ORIGINAL RESEARCH article

Prevalence of comorbidity and polypharmacy among hospitalized elderly patients

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HOW TO CITE THIS
Alssageer et al. (2022) Prevalence of comorbidity and polypharmacy among hospitalized elderly patients.
Mediterr J Pharm Pharm Sci. 2 (1): 53-61. [Article number: 53]. https://doi.org/10.5281/zenodo.6399521

Abstract: Aging seldom comes alone and it is considered to be the major factor for many diseases and comorbidities and disabilities. The objectives of the study are to examine demographic characteristics and prevalence of comorbidities and polypharmacy of elderly patients who were admitted at Sebha Medical Center according to the selected period. This study is a descriptive and retrospective cross-sectional study conducted in Sebha in 2021. From 195 participants in the study, the highest rate of patients was from the age group of 65-74 years which accounted for 86 participants (44.0%) and followed by the age group of 75-84 years which was reported by 65 participants (33.0%). The majority of elderly patients have hypertension, (n=116, 59.0%) and over one-third of the patients (n=73, 37.0%) have diabetes mellitus while nearly one-quarter of patients have both diseases at the same time (n=47, 24.0%). Almost, three-quarters of patients have electrolyte imbalance (n=142, 72.0%). Nearly, two-thirds of the patients had three to five comorbidity diseases (n=122, 63.0%). Whereas, over one-third of the patients had just one or two comorbidities (n=70, 36.0%). Almost all the participants have polypharmacy (n=187, 96.0%). Just above half of the patients have five to ten medications (n=100, 51.0%) compared with 45.0% of the patients from those who have more than ten medications (n=87). This study showed a strong relationship between the prevalence of polypharmacy and the number of comorbidities. A Spearman correlation test indicated that the rate of comorbidities was related to polypharmacy with a significant correlation (p<0.01). The present study found a high prevalence of comorbidities and polypharmacy among elderly inpatients. Based on this high prevalence, practicing pharmaceutical care could play an effective role in reducing the risk of inappropriate polypharmacy among hospitalized elderly patients by encouraging clinical pharmacists to engage in clinical activities in hospitals.

Introduction

The population of elders is rapidly increasing in many countries in the world. The global share of older people increased from 09.0% in 1990 to 12.0% in 2013 and is expected to reach 21.0% by 2050 [1]. In the same way, the life expectancy of the people was also raised. In 1950, the life expectancy in developed countries was 65 years while in developing countries it was 42 years. Currently, however, life expectancy is 78 years in the developed

world and 68 years in the developing world [2]. Aging seldom comes alone and it is considered to be the major factor for many diseases, comorbidity, disability, frailty and social isolation [3]. Therefore, aging is an established risk factor for the development of comorbidity, disability and frailty as well as increasing health and pharmaceutical spending. Along the same line, hospital admission rates, the need for intensive care, return visits and length of Emergency Department stay are higher for elderly patients than for younger patients [4].

The elderly population in Libya has increased nearly doubled over the last 20 years [5]. Older persons comprise 12.0% of the U.S. population, they account for 34.0% of all prescription drug expenditures [5]. Particularly for the treatment of chronic diseases, elderly patients were found to use about three times more drugs than younger patients [6]. Polypharmacy is often a consequence of multiple chronic conditions which may create a concern to physicians and it exposes elderly patients to effect beyond the beneficial patient outcome, thus, increasing the risk of adverse drug reactions, drug-drug interactions and as a consequence increased risk of disability, hospitalization and mortality [7]. However, the use of multiple drug treatments can be clinically appropriate if they improve health and quality of life [8]. In most of the literature, polypharmacy is defined as the regular intake of five or more medicines [9]. Elderly people in developing countries such as Libya have limited resources to access adequate medical care and shortage in some specialties which include geriatrics or physicians trained in geriatric medicine. Therefore, the objectives of this study are to examine demographic characteristics and prevalence of comorbidities and polypharmacy of elderly Libyan patients who were admitted to the hospital according to the selected period.

Materials and methods

This study is a descriptive and retrospective cross-sectional study conducted at Sebha Medical Centre (the largest University hospital in the south region of Libya) in 2021. It uses a non-probability convenient sampling technique to select the sample from those who fulfill the inclusion criteria were enrolled. Patient records were eligible for inclusion if the patient's age was 65 years and above. Patients with more than 24 hours of length of stay in the hospital were included. A letter of ethical clearance was obtained from the ethical review committee of Sebha University (1/2021); after getting the official letter of permission from the faculty of pharmacy, permission was also obtained from the Sebha Medical Center (SMC) office for cooperation from the Department of Medical Record at SMC. Two independent researchers retrieved the records of the medication review from the medical records. We used a standardized data extraction sheet to collect relevant information from patient medical records and data will be collected by trained pharmacy students using a pre-tested data collection checklist.

Statistical analysis: Data from the recorded collection sheet were classified and coded. All collected data were fed into the computer and tabulated by using Microsoft Excel and IBM Statistical Package for the Social Sciences (SPSS), version 20th of statistical software. The categorical and the nominal variables were used for dependence and independence variables and were expressed as frequency and percentage. Descriptive statistics are expressed as numbers, averages and percentages. The correlation coefficient was tested by the Spearman correlation test.

Results

During four months of collecting data, out of 1000 patient files, 195 elderly patients' files met the inclusion criteria (20.0%). **Table 1** shows that the highest rate of patients was from the age group of 65-74 years old which accounted for 44.0% (n=86) and followed by the age group of 75-84 years which was reported by 65 patients (33.0%). From 195 participants in the study, the majority of elderly patients have hypertension (n=16, 59.0%)

and over one-third of the patients have diabetes mellitus (n=73, 37.0%) while nearly one-quarter of the patients have both diseases at the same time (n=47, 24.0%). Nearly, three-quarter of the patients have electrolytes imbalance (n=142, 72.0%) whereas female patients accounted for 81.0% (n=75) compared with male patients (n=67, 67.0%).

Table 1: Demographic characteristics of elderly patients with comorbidity and polypharmacy rate			
Gender	Male	Female	**Total**
Age (years)			
65-74	(47%) 48	(41%) 38	**(44%) 86**
75-84	(30%) 31	(36%) 34	**(33%) 65**
85 ≤	(23%) 23	(23%) 21	**(22%) 44**
Total	(52%) 102	(48%) 93	**(100%) 195**
comorbidity rate			
Comorbidity	Male	Female	**Total**
3-5	(59%) 60	(66%) 62	**(63%) 122**
1-2	(40%) 41	(31%) 29	**(36%) 70**
> 5	(01%) 01	(02%) 02	**(02%) 03**
Total	(52%) 102	(47.6%) 93	**195**
Polypharmacy			
Polypharmacy	Male	Female	**Total**
< 5	(05%) 05	(03%) 03	**(04%) 08**
5-10	(54%) 55	(48%) 45	**(51%) 100**
> 10	(41%) 42	(48%) 45	**(45%) 87**
Total	(52%) 102	(47.6%) 93	**195**

As shown in **Table 2** and **Figure 1**, nearly half of the patients have anemia (48.7%). To a lesser extent, infectious and heart disease were reported in 73 and 68 patients (37.0% and 34.0%), respectively. Regarding gender difference, female patients who have heart diseases were nearly as double the male patients which accounted for 42 and 26 patients (45.0% and 35.0%), respectively. However, the lowest rate was reported for cardiovascular disease which accounted for 31.7% of the patients. Based on results in the **Table 1**, illustrate that most of the patients in this study sample suffer from multimorbidity. It shows that nearly two-thirds of them had (n= 122, 63.0%) from three to five comorbidity diseases in the same time. Whereas over one third of patients had just one or two comorbidities (n=70, 36.0%). Regarding to the polypharmacy (**Table 1** and **Figure 2**), almost all elderly patients have polypharmacy (n=187, 96.0%). Just above half of patients (100, 51.0%) have from 5 to 10 medications compared with 87, 45.0% of those who have more than 10 medications. However, just eight patients (04.0%) take less than five medicines.

Comorbidity	Male	Female	Total
Table 2: Comorbidity among Libyan elderly patients			
Electrolyte	(66%) 67	(81%) 75	**(72%) 142**
Hypertension	(56%) 58	(62%) 58	**(59%) 116**
Anemia	(49%) 50	(48%) 45	**(49%) 95**
Diabetes mellitus	(37%) 38	(39%) 36	**(38%) 74**
Infection	(34%) 35	(41%) 38	**(37%) 73**
Heart disease	(25%) 26	(45%) 42	**(35%) 68**
Cardiovascular disease	(35%) 36	(28%) 26	**(32%) 62**
Hypertension and diabetes mellitus	(24%) 24	(25%) 23	**(24%) 47**
Total	(52.0%) 102	(47.6%) 93	**195**
Patients may have more than one comorbidity			

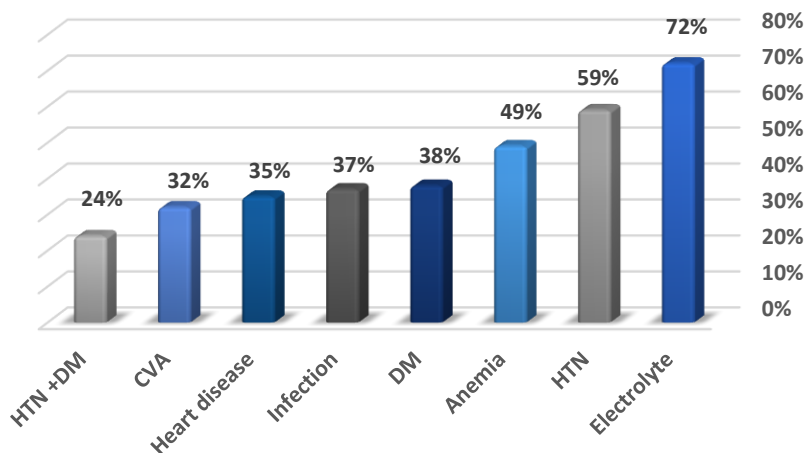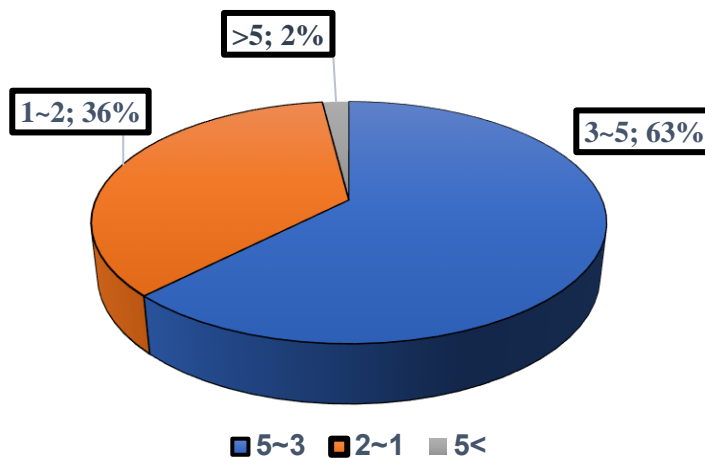**Figure 1:** Precentage of comorbidity among elderely patients

Figure 2: Comorbidity diseases among Libyan elderly patients

The results of **Table 3** show that there is a relationship between the prevalence of polypharmacy and the number of comorbidities. A Spearman correlation test indicated that the number of comorbidities is related to polypharmacy with a high significant level ($p < 0.01$). In the same way, polypharmacy is affected by differences in gender. A Spearman's test showed that a very high significant difference in the prevalence of polypharmacy between both genders with p<001.

Table 3: Correlation of polypharmacy versus comorbidity rate					
Polypharmacy		**Comorbidity**			
		1-2	3-5	> 5	**Total**
<5	Count	05	03	00	**08**
	Total	02.6%	01.5%	00.0%	**04.1%**
5-10	Count	36	49	00	**85**
	Total	18.6%	25.3%	00.0%	**43.8%**
>10	Count	30	67	04	**101**
	Total	15.5%	34.5%	02.1%	**52.1%**
Total	**Counts**	**71**	**119**	**04**	**194**
	Total	**36.6%**	**61.3%**	**02.1%**	**100%**
Ordinal by ordinal	Spearman correlation	0.181	**Significance = 0.01**		

Discussion

In the present study, the average age found is 74.0 years old. It is slightly higher than that found in Lebanon and Iran studies which reported to be 72.5 and 72.6 years, respectively [10, 11]. Aging seldom comes alone and it is considered to be a major factor for several diseases, and comorbidity [3]. The presence of comorbidity is also related to the high consumption of medicines. Irrational medicine use is quite common, especially among elderly populations who have multiple comorbidities [12]. The present study shows that nearly two-thirds of patients had three to five comorbidity diseases at the same time. Similar trends in the Dutch population found that patients aged ≥75 have multi-morbidity [13]. Multi-morbidity becomes progressively more common with age [14]. Also, in the present study, nearly three-quarters of patients have electrolyte imbalance and the highest rate was hyponatremia. This consists of present findings evidence showed that hyponatremia is the most common in hospitalized patients [15]. Hyponatremia, even when mild, is associated with increased mortality [16]. The risk of death during hospitalization is increased by double in patients admitted with hyponatremia compared with normonatremia [17]. Hyponatremia more likely common in the elderly than hypernatremia [18-20]. This trend consistence with the present study. Morbidity and mortality may be due to hyponatremia itself, or the inappropriate treatment of hyponatremia. Therefore, caution must be exercised to avoid inappropriate correction of the sodium imbalance, which could result in further complications, morbidity and death [21].

Abnormalities in potassium balance are common medical problems encountered among hospitalized patients [22]. The elderly are associated with an increased probability of developing hypokalemia during a hospital stay [23]. In our study, about 10.0% of the elderly have hypokalemia compared to about 05.0% who have hyperkalemia. In agreement with the present study, the prevalence rate of hypokalemia in hospitalized patients is between 05.0% and 20.0% [24-26] as in the present study, 17.5%. Along the same lines, a descriptive cross-sectional study conducted in a tertiary care center found the prevalence of hypocalcemia in the elderly [27]. In the elderly, there

is inadequate intestinal absorption of calcium combined with an age-related hormonal decline and vitamin D deficiency, which results in adverse effects on calcium hemostasis [28]. Hypertension is age-dependent and with the prolongation of life expectancy, affects more elderly people [29]. The majority of hypertension patients are not achieving their target blood pressure. Evidence shows that 40.0% of the patients had controlled blood pressure [30]. Aging affects the clinical presentation of diabetes and accelerates diabetic-related complications, alterations in the pharmacokinetics of insulin and oral medications affect individual drug choices and dosing decisions, making diabetic management more complicated [31]. The presence of hypertension with diabetes increases the risk of mortality by seven-fold [32] with a greater risk of death in developing nations [33]. Thus, about a quarter of Libyan elderly patients have concurrent diabetes mellitus with hypertension. Anemia is highly prevalence in the elderly and this incidence increases with age [34]. The prevalence of anemia ranges from 40.0% in patients admitted to the hospital, to half in nursing home residents [35]. This is a quite similar rate that found nearly half of Libyan patients have anemia. In adults aged 60 years and above, anemia has notable adverse consequences of impaired functionality, and cognition, increased hospital admissions and increased morbidity and mortality [36]. The higher prevalence in hospital-based studies is not surprising as it is well known that anemia is not an uncommon finding in most disease states particularly patients with serious enough to necessitate hospital admission. Clinicians may overlook anemia or attribute its symptoms to the underlying disease process.

The elderly generally have greater vulnerability to infections than younger adults since aging is associated with immune dysfunction [37]. Immune aging is associated with declining protective immunity combined with an increasing incidence of inflammatory disease [38]. Comorbidity most often results in reduced innate immunity. In Turkey, infection is the most common cause of hospitalization among geriatric patients [39]. In the present study, about 40.0% of elderly patients have an infection. This higher rate could be related to the difference in the design of the study since in our study we did not investigate the reasons for the admission of the elderly into the hospital. The incidence of cerebrovascular diseases (CBVD) has risen by 100% in developing countries and it is the leading cause of continuous neurological disability in many countries [40]. With increasing age, the crude death rate of CBVD showed a fast growth [41]. A highly prevalent in persons with incident stroke, estimated at 89.0% for those aged > 65 years and 60.0% for those aged < 65 years [42]. Currently, about 30.0% of elderly patients who are admitted have comorbidity cerebrovascular accident (CVA) disease. This lower rate of prevalence compared to the other studies in the literature could be related to the characteristics the population of our study which was restricted only on hospitalized elderly patients. According to the latest WHO report, stroke deaths in Libya were about 10.0% of total deaths. Thus, the incidence of CVA is high in South Libya and stroke has revealed a high incidence rate of 662 per 100,000 deaths per year with a morality rate was about 25.0% within 30 days cases [43].

The prevalence of polypharmacy is increasing, owing largely to changes in population demographics and increasing multi-morbidity. Individuals using at least five prescription medicines amplified by 70.0% as compared to the last decade [44]. Elderly patients who suffer from multi-morbidity they usually need multi-medications to manage their comorbidities which inherently increases the risk of poly-pharmacy. The present study revealed significant correlation between comorbidity and polypharmacy and almost all elderly patients have polypharmacy. Previous studies have shown a similarly high prevalence of polypharmacy in other countries. In Saudi Arabia and Germany, polypharmacy was found in 90.0% of the patients [45, 46]. Polypharmacy may create a concern for clinicians because it exposes elderly patients to effect beyond the beneficial patient outcome [7]. A systematic review noted that polypharmacy has a clearly established strong relationship with negative clinical outcomes [47]. A cohort Korean study found that polypharmacy is associated with an increased risk of mortality

in the elderly [48] and a greater risk of hospitalization [49] and death [48]. However, the use of multiple drug treatments can be clinically appropriate if they improve health and quality of life [8]. Best approaches towards appropriate polypharmacy should address over- as well as under-treatment in older patients. Clinical pharmacists with their extensive knowledge and training in pharmacotherapy and pharmaco-kinetics can play a crucial role in the management of chronic diseases through their engagement with other healthcare staff in pharmacotherapy interventions and preventing harmful consequences of polypharmacy.

Conclusion: The prevalence of comorbidity and polypharmacy among elderly inpatients is high. Practicing pharmaceutical care may play an effective role in reducing the risk of inappropriate polypharmacy among hospitalized elderly patients by encouraging clinical pharmacists to engage in clinical activities in the hospitals. It also urgently needs the establishment of therapeutic local guidelines based on evidence-based medicine at Libyan hospitals and implementation in elderly treatment.

Author contributions: MA Conceived, design of study, editing and revising the manuscript. ESM Collect and analyze of data and prepare the first draft of the manuscript. SAA collect and analysis of data and prepare the first draft of the manuscript. All authors approved the final version of the manuscript.
Conflict of interest: The authors declare the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.
Ethical issues: Including plagiarism, informed consent, data fabrication or falsification and double publication or submission were completely observed by the authors.
Data availability statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.
Author declarations: The authors confirm that all relevant ethical guidelines have been followed and any necessary IRB and/or ethics committee approvals have been obtained.

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