the association between frailty and depressive symptoms was not significant.

Investigations conducted not only in Mexico but also in other populations, concluding that disability (measured by ADL or IADL) was related with the development of frailty[15,16].

For example, Sanchez *et al*. established a direct association with disability (odds ratio [OR] = 7) and malnutrition (OR= 1.49), while the present study showed similar results even after adjust: disability had a negative association with FS ($p = 0.001$). Ottenbacher *et al*. identified disability (ADL) and comorbidity as the most powerful associated variables for frailty in an linear regression analysis[16]. Another study of frailty prevalence conducted in Beijing showed that polypharmacy (≥ 3 drugs) was more likely to develop frailty at follow-up ($p < 0.01$)[19]. These results are consistent with our findings, where higher baseline scores for polypharmacy accounted for worst FS ($b = 0.21$).

Our study had several limitations. First, it is a cross-sectional design and is not possible to know the direction of the associations found. Second, participants were recruited consecutively to participate in the study, per the attendance at their medical consultation, in a geriatric clinic. The sample was probably consisted of individuals with heterogeneous characteristics, as many at-risk patients; hence, the participants of this study had the presence of multiple GS associated with the fragility status. Third, short data collection precluded a better analysis in this study. However, the main strengths of this study include GS screening, which was done with standardized CGA. Our analysis did consider covariates; all these factors are well known for their influence on the development of frailty, and after adjustments, the results have turned out to support the assumptions, along with the initial hypothesis. However, our preliminary results require future confirmation studies with a larger sample size and a longitudinal design.

CONCLUSION

This study showed that the prevalence of frailty is higher in outpatient older adult outpatients in Western Mexico. The linear regression model of disability, cognitive impairment, malnutrition, and polypharmacy can explain 56% of the variation in the dependent variable (FS). The results of the present study suggest the importance of intentioned searching of GS through the comprehensive geriatric assessment in outpatient older adults, to make timely diagnoses and establish effective therapeutic strategies in patients with risk of developing frailty.

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THE JOURNAL OF LATIN AMERICAN GERIATRIC MEDICINE ORIGINAL ARTICLE

Prevalence of frailty and its association with comprehensive geriatric assessment scores among older adults with HIV

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Abstract

Background: *The number of older adults living with HIV (OALHIV) has increased significantly. Several similarities have been found between aging and HIV infection. Patients with HIV have premature complications observed only in chronological aging, usually called geriatric syndromes (GS): cognitive impairment, depressive symptoms, disability, nutritional risk, and frailty. The association between GS and the status of frailty in elderly adults with HIV is not yet clear. However, an effective strategy for the diagnosis of GS is the comprehensive geriatric assessment (CGA).* **Objectives:** *The objectives of this study were to determine the prevalence of frailty and its associations between CGA scores in OALHIV, attending HIV-AIDS clinics at a university-affiliated hospital in Mexico.* **Methods:** *A cross-sectional study in participants OALHIV, recruited between January 2015 and January 2017. Participants underwent a CGA, with which the diagnosis of frailty and GS was obtained. A multivariate linear regression analysis was determined to establish the association between CGA scores (disability, cognitive impairment, depression, and malnutrition) and frailty scores (FS).* **Results:** *We included 116 subjects; mean age was 55 years (standard deviation ± 6), women accounted for 20%. Overall, 14% were frailty. After adjusted, linear regression analyses showed that disability, cognitive impairment, depressive symptoms, and malnutrition scores explained 39% of the total variance of the FS ($p < 0.0001$).* **Conclusions:** *This study showed that the prevalence of frailty is higher in Mexican OALHIV. The combination of CGA scores can explain almost 40% of the variation in the dependent variable (FS). These results suggest that CGA can provide relevant information of health in the elderly community living with HIV.* (J Lat Am Geriat Med. 2018;4:13-18)

Key words: *Frailty. HIV. Comprehensive Geriatric Assessment. Geriatrics Syndromes.*

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INTRODUCTION

The number of older adults living with HIV (OALHIV) has increased significantly since highly effective antiretroviral therapy (HAART) was available. Thus, with the use of HAART infection has become a chronic disease[1]. This change on HIV demography is so unexpected that the American Society of Geriatrics and the American Academy of HIV had to redefined "elderly." In the context of people with HIV, all 50-year-old and more are considered as elders[2]. The control disease centers have projected an increase in OALHIV. In Mexico, almost 20,000 cases have been recorded from 1983 to 2011 in people over 50 years of age (12.5% of the total population affected). In the US, it is estimated that currently almost 50% of the HIV-infected population is over 50 years old[3,4].

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Several similarities have been found between aging and HIV infection: DNA damage and impairment of repairability, neuroendocrine alterations, sarcopenia, and immunosenescence. Patients with HIV have premature complications usually observed in chronological aging: cognitive impairment, disability, depressive symptoms, malnutrition, and frailty[5-12]. The presence of frailty is an independent factor of morbidity and mortality in the context of HIV infection[4,5,13]. Although there is currently no specific definition of frailty in OALHIV, it has been accepted as a condition characterized by a decreased physiological reserve and poor response to stressors. One way to assess frailty is through the frailty score (FS) proposed by Linda Fried[13-16].

This study aims to determine the prevalence of frailty and its association between CGA scores in OALHIV, attending the HIV-AIDS clinics at a university-affiliated hospital in Mexico.

METHODS

Participants

This cross-sectional study includes 116 participants aged 50 years or older living with HIV attending an HIV-AIDS clinic at a university-affiliated hospital in Mexico in Guadalajara. Participants were identified through the appointment schedule of the outpatient HIV/AIDS clinic. Recruitment occurred between January 1, 2015 and January 29, 2017. Eligible patients had to be 50 years or older with a confirmatory diagnosis of HIV infection. They were all invited to participate in the study and provided written informed consent. All participants were subjected to the CGA carried out by trained medical staff. Patients who did not complete the assessment were excluded from the study. The study protocol was reviewed and approved by the hospital ethics committee.

MEASURES

Frailty

Frailty was defined according to the five components proposed by Fried et al.[14]. Weight loss was defined as self-report of recent and unintentional weight loss (≥ 10 lbs. or more) in the last year. Exhaustion was determined by two questions from the CES-D scale: "I felt that everything I did was an effort" and "I could not get going." Slowness was defined by the lowest quintile on timed 4.5-meter walking test, at usual pace, adjusted for sex and height. Weakness was identified by the lowest quintile on grip strength test adjusted for sex and body mass index. Low physical activity was established according the physical activity scale for the elderly as recommended. As proposed, participants meeting three or more criteria were classified as fragile, one or two were considered as prefrail, and no frail if none of the criteria met[14]. The FS was summed up in a score ranging from 0 to 5, where a higher score indicates more positive criteria.

Correlates

Social and demographic variables included age, gender, and the presence of ten chronic diseases including diabetes, hypertension, dyslipidemia, cancer, myocardial infarction, stroke, chronic obstructive pulmonary disease, cirrhosis, osteoarthritis, and/or chronic kidney disease. All these comorbidities were summed up in a score ranging from 0 to 10[17]. Time from HIV diagnosis and time on combination antiretroviral therapy (cART), both in years, were considered as continuous covariates. The HIV - clinical stage was determined by retrospective searched in the records of each participant.

Comprehensive geriatric assessment (CGA)

Five geriatric scale scores were investigated as independent variables: disability, cognitive impairment, depressive symptoms, and malnutrition.

Disability

Disability for instrumental activities of daily living (IADL) was evaluated with the Lawton and Brody scale, which assesses the ability to perform eight tasks independently: using the telephone, transportation, shopping, handling finances, responsibility for own medications, food preparation, housekeeping, and laundry. Disability for activities of daily living (ADL) was evaluated with the Barthel index; participants were asked whether they required help for activities such as bathing, dressing, grooming, feeding, transfers, toilet use, walking, and climbing stairs as well as the presence or absence of fecal and/or urinary incontinence[18,19].

Cognitive impairment

The mini-mental state examination (MMSE) was used to assess global cognitive performance, where higher scores indicate better cognitive status[20].

Depressive symptoms

Depressive symptoms were assessed using the validated version of the 15-item Geriatric Depression Scale (GDS)[21,22].

Malnutrition

The nutritional risk was evaluated through the mini nutritional assessment (MNA)[23].

Statistical analyses

Variables were described using frequencies and proportions or means and standard deviations when appropriate. For the comparison between participants with and without frailty, χ^2 test or Student's t-test were used as appropriate. To develop an explanatory model, unadjusted linear regression analysis was created to identify the geriatrics syndromes (GS) scales correlates of FS. Regression diagnostics were performed to investigate any violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity (variance inflation factor and Durbin–Watson test). The choice of independent variables used in the univariate analyses was based on the review of literature and clinical judgment. In the next step, variables that were statistically significant were included in multivariate regression models with additional adjustment for age, sex, and comorbid. The baseline for five scales was the model of the multivariate regression analysis. This included disability evaluated with ADL and IADL, cognitive function evaluated by MMSE, depressive symptoms, and nutritional risk with GDS and MNA, respectively. The scores of these five scales contained in the CGA were added in a range from 0 to the highest score in each of them. For the linear regression analyses, the five scales were used as continuous variables. All statistical tests were performed using 95% confidence intervals. Statistical analyses were conducted using Stata statistical package for Windows® (Stata Corp., Texas, IL., v. 14).

RESULTS

Mean of age was 56 (standard deviation [SD] = ± 5; range 50-84) and 80% of participants were men. Table 1 summarizes the sociodemographic and health-related characteristics of participants. Diabetes and hypertension were the most frequent chronic diseases (21% and 27%, respectively); 34% of participants were aged 50 years or more at the time of HIV diagnosis. Mean CD4+ cell count was 418 (interquartile range: 270–619), 19% had a detectable viral loud and 7.8% had virologic failure.

Table 1. Prevalence of frailty phenotypes according to the sociodemographic and clinical characteristics

Variable (total)	Prevalence of frailty phenotype		
	Not frail n, (%)	Prefrail n, (%)	Frail n, (%)
Sex			
Female (20)	3 (15)	13 (65)	4 (20)*
Male (83)	11 (13.3)	62 (74.7)	10 (12)
Clinic stage			
A1 (11)	2 (18.2)	8 (72.7)	1 (9.1)
A2 (6)	1 (16.7)	5 (83.3)	0
A3 (5)	0	5 (100)	0
B1 (8)	1 (12.5)	6 (75)	1 (12.5)
B2 (10)	3 (30)	5 (50)	2 (20)
C1 (18)	3 (16.7)	12 (66.7)	3 (16.7)
C2 (26)	1 (3.8)	21 (80.8)	4 (15.4)
C3 (19)	3 (15.8)	13 (68.4)	3 (15.8)
IADL disability			
Yes (3)	0	2 (66.7)	1 (33.3)*
No (99)	14 (14.1)	73 (73.7)	12 (12.1)
Mild cognitive impairment			
Yes (7)	0	6 (85.7)	1 (14.3)
No (81)	10 (12.3)	63 (77.8)	8 (9.9)
Depressive symptoms			
Yes (28)	5 (17.9)	17 (60.7)	6 (21.4)
No (74)	9 (12.2)	57 (77)	8 (10.8)
Malnutrition			
Yes (45)	5 (11.1)	28 (62.2)	12 (26.7)
No (99)	9 (15.8)	46 (80.7)	2 (3.5)

*$p < 0.05$
IDAL: instrumental activities of daily living

Disability for IADL was reported by 3% and none were disabled for at least one ADL. Depressive symptoms were present in 27% of participants. The mean in the MNA was 25 (SD ± 3.8). The 14% of participants were classified as frailty. Participants with frailty were more likely to be female, to report ADL disability and to have malnutrition ($p < 0.005$) when compared to those not reporting frailty. Nevertheless, the comparison between groups showed no differences regarding HIV - clinical stage, cognitive impairment or depressive symptoms.

The univariate linear regression analyses (Table 2) showed that lower score at IADL, ADL, MMSE, and MNA and higher scores at GDS were associated with

Table 2. Coefficients (95% CI) for the effects of a standard deviation increase in frailty index scores at baseline on change in predictor variables scores

Predictor variables, per SD	Simple regression	Multiple regression[a]
	β (SE), p value	β (SE), p value
Age	0.276 (0.011), 0.003	
Sex	–0.039 (0.221), 0.676	
Comorbid	0.143 (0.074), 0.124	
IADL		
Lawton and Brody	–0.442 (0.083), 0.0001	–0.296 (0.105), 0.009
ADL		
Barthel	–0.509 (0.017), 0.0001	–0.160 (0.024), 0.197
MMSE	–0.282 (0.042), 0.004	–0.259 (0.035), 0.001
GDS	0.269 (0.026), 0.006	0.182 (0.023), 0.035
MNA	–0.467 (0.023), 0.0001	–0.181 (0.025), 0.066

[a]Adjusts for age, sex, and comorbid at baseline: $p < 0.0001$
IADL: instrumental activities of daily living, ADL: activities of daily living, GDS: Geriatric Depression Scale, MMSE: mini-mental state examination, SD: standard deviation, SE: standard error, MNA: mini nutritional assessment, CI: confidence interval

higher FS. Higher baseline score for GDS had a direct association with FS (b = 0.181, p = 0.035). Moreover, having low scores on the IADL scale had a negative association with FS (b = –0.296, p = 0.009). The multivariate linear regression model showed a $R^2 = 0.42$ of the total variance of FS ($p < 0.0001$). Analyses showed no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity.

DISCUSSION

In the present study, disability for IADL, ADL, cognitive status, depressive symptoms, and malnutrition evaluated by CGA scores was independently associated with FS. These results underline the relevance of considering geriatric syndromes in the evaluation of OALHIV since they could play a role for frailty developing. Our results demonstrated an independent association between scores on five scales contained in the CGA (representing geriatric syndromes: disability for IADL and ADL, cognitive impairment, depressive symptoms, and malnutrition) and FS. Thus, our study showed an association between some GS and frailty in OALHIV. In the present study, multiple linear regression analyses explained 39% of the total variance of the FS and the prevalence of frailty was 14%. Other studies have reported prevalence between 5% and 33% in routine HIV care[24-31].

In the present study, higher baseline score for GDS was associated with higher FS (b = 0.181, p = 0.035). In prior studies, frailty in OALHIV was consistently associated with depressive symptoms[24-27]. Data derived from prospective studies have called attention to depression as a risk factor for frailty development in older adults without HIV[32,33]. In the same way, our result showed that disability was associated with FS in OALHIV, as other studies had been demonstrated[24,34-37].

Now, it is clear that HIV infection promotes an accelerated aging trough persistent and chronic activation of the immune system that leads to immunosenescence, even with HAART[38]. Associations between frailty and HIV infection have been suggested in previous research[39-41]. Some clinical expressions of this are the increased prevalence of aging-related comorbidities. Many of them are the so-called GSs (e.g., disability, cognitive impairment, depression, and malnutrition).

Although current CD4 count is a strong independent predictor of frailty, some studies have shown a lack of association between nadir CD4 cell count and frailty[26,31]. Previously, frailty in OALHIV was commonly observed in the setting of immunocompromise, but in a study of 40 patients by Krupa Shah et al. found that frail participants were mostly obese and had immune restoration as indicated by higher CD4 count and suppressed viral load[42]. In a study of 12,530 persons by Desquilbet et al. described that the viral load

was not significantly associated with the frailty in the model that included CD4 T-cell count[43].

Probably, frailty manifestations in OALHIV could be a final common pathway of diseases associated with wasting as seen in the GS[44]. In many studies, the frailty in HIV infection has showed an association with conditions considered GS such as disability, cognitive impairment, and depression[24,25,45].

In this way, frailty appears to exceed that observed in people without HIV infection and is strongly associated with depression[24]. In an urban outpatient study, frailty was associated with depression at the time of assessment (at least moderate depression in 54% of frail persons vs. 17% of non-frail persons) and a greater receipt of antidepressants ($p < 0.001$). Frailty participants had lower median of cognitive scores with impaired scores in 59% versus 34% non-frail persons ($p < 0.001$)[26]. These results are similar to the findings of the present study.

Ávila-Funes evaluated a sample in the city of Mexico with characteristics similar to the present study: a mean age of 59 years (some older than our results), and a majority of men (83%), a sex distribution identical to ours. However, one of the main differences is the disability rate. While they found disability in IADL of almost 18%, our participants had only 3%. It is likely that this can be explained by the lower morbidity, the better immunological status and the youth of our sample compared to that of Mexico City[39]. The same group of researchers has already noticed that frailty OALHIV has a higher risk of cognitive impairment[46]. Frailty has been associated with the development of different degrees of cognitive impairment. Boyle et al. reported the relationship between a frailty and the development of mild cognitive impairment in 761 elderly people without HIV[47]. This finding has been replicated in people infected with HIV, in which the presence of the frailty syndrome can promote a more marked or accelerated cognitive impairment, in comparison with fragile patients without HIV infection[46]. However, if the direction of the risk is opposite, as Aguilar-Navarro's conclusion suggests, our results showed the same an association between cognitive impairment and FS in OALHIV.

Remarkably, we observed that the scores of some geriatric scales had an independent association with frailty. In particular, disability, cognitive impairment, depression, and malnutrition were robustly associated with higher FS.

Our study has several limitations. First, it is a cross-sectional design and is not possible to know the direction of the associations found. Second, this is a non-probabilistic sample; participants were recruited consecutively to participate in the study in a HIV-AIDS clinic; thus, the sample was consisted of individuals with heterogeneous characteristics.

However, the main strengths of this study include GS screening, which was done with a standardized CGA, the present study is one of the most numerous in the region, and our analysis did consider covariates. However, these results must be replicated in a more extensive cohort with a longitudinal approach.

CONCLUSION

This study showed that the prevalence of frailty is higher in OALHIV in Mexico (14%). The linear regression model of disability, cognitive impairment, depressive symptoms, and malnutrition can explain almost 40% of the variation in the dependent variable (FS). The presence of frailty and its potential negative effects are some of the challenges of this time in which HIV infection has become a chronic disease with which it is possible to grow old. The results of the present study suggest the importance of intentioned searching of GS through the CGA in OALHIV, to make timely diagnoses and establish effective therapeutic strategies in patients with risk of developing frailty.

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THE JOURNAL OF LATIN AMERICAN GERIATRIC MEDICINE ORIGINAL ARTICLE

Endoscopic findings in elderly people with upper gastrointestinal bleeding who attend the emergency room of a second level hospital

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Abstract

Introduction and Objectives: *Upper gastrointestinal bleeding (UGB) is one of the main causes of morbidity and mortality in the elderly. The objective was to determine the endoscopic findings in older adults according to each anatomical location as well as identify an association between smoking, polypharmacy, and gender to UGB in older patients.* **Materials and Methods:** *This is a descriptive, transversal, analytical, and retrospective study. Medical records of patients with UGB requiring diagnostic endoscopy who were admitted to the emergency room over a period of 3 years were included in the study. Descriptive and inferential statistics as well as ×2 and multivariate logistic regression was used.* **Results:** *Mean age was 73 years; there were 51.5% (n = 295) of women. We found 173 single lesions, 107 double, and 15 triple lesions. We found an OR of 4.25 (95% CI 2.11-8.54) for polypharmacy and an OR of 3.26 (95% CI 1.45-7.3) for smoking.* **Conclusions:** *The most frequent finding was erosive gastropathy and the association with polypharmacy reached a p0.05, this being one of the main probable causes of UGB.* (J Lat Am Geriat Med. 2018;4:19-22)

Key words: *Upper gastrointestinal bleeding. Elderly. Endoscopy. Polypharmacy. Erosive gastropathy.*

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INTRODUCTION

It is frequent to find gastric atrophy and functional insufficiency in patients of old age. Atrophic gastritis is observed due to a deterioration in the mucous layer, an increase in the leukocyte count, lymphoid aggregates, and deterioration of connective tissue in the lower layers as well as hypotonia of muscle layers, and a decrease of parietal cells and their absorption capacity. Rebleeding is the main risk and prognostic factor in upper gastrointestinal bleeding (UGB) and as such is an indicator of which patients should undergo endoscopy. It is important to adequately describe the signs of hemorrhage according to the lesions that are present[1].

Older patients are more likely to take several medications daily which could increase the symptoms and diseases that are already present. This is also related to the presence of other pathologies such as gastroesophageal reflux, gastropathy due to anti-inflammatory medication, gastrointestinal tract bleeding, constipation, and diverticulitis, among others[2]. Alterations in the correct functioning of the digestive system are due to lifestyle (alcoholism, smoking, and

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high intake of tea and coffee), chronic diseases that afflict old patients (mainly cardiovascular and osteoarticular), and a prolonged intake of medication[3].

Gastrointestinal endoscopy is an important diagnostic and therapeutic resource that allows confirmation and management of numerous digestive tract pathologies by presenting findings in real time. Endoscopy is a secure and effective measure to stop UGB in older patients, reducing the need for surgery and increasing patient survival[4,5].

One of the diseases in which gastrointestinal endoscopy plays a key role is in UGB, in which endoscopy is the main diagnostic tool as it is safe and effective in older patients[6]. Other diagnostic methods for this pathology are an x-ray of the esophagus, stomach, and duodenum using oral contrast, arteriography, enteroscopy, gammagram, and surgical endoscopy[1]. Laboratory testing is only useful in severe UGB in which hemoglobin is <8 g/dL, leukocytes is $> 12 \times 10^9$, or serum urea is > 90 mg/dL[7].

The prognosis in patients with UGB depends on factors such as age and comorbidities, and the risk is usually determined using Rockall Index[8]. Forrest classification is used to classify gastric ulcers.

According to the most recent population census in Mexico, in 2010, the population over 60 years of age was 10,055,379 inhabitants, of which 4,679,538 were male. It is estimated that in 2020 12.5% of the population will be over 60 years old and in 2050 it will be 28%[9]. This is why the government is taking measures to affront the demand for health services from this population by creating the program GeriatrIMSS in the Mexican Social Security Institute (IMSS) and National Geriatric Institute of the Health Ministry[10].

The increase in the number of elderly adults is attributed to the increase in life expectancy which in turn contributes to a rise in the number of diseases in this population. Among these diseases, peptic ulcers, gastritis, and duodenitis occupy the 4th place in morbidity causes and the 13th place as causes of mortality in older adults that are cared for in health institutions[11,12].

Even though worldwide the risk of UGB increases with age as well as being associated to a higher mortality than in younger patients[13], in our country, there are no studies regarding endoscopic findings in old patients, so it is unknown if our population behaves in the same way as what has been reported.

The objective of this study is to determine endoscopic findings according to each anatomical portion of the stomach in older adults who attended a second level hospital. As part of this objective, we determined the types of lesions present as well as identifying an association between smoking, polypharmacy, and gender to UGB in older patients.

MATERIALS AND METHODS

This was an observational study with a descriptive, analytical, transverse, and retrospective design. Clinical files were revised of patients older than 60 years of age, both genders, who attended The General Hospital No. 50 of the Mexican Social Security Institute, from January 2010 to December 2012, with a diagnosis of UGB, admitted through the emergency room and that had an upper digestive tract endoscopy during that hospital stay. A total of 300 patient files were revised by an ER specialist to determine a history of smoking or polypharmacy. All endoscopies were carried out by a single gastroenterologist with a Pentax 3500 video endoscopy system. Five patients were eliminated, two of which did not have a complete endoscopy report and 3 who on revision of the clinical file did not match the inclusion criteria.

Forrest classification was used to classify gastric ulcers. The parameters used were arterial or spurting hemorrhage, oozing hemorrhage, visible vessel, adherent clot, dark base or hematin covered lesion, and lesions without active bleeding.

Age and sex of patients were analyzed for the classification of endoscopic findings. These were divided according to their etiology in two groups: varicose and non-varicose. Varicose bleeding is caused by portal hypertension and liver damage, and by separating varicose and non-varicose causes of bleeding, we eliminated the effect that liver damage could have on the model. Smoking was dichotomized (yes and no) and polypharmacy was considered if three or more medications were taken daily.

A preliminary statistical analysis was performed in which qualitative and quantitative variables were presented with central tendency measures, frequencies (mean, median, and mode), measures of dispersion (standard deviation), percentages, proportions, and χ^2. A multivariate logistic regression was carried out adjusted by age and sex, to determine the association of varicose versus non-varicose bleeding to smoking and polypharmacy. Variables with a $p > 0.2$ in a bivariate model or with biological plausibility were included in the multivariate model. Analysis was carried out using the statistical package SPSS version 21.

RESULTS

The total sample was of 295 patients, of which 152 were women (51.5%) and 143 were men (48.5%). The median age was 73 years. 109 patients reported smoking which represents 36.9% of the studied population with 186 patients having never smoked (63.1%). The frequency of patients with UGB that had concomitant polypharmacy was of 182 patients versus 113 that did not; this represents a prevalence of 61.7%.

The results of endoscopic findings are shown in table 1. Erosive gastropathy was the most common endoscopic finding.

Endoscopic findings were divided into two groups according to etiology: varicose and non-varicose. The latter being the most frequent with 235 cases (79.6%) compared to 60 cases of varicose etiology (20.3%).

By anatomical site, the results are shown in figure 1. The stomach was the most frequent site of lesions throughout its different anatomical portions. Of the 432 reports of lesions, 173 were single lesions, 107 double lesions, and 15 triple lesions.

The final diagnosis of erosive gastropathy, duodenal ulcer, gastric ulcer, and esophageal varix was more frequent in patients with polypharmacy. When analyzed by χ2 of Pearson only erosive gastropathy and esophageal varix were significantly associated to polypharmacy (p0.05 and p0.02 respectively).

We found that two diagnoses were more frequent in smokers than in non-smokers, malignant tumors, and duodenal ulcers. When analyzed by χ^2, the association was only statistically significant for malignant tumors (p = 0.01),and when Fisher's exact test was used, the p was 0.02.

In the multivariate model, both polypharmacy and smoking were risk factors for non-varicose UGB (OR 4.25 [95% CI 2.11-8.54] and 3.26 [95% CI 1.45-7.3], respectively) as shown in table 2.

Table 1. Endoscopic findings.

Lesions	General (%)
Erosive gastropathy	107 (36.2)*
Esophageal varix	51 (17.3)**
Diffuse chronic gastropathy	48 (16.2)
Esofagitis	33 (11.2)
Gastric ulcer	18 (6.1)
Duodenal ulcer	13 (4.4)
Duodenitis	12 (4.0)
Gastric varix	9 (3.1)
Malignant tumors	4 (1.4)***
Total	295

*Polypharmacy χ^2; p=0.05.
**Polypharmacy χ^2; p=0.02.
***Smoking χ^2; p=0.01

Table 2. Bleeding etiology logistic regression.

Variable	n=295 (%)	p	OR	95% CI
Sex				
Male	143 (48.5)	0.833	1.07	0.54-2.15
Female	152 (51.5)			
Polypharmacy				
Positive	182 (61.7)	0.000	4.25	2.11-8.54
Negative	113 (38.3)			
Smoking				
Positive	109 (36.9)	0.004	3.26	1.45-7.29
Negative	186 (63.1)			

DISCUSSION

We found a predominance of UGB in female patients similar to what Mamdani found in a cohort of 55,000 patients older than 65 years in hospitals in Canada. They studied 187 hospital admissions in which 55% of all cases of UGB were female[14]. In our study, we observed a frequency of 51%. This was also found in a study by Alkhatib in which differences by sex in older patients with UGB were studied, finding a predominance of female sex with 54%[15].

The majority of data for UGB is based on revisions of adult patients from 18 years of age onward. Such is the case of the cohort of Liang et al., in which 1,402 patients were followed, with 66% male population and a majority of patients under 40 years of age[16]. Another example was the study by Kim et al., in which 1,929 patient files with diagnosis of UGB were revised finding a median age of 52 years and a predominance of male sex 75%[17]. Our study shows marked differences compared to study groups elsewhere as well as showing differences related to the site of the bleeding.

We conclude that the most frequent endoscopic finding in older patients is caused by erosive gastropathy. This is associated with patients that have polypharmacy which is estimated to have a prevalence of 61.7%. This prevalence was higher than that reported

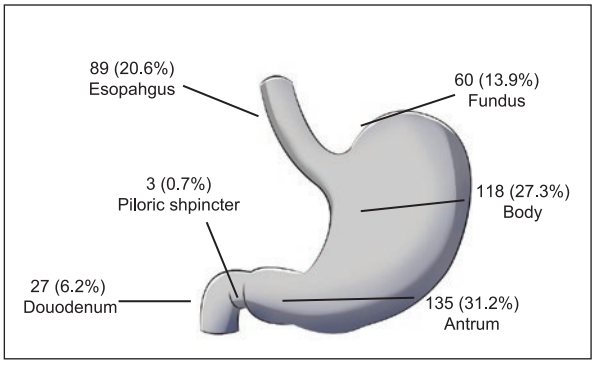

Figure 1. *Lesions by anatomical site (n = 432).*

by Roschelle (43.4%) in a sample of 1,100 older adults residing in rural areas of the United States. It could be that residing in urban areas influences the higher prevalence of polypharmacy[18].

We found that globally the most frequent endoscopic finding for this age group is peptic ulcer which is different to what we found in this study.

UGB is a common occurrence which has a high mortality in older patients. This is why there should be more studies that help to predict the etiology, associated risk factors in our population as well as predicting mortality with prospective studies.

ETHICAL IMPLICATIONS

This study was carried out in accordance to the rules and regulation stipulated by the General Health Law regarding research. The study protocol was submitted to the Research Ethics Committee 2402 of the Mexican Social Security Institute with registry R-2014-2402-60. All authors declared no conflicts of interest.

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THE JOURNAL OF LATIN AMERICAN GERIATRIC MEDICINE ORIGINAL ARTICLE

The mobile phone use and its associations with depressive symptoms among older adults

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Abstract

Background: *Demographic aging has led to an increase in the prevalence of different diseases including the so-called geriatric syndromes (GSs) as depressive symptoms (DSs). The mobile phone (MP) use in old age may provide benefits as in the prevention of the development of GS, like DS. Therefore, promoting MP use could be relevant as a strategy for successful aging.* **Objectives:** *The objectives of this study were to determine the prevalence of MP use and its association's between DS in community-dwelling adults aged 60 years or older.* **Methods:** *A cross-sectional study including 100 participants aged 60 years or older, recruited from geriatrics clinics of a tertiary care university-affiliated hospital in 2017. Participants underwent a comprehensive geriatric assessment with which information about MP use and DS diagnosis was obtained. Regression analyses adjusted for confounding variables were determined to establish the association between the MP use and DS diagnosis.* **Results:** *Mean age was 68 years (standard deviation = ± 6.4). MP use rate was 55%. After adjusted by age, sex, civil status, > 3 pathologies, and Mini-Cog, multiple logistic regression analyses showed a statistically significant association between MP use and DS ($p < 0.05$).* **Conclusions:** *The prevalence of MP use is higher in West Mexican elders and adults 60 years old or older who used MPs had 70% of lower probability of having a diagnosis of DS after adjustment. These results suggest that the use of MP could have a positive influence on the mental health of the elderly.* (J Lat Am Geriat Med. 2018;4:23-28)

Key words: *Information and Communication Technology. Elderly. Depressive Symptoms. Mobile Phone.*

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INTRODUCTION

The worldwide aging population is increasing, and it is predicted that by 2050 one in five people will be aged 60 years or more in developing countries[1,2]. This demographic evolution may be associated with an increase in the prevalence of geriatric syndromes (GS)[3-5]. This term has commonly been used to indicate the "accumulated effect of impairments in multiple domains" that result in a particular adverse outcome like depressive symptoms (DS)[6]. Another challenge of these times is the development of information and communication technologies (ICT), which has been transformed the human's ways of information exchanges. The use of ICT's among older adults has increased considerably in the last decade. According to the United Nations, 96% of the world population had access to the mobile phone (MP)[7-10].

This proliferation has led to a substantial interest and debate regarding the impact of technology use on physical and mental health status, especially in older people[11-15].

The ability to use a telephone is considered for geriatrics medicine as one instrumental activity of daily living.

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Thus, MP use can be viewed as an indicator of functional status in older adults[13-17]. Advancements in ICT through MP are recognized for their positive influence in health education, health monitoring, and support of health behavior[18,19]. MP facilitates communication, increasing the level of connection with other people, making users quickly accessible to other people, and reinforcing existing interpersonal connection[20-25].

The use of MP may provide greater opportunity for supportive social interaction and may help to reduce loneliness, an important risk factor for DS in older adults[26-28].

This study aims to determine the prevalence of MP use and its association between the DS among community-dwelling older adults in western Mexico.

METHODS

Participants

This cross-sectional study including 100 participants aged 60 years or older, which were consecutively recruited from geriatrics clinics of a tertiary care university-affiliated hospital in Jalisco (a 1000-bed teaching hospital in the west of Mexico). Participants were identified through the appointment schedule of the outpatient geriatric clinic. Recruitment occurred between January 1, 2017 and March 29, 2017. Eligible patients had to be 60 years or older. Patients with diagnosis of a previous neuropsychiatric illness, excluding major depressive disorder were excluded from the study. Eligible participants were invited to participate in the study and provided written informed consent. All participants were subjected to the comprehensive geriatric assessment (CGA) carried out by trained medical staff. The study protocol was reviewed and approved by the hospital ethics committee.

Measures

Depressive symptoms

The instrument used was the 15-item version of the Geriatric Depression Scale (GDS-15), which has been widely used for evaluating DS in geriatric population. Those with a score > 5 were identified as having clinically significant DS[29,30].

Correlates

Sociodemographic variables included age, sex, schooling, and domestic partner status. The presence of 12 chronic diseases including diabetes, hypertension, dyslipidemia, cancer, myocardial infarction, stroke, chronic obstructive pulmonary disease, cirrhosis, osteoarthritis, rheumatoid arthritis, osteoporosis, and/or chronic kidney disease. All these comorbidities were summed up in a score ranging from 0 to 12[31].

Health and economic self-perception was determined by two questions: "how does it describe your current health situation and your current economic situation?" (Bad, regular, good, and excellent).

The Mini-Cog™ (score ranging from 0 to 5) was used to assess global cognitive performance, where higher scores indicate better cognitive status, and a score of 0, 1, or 2 indicates a possible cognitive disorder[32,33]. A cutoff point of > 2 drugs was considered for polypharmacy[34].

The MP use was investigated as independent variable. Participants who responded positively to the question "have you used an MP for make and/or receive calls, at least once in the last week?" were classified as current MP users.

Statistical analyses

Variables were described using frequencies and proportions or means and standard deviations when appropriate. For the comparison between participants with and without MP use, χ^2 test or Student's t-test were used as appropriate. To develop an explanatory model, unadjusted logistic regression analyses were created to identify the sociodemographic and health correlates of DS. The choice of independent variables used in the univariate analyses was based on the review of literature and clinical judgment. Wald tests were used to eliminate from every model those variables judged not significant at the 10% level and then the variables considered significantly associated with DS. Finally, a forward multiple logistic regression model was run and the cutoff level at this time was 5% to select a set of variables to be included in a last full model. All statistical tests were performed using 95% confidence intervals (CI). Statistical analyses were conducted using Stata statistical package for Windows® (Stata Corp., Texas, IL v. 14).

RESULTS

Mean age was 68 (standard deviation (SD) = ± 6 range 60-86) and 65% of participants were women. Table 1 shows the sociodemographic and health-related

characteristics of participants. Hypertension and diabetes were the most frequent chronic diseases (52% and 29.5%, respectively); 54% of participants had 0-3 school years. Widowhood was present in 24% of participants.

Participants with DS were more likely to be more older and to have good economic self-perception ($p < 0.05$). Nevertheless, the comparison between groups showed no differences regarding schooling, marital status, cognitive status, and chronic diseases (≥ 3). The 55% of participants used MP. DS were reported by 18%. The 75% of participants that do not report MP use presented DS at baseline.

The univariate logistic regression analyses (Table 2) showed that the report of MP use was associated with DS (odds ratio = 0.27; 95% CI = 0.08-0.85, $p = 0.02$). The multivariate logistic regression model showed that the use of MP maintained a significant association with DS, even after adjustment to confounders.

DISCUSSION

In the present study, MP was independently associated with DS. These results underline the relevance of considering MP use in the evaluation of older adults since this could play a very important role in the course of social isolation and developing of depression in this population, independently of their sociodemographic status.

Our results demonstrated an independent association between MP use and DS among older adults. This is consistent with others analysis, in which use the MP can improve skills to develop strategies to improve health in older persons[35-39].

Table 1. Prevalence of depressive symptoms according to the sociodemographic and clinical characteristics

Variable	Depressive symptoms No (%)	Depressive symptoms Yes (%)	p
Age, years			
60-69 (56)	87	13	0.100
≥ 70 (39)	74	26	0.013
Sex			
Female	82	18	0.958
Male	82	18	0.950
Schooling, years			
0-5	81	19	0.491
≥ 6	9	1	0.801
Partner status			
Married	77	22	0.240
Single	100	-	-
Divorced	100	-	-
Widowhood	83	17	0.079
Health self-perception			
Excellent	100	-	-
Good	94	6	0.310
Regular	79	21	0.188
Bad	77	23	0.091
Economic self-perception			
Good	87	13	0.001
Regular	93	7	< 0.0001
Bad	61	39	0.002
Morbidity			
Polypharmacy	74	26	0.08
Cognitive impairment	78	22	0.1
≥ 3 Pathologies	82	18	0.9
Mobile phone			
Yes	100	-	0.007
No	76	24	

Table 2. Regression logistic analyses of depressive symptoms by mobile phone use

Variable	Univariate		Bivariate	
	OR (95% CI)	p	OR (95% CI)	p
Depressive symptoms	0.27 (0.08-0.85)	0.02		
Age			0.28 (0.08-0.91)	0.035
Sex			0.27 (0.08-0.84)	0.024
Schooling			0.33 (0.1-1.1)	0.073
Partner status			0.30 (0.09-0.92)	0.037
Health self-perception			0.33 (0.10-1.04)	0.06
Economic self-perception			0.34 (0.10-1.15)	0.085
≥ 3 pathologies			0.27 (0.09-0.87)	0.03
Mini-Cog			0.30 (0.09-0.98)	0.04
Polypharmacy			0.33 (0.10-1.06)	0.06

OR: odds ratio, CI: confidence interval

Chopik found that, like our results, higher social technology use was associated with better self-rated health, fewer chronic illnesses, higher subjective well-being, and fewer DS[28]. The knowledge and use of the MP become relevant as an effective strategy for social inclusion. However, the scope of MP use in the prevention of GS and in the promotion of successful aging is not clear.

A study found that MP use was correlated to lower levels of DS among Japanese older adults, adjusting for sociodemographic and physical health characteristics. These protective effects persisted among women[39]. Our results demonstrated that ≤ 69-year-old people reported MP use more frequently in comparison to participant aged 70 years or older. The married elders who report MP use were a third of total sample. Other studies have found similar results in which there is a higher prevalence of technology use associated with younger age and married[40,41].

Our results demonstrated that users that report MP use had 82% less probability to have DS. The relationship between depression and MP use is extremely complex. In a cross-sectional analysis carried out in China, it was found beneficial applicability of cellular use in the presence of depression[42]. An Australian study found that online social connectedness can help to protect older people from DS following driving cessation[43]. In addition, our results showed that most of the participants, who report MP use, referred regular, good, and excellent self-perception of health (48%). In terms of morbidity, the participants who report do not use MP had higher frequency of polypharmacy ($p = 0.02$). Furthermore, our results showed that MP use was associated with better cognitive performance and higher functional abilities. Similarly, positive outcomes in older people that report MP use had been a constant observation in most studies. In a study of older adults, MP use was a positive indicator of cognitive and functional status[38].

However, no association was found between the presence of DS and MP after adjustment for some confounding (schooling, economic and health self-perception, and polypharmacy).

The mechanisms by which the use of the MP promotes improvements in health have not yet been explored. MP may in fact directly enhance the psychological well-being of the elderly, providing older people with a sense of comfort and safety; by carrying MPs, elder feel safer going out alone, are less afraid of getting lost and feel confident that there is someone to call in case of trouble[44,45]. Furthermore, each of the links between social technology use and physical and psychological health could was mediated by reduced loneliness[28,46].

Some limitations in the present study must be acknowledged. The cross-sectional design did not allow the trends of DS and MP use to be studied longitudinally and is not possible to know the direction of

the associations that we found. Second, this is a non-probabilistic sample and participants volunteered to enroll in the study. The sample was probably consisted of highly motivated individuals who were interested in lifestyle improvements. Third, participants showed distinct profiles in the use of MP. Whether differing devices and data providers will be similar, are unknown.

The major strengths of this study include the utilization of the GDS to measure DS diagnosis; which in contrast to other scales to screen for DS, this instrument seems appropriate for this population because it is distinctly free of somatic symptoms in its items, which are closely related to the physical disability. Furthermore, the present study did consider other confounding variables; all these factors are well known for their influence on the development of DS.

However, given that there are mixed results and methods of assessment in previous studies similar to the present one; more research is needed to understand the relationship between DS and MP use among older adults.

CONCLUSION

This study showed that the prevalence of DS is higher among older adults in Mexico. The multivariate logistic regression analyses showed that the report of MP use was associated with less DS prevalence after adjust by age, sex, partner status, comorbid, and global cognitive performance ($p < 0.005$).

The use of the MP and their potential positive effects on promoting healthy aging are still areas of uncertain knowledge that need to be explored by the geriatrician, gerontologist, and technology developers. The current world faces the convergence of two revolutions: technology and aging, citing Deets, "the challenge is for the leaders of these two revolutions to understand each other and harness the power of their convergence for the good society in the future[47]." We think that MPs are tools to promote positive social skills to replace the elderly through multiple forms of social interaction, and it is important to promoting ICTY from geriatrics medicine, as they seem to have an impact on health status of the elderly.

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