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PREVALENCE OF POLYPHARMACY AMONG LIBYAN ELDERLY ADULTS

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Polypharmacy is one of the most significant health issues associated with increased occurrence of Potentially Inappropriate Medications (PIMs), that impacts the disease burden and healthcare costs. There is currently no multicenter cross-sectional study in Libya that evaluated the prevalence of polypharmacy and PIMs used by older patients. Prescriptions from two governmental hospitals and two private clinics were retrospectively explored. Patients' details, number of drugs per prescription, and other drug details were collected. Beers criteria of 2019 were used to identify the presence of PIMs and ultimately the prescribing suitability. Prescriptions from hospitals contains significantly higher polypharmacy than in clinics (75.3% vs. 48.8%, P=0.012). In contrast, the presence of PIMs in the private clinics was significantly higher than in hospitals (46.4% vs 36.3%, P=0.022). Medications used to treat chronic disorders like diabetes, dyslipidemia, and hypertension were frequently prescribed to patients with polypharmacy in both health settings. Drugs for gastrointestinal disorders and antihistamines were commonly identified as PIMs for both care settings. We confirmed the presence of polypharmacy associated with PIMs, especially for patients with cardiovascular disease, or diabetes. Efforts should be made to improve the prescription quality of older patients

Keywords. *Polypharmacy, Prescription Suitability, Potentially Inappropriate Medications.*

INTRODUCTION

Polypharmacy is a term used to describe the practice of taking multiple medications concurrently to manage various health conditions, generally taking five or more drugs[1]. The World Health Organization (WHO) defines polypharmacy as "the administration of many drugs at the same time or the administration of an excessive number of drugs" [2]. While medications can be essential for treating illnesses and improving quality of life, the use of multiple drugs can sometimes lead to unintended consequences such as drug interactions, adverse effects, and increased complexity in managing one's health regimen[3]. As the population ages and the prevalence of chronic diseases rises, polypharmacy has become a growing concern in healthcare, highlighting the importance of careful medication management, regular reviews by healthcare providers, and a patient-centered approach to ensure the safe and effective use of medications[4].

The prevalence of polypharmacy has been on the rise globally, particularly in older adult populations. It has been reported that more than 30% of patients aged 65 years or older had obtained ≥ 5 drugs and about 53.6% dispended OTC drugs[5]. Polypharmacy is a common phenomenon in modern healthcare systems as the burden of chronic diseases increases, life expectancy rises, and medical advancements lead to the availability of a wide array of therapeutic options[6].

The prevalence of polypharmacy raises concerns about its potential negative impacts, including an increased risk of adverse drug

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reactions, drug interactions, medication non-adherence, decreased quality of life, and higher healthcare costs. Therefore, understanding the prevalence of polypharmacy is crucial for healthcare professionals to develop strategies for optimizing medication use, promoting deprescribing when appropriate, and ensuring the safe and effective management of patients' medication regimens[7]. Studies have shown that polypharmacy is more prevalent in older adults due to the higher likelihood of having multiple chronic conditions that require pharmacological management[8]. Additionally, healthcare providers may sometimes unintentionally contribute to polypharmacy through the prescribing of multiple medications for various health issues without adequate consideration of potential interactions or redundancies[9].

Polypharmacy is closely linked to the concept of potentially inappropriate medications (PIMs). PIMs refer to medications that pose a higher risk of adverse events when compared to alternative treatments, especially when used in older adults[10]. A list of PIMs is frequently included in guidelines focusing on safe medication prescribing, such as the Beers Criteria[11]. The presence of PIMs in the context of polypharmacy can lead to a higher risk of adverse drug events, hospitalizations, cognitive impairment, falls, and other negative health outcomes in older adults. Therefore, it is essential for healthcare providers to regularly review and optimize medication regimens, consider deprescribing PIMs when appropriate, and ensure that the benefits of each medication outweigh the potential risks, especially in the context of polypharmacy[12].

In Libya, there are a paucity of information regarding the prevalence of polypharmacy among elderly patients. In a study conducted in Sabha city, involved elderly patients who were admitted at Sebha Medical Center, found that 187(96%) of patients had a polypharmacy, and 45% of them had ≥10 drugs per prescription[13]. Another study also conducted in Libya reported 53.3% of older people had ≥10 drugs per prescription, with an average of 11.25 drug per prescription[14].

The current study was the first multicenter cross-sectional study in Libya that aimed to ascertain the prevalence of polypharmacy, and assess prescribing suitability of drugs used by elderly Libyan patients.

MATERIALS AND METHODS

Study design and population

This was a multicenter retrospective cross-sectional study conducted in two governmental hospitals (Tripoli University Hospital and Tripoli Central Hospital) and two private clinics (Aldia and Alshifa linics). Discharge prescriptions from outpatient departments from both healthcare settings on six randomly selected days (13 to 18 April 2024) were analyzed. Prescriptions from patients aged <30 years old were excluded. This study was approved by the ethical committee of the university of Tripoli Alahlia (IRB-UTA-0323).

Data collection

Details on patient's demographics (such as; age, gender), number of drugs per prescription, details of prescribed drugs (e.g., drug name, dose) were reviewed from the obtained prescriptions. Regardless of the length of treatment, all prescribed medications were included to ensure that every medication used by each patient was covered in full and to identify any possible drug-related risks.

Polypharmacy, as per the WHO report (World Health Organization, 2019), was considered as obtaining five or more prescribed medications at the same time.

Prescribing suitability was evaluated with polypharmacy by two pharmacists with at least 7 years of clinical experience. Unsuitable polypharmacy was defined as the use of at least one PIM with polypharmacy.

The detection of PIM in the collected prescription were based on Beers Criteria (North America)[11], which prescribing of medications without a valid indication or with a contraindication (overprescription); failure to prescribe a clinically indicated drug (underprescription); the occurrence of unwanted drug–drug or drug–disease interactions or the incorrect prescribing of an indicated drug (misprescription), such as duplicate prescribing, inappropriate follow-up and incorrect medication dose or duration.

Data analysis

Descriptive statistics were used to describe the study population. Prevalence of polypharmacy was presented as frequency (n) and proportion (%). The normality test was carried out, the Shapiro-Wilk test was considered. For comparison between care settings, Mann–Whitney U test was used for continuous non-normally distributed data, such as age and number of drugs per prescription, and chi-square test was used for categorical data such as gender and prevalence of polypharmacy. All statistical analyses were performed using IBM SPSS Statistics version 27.0 (IBM Corp, Armonk, NY, USA), at a significance level of a = 0.05 and 95% confidence interval (CI).

RESULTS AND DISCUSSION

Results

Patients' demographics

Overall, 161 prescriptions were retrieved, of which 77 were from hospital patients and 84 were from private clinic patients **(Fig. 1)**.

In **table 1**, the mean±SD age of the patients in hospitals and clinics was 70±2 years and 68±1 years, respectively. Females were predominated in both healthcare settings (44.1 % vs 27.4% in hospital, 55.9% vs 53.6% in clinics, male to female; respectively).

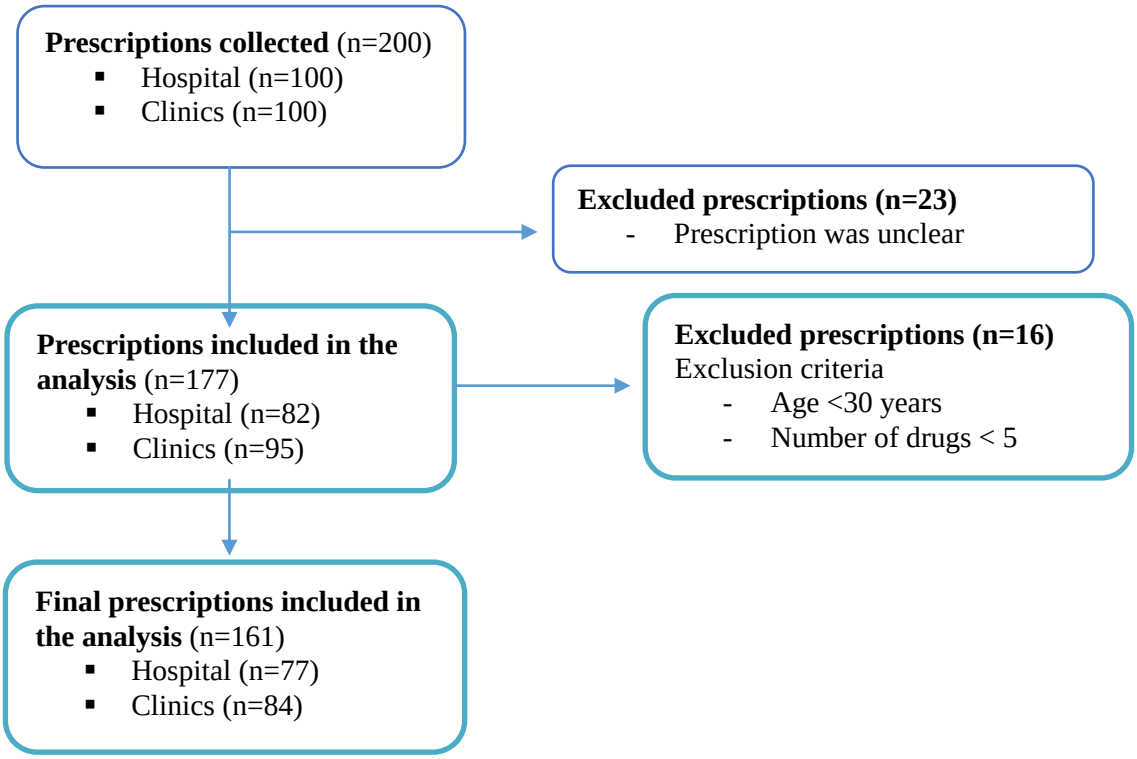

Fig. 1: Flowchart of the prescription selection process.

Table 1: Demographic characteristics of the study population.

Variables	n(%)		P value
	Prescriptions from hospitals (n=77)	Prescription from clinics (n=84)	
Age (mean±SD)	70±2	68±1	0.105[a]
Gender			
Male	34 (44.1%)	23 (27.4%)	0.203[b]
Female	43 (55.9%)	45 (53.6%)	

[a] *Unpaired t-test used to compare between care setting as p<0.001 for normality test.* [b] *Chi - square test used to compare between care setting.*

Prevalence of Polypharmacy in the Elderly

The prevalence of polypharmacy was exhibited in **table 2**. Patients in hospitals had a significantly higher prevalence of polypharmacy than patients in clinics (75.3% vs. 48.8%, P=0.012). Compared to private clinic prescriptions, hospital prescriptions contained more drugs per prescription (8.2 vs. 7.8 drugs, P=0.241). For prescribing suitability, the percentage of prescriptions with ≥1 PIM in clinics was significantly higher than in hospitals (36.3% vs. 46.4%, P=0.022).

Categories of prescribed drugs

Table 3 lists the top five medications prescribed to patients with polypharmacy as well as the top five drug classes recognized as PIMs. Medications used to treat long-term conditions like diabetes, dyslipidemia, and hypertension were frequently prescribed to patients with polypharmacy in both types of settings. Other drugs involved in polypharmacy included anti-acidity drugs in hospitals, as opposed to analgesics in clinics. Drugs for gastrointestinal disorders and antihistamines were common drug classes identified as PIMs for both care settings. Aside from cough and cold remedies, antihypertensive, and antithrombotic medications used in clinics, other drug classes implicated in PIM use were those used as skeletal muscle relaxants and for insomnia in hospitals.

Table 2: Level of polypharmacy and presctipion suitability among the collected prescriptions.

Variables	n(%)		P value
	Prescriptions from hospitals (n=77)	Prescription from clinics (n=84)	
Polypharmacy (≥ 5 drugs)	58(75.3%)	41 (48.8%)	0.012*
No. of drugs per prescription	8.2	7.8	0.241
Unsuitable polypharmacy (≥ 1 PIM)	28(36.3%)	39(46.4%)	0.022*

Unpaired t-test used to compare between care setting.

Table 3: Top-5 drugs prescribed to elderly patients.

Prescriptions from hospitals (n=77)		**Prescription from clinics (n=84)**	
Drugs	**n(%)**	**Drug class**	**n(%)**
Polypharmacy			
Metformin	39(50.6%)	Paracetamol	65(77.3%)
Atorvastatin	27(35.1%)	Carvedilol	52(61.9%)
Omeprazole	26(33.7%)	Metformin	49(48.3%)
Furosemide	14(18.1%)	Verapamil	28(33.3%)
Candesartan	13(16.8%)	Glimepiride	22(26.2%)
PIMs			
Metoclopramide	16(20.7%)	Domperidone	28(33.3%)
Promethazine	14(18.1%)	Aspirin	23(27.3%)
Amitriptyline	12(15.5%)	Nifedipine	16(19.0%)
Orphenadrine	9(11.6%)	Cyproheptadine	11(13.1%)
Diphenhydramine	4(5.1%)	Codeine	7(8.3%)

Discussion

The concurrent use of multiple medications by an individual, is a common phenomenon, especially among older adults who often have multiple chronic conditions that require ongoing management. While polypharmacy can be necessary and beneficial in some cases, it also increases the risk of PIMs being prescribed[15]. To address the prevalence polypharmacy and associated PIMs, the current study was undertaken.

Consistent with previous reports, this study revealed that women were more likely than men to have polypharmacy[16,17]. This could be explained in part by women's higher life expectancy, and women more likely to be influenced by psychiatric and social factors, resulting in increased symptom perception and health-seeking behaviors[18]. Nevertheless, the higher rate of polypharmacy in men requires additional attention.

Previously, there have been efforts to determine the prevalence of polypharmacy and PIMs among older adults in Libya. Two studies published recently by the same author, reported some insight of the scope of the problem. Both of the studies were conducted in the city of Sabha at the south region of Libya, which noticed that 96%[13] and 53.3%[14] of older patients had polypharmacy. Our study also exhibited high level of polypharmacy in two health setting (hospital (75.3%) and clinics (48.8%)), which agreed with the previous studies. Similarly, in two recent multicenter studies one carried out in Singapore in 2023 reported high polypharmacy in hospital setting compared to clinics (66.6% vs. 35.0%, $P < 0.001$) ,[19] and the other study conducted in seven centers in Europe in 2022 reported polypharmacy ranging from 16.4% in Geneva to 60.8% in Coimbra[20]. The possible clarification for the high prevalence of polypharmacy in these studies might be due to non-adherence to standard treatment guidelines.

For prescribing suitability reported in the existing study, the percentage of prescriptions with ≥1 PIM in clinics was significantly higher than in hospitals (36.3% vs. 46.4%, P=0.022). This was in line with recent systematic review in 2023 retrieved 94 articles including nearly 371.2 million older participants from 17 countries, found overall pooled prevalence of PIMs use was 36.7% (95% CI, 33.4%-40.0%)[21]. In the same study, Africa had the highest prevalence of PIM use (47.0%; 95% CI, 34.7%-59.4%). In Saudi Arabia, the prevalence of PIMs was high and ranging between 57.2% and 63.6%[22].

PIMs and polypharmacy in older patients with chronic disease are common worldwide[23]. This fact was also observed in the findings of the current study where medications used to treat long-term conditions like diabetes and cardiovascular diseases were frequently prescribed to patients with polypharmacy. The use of multiple drugs is advised in recent guidelines for the treatment of cardiovascular disease in order to prevent complications or lower mortality[24]. But this also can come with harmful consequence, like inadequate adherence, adverse drug reactions, lengthy hospital stays, and high medical expenses[25]. A number of guidelines for managing polypharmacy in individuals with diabetes or cardiovascular diseases have progressively been proposed in an effort to find a balance between ineffective therapies and needless prescription drugs[1,26].

Regarding PIMs, gastrointestinal disorders and antihistamines were the most identified in both healthcare settings. This is comparable to previous literature studies that had reported that gastrointestinal agents and antihistamines as their most prescribed PIMs[27,28]. PIMs use in older patients has been noted to be a cause of declining functional autonomy and physical performance. Many PIMs have a high frequency of peripheral and central side effects. They can also exacerbate or worsen depressive symptoms, cognitive decline, incontinence, weight loss, malnourishment, and other geriatric symptoms[29].

Recognizing any polypharmacy is the first step in determining whether it is inappropriate. There are several approaches for reducing unsuitable prescribing or polypharmacy. Medication assessment (e.g., by pharmacists or physicians), education, and the use of analysis tools to detect possibly unsuitable prescribing (e.g., Screening Tool of Older Persons' Potentially Inappropriate Prescription (STOPP)) have been effective in reducing

polypharmacy in various populations[30].

Study limitation

This was a retrospective study. The collected prescription data may not accurately reflect the patient's actual medication use. Thus, the use of prescription data may have been overestimated. Furthermore, a cross-sectional study may not fully capture patients' medication use. The prevalence of polypharmacy and PIM use may be underestimated because medications prescribed outside of the six randomly selected days are excluded from the count, even if the patient is taking them.

Conclusion

The present study highlights that polypharmacy and PIMs use is common among elderly in different healthcare settings. Given the potential negative consequences of polypharmacy, it is critical to understand its prevalence as well as the populations most vulnerable to it. The current study emphasizes the importance of routine medication reviews, particularly in the older patient population.

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نشرة العلوم الصيدلية
جامعة أسيوط

إنتشار تعدد الأدوية بين كبار السن الليبيين

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تعد تعدد الأدوية واحدة من أهم القضايا الصحية المرتبطة بزيادة حدوث الأدوية غير المناسبة المحتملة (PIMs) ، مما يؤثر على عبء المرض وتكاليف الرعاية الصحية. لا توجد حاليًا دراسة مقطعية متعددة المراكز في ليبيا لتقييم انتشار تعدد الأدوية والأدوية غير المناسبة المحتملة التي يستخدمها المرضى الأكبر سنًا. تم استكشاف الوصفات الطبية من مستشفيين حكوميين وعيادتين خاصتين بأثر رجعي. تم جمع تفاصيل المرضى وعدد الأدوية لكل وصفة طبية وتفاصيل الأدوية الأخرى. تم استخدام معايير بيرز لعام ٢٠١٩ لتحديد وجود الأدوية غير المناسبة المحتملة وملاءمة الوصفة في النهاية. تحتوي الوصفات الطبية من المستشفيات على تعدد أدوية أعلى بكثير من تلك الموجودة في العيادات (٧٥.٣ %، ٤٨.٨%، قيمة ٠.٠١٢). في المقابل، كان وجود PIMs في العيادات الخاصة أعلى بشكل ملحوظ من المستشفيات (٤٦.٦% مقابل ٣٦.٣%، بقيمة ٠.٠٢٢). غالبًا ما يتم وصف الأدوية المستخدمة لعلاج الاضطرابات المزمنة مثل مرض السكري وخلل شحميات الدم وارتفاع ضغط الدم للمرضى الذين يعانون من تعدد الأدوية في كل من بيئات الرعاية الصحية. تم تحديد الأدوية المستخدمة لعلاج اضطرابات الجهاز الهضمي ومضادات الهيستامين بشكل شائع على أنها PIMs لكلا بيئتي الرعاية. لقد أكدنا وجود تعدد الأدوية المرتبط بـ PIMs، وخاصة للمرضى الذين يعانون من أمراض القلب والأوعية الدموية أو مرض السكري. يجب بذل الجهود لتحسين جودة الوصفات الطبية للمرضى الأكبر سنًا.