Research Article

Prevalence of polypharmacy and its associated factors among elderly cardiovascular patients who were on follow-up at the chronic care clinic of Hiwot Fana comprehensive specialized hospital in Eastern Ethiopia

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Abstract

Introduction: It is critical to understand the rate of polypharmacy in cardiovascular patients because this issue is becoming more prevalent and has been linked to possibly inappropriate prescribing practices and detrimental health outcomes, especially in older cardiovascular patients.

Objective: To assess the prevalence of polypharmacy and its associated factors among elderly cardiovascular patients who were on follow-up at the chronic care clinic of Hiwot Fana comprehensive specialized hospital in Eastern Ethiopia.

Methods: A cross-sectional study was conducted involving 364 patients aged 65 years and above on treatment follow-up for cardiovascular disease. A data abstraction sheet was used to gather the data. The method of convenience sampling was employed. For coding, cleaning, and analysis, the collected data was first entered into Epi data statistical program version 3.1 and exported to statistical package for social sciences version 22. To identify factors related to the prevalence of polypharmacy, multivariable logistic regression analysis was employed.

Results: A total of 325 patients' medical records were included in the analysis. The prevalence of polypharmacy was 20.7%. Angiotensin converting enzyme inhibitors 163 (50.1%), beta blockers 117 (36%), aspirins 90 (27.7%), and calcium channel blockers 87 (26.7.32%) were the frequent prescribed cardiovascular drugs. Patients who were 77 years or older had a 1.12 times higher likelihood of having polypharmacy than patients who were 65 to 70 years old. Presence of comorbidities along with cardiovascular diseases were found to be significant factor associated with polypharmacy. Polypharmacy was higher among patients who had a higher number of comorbidities. Patients who had lived with cardiovascular diseases for five or more years were 2.17 times more likely to have polypharmacy. In addition, patients who had received treatment for their cardiovascular diseases for longer years were more likely to have polypharmacy.

Conclusion: The results of the present study demonstrate that polypharmacy is low relative to prior studies across the world. Being of advanced age, having comorbidities along with cardiovascular diseases, having three and above comorbid diseases, living with cardiovascular diseases for five and above years since diagnosis, and taking cardiovascular drugs for five and above years duration were associated with higher odds of polypharmacy.

Keywords: Polypharmacy, Prevalence, Cardiovascular, Chronic care, Angiotensin converting enzyme inhibitors

Introduction

Cardiovascular Diseases (CVDs) are a collection of illnesses that are linked to one another because one illness may develop as a consequence of another. As a result, cardiovascular patients are more likely to have several medical illnesses and take multiple drugs, which exposes them to a variety of medication-related burden [1,2]. While using the right combination of medications to treat multiple conditions can be beneficial, there is a chance of receiving Potentially Inappropriate prescriptions (PIMs) which could lead to negative pharmacological interactions, poor medication adherence, and a higher mortality rate [3].

Although there isn't a single definition that applies to all cases of polypharmacy, the majority of the literature defines it as the routine use of five or more medicines simultaneously [4-7]. It is a substantial and preventable cause of morbidity and mortality in older individuals.

Worldwide, previous research has demonstrated that elderly patients frequently experience polypharmacy, with prevalence rates ranging between 9% and 90% [8-12]. There have been reports of up to 82% prevalence in elderly CVDs patients [5,13], making CVDs the most prevalent category of disease entities with the greatest polypharmacy prescriptions [14].

The degree of polypharmacy and patient medication experience become more crucial factors in determining the quality of life associated with patient medication. Reducing polypharmacy and enhancing medication experiences are at the forefront of pharmaceutical care, along with attaining a satisfactory therapeutic outcome and addressing patients' drug-related requirements [5]. It is critical to understand the rate of polypharmacy in cardiovascular patients because this issue is becoming more prevalent and has been linked to possibly inappropriate prescribing practices and detrimental health outcomes, especially in older cardiovascular patients [15]. The polypharmacy has also been strongly linked to an increase in the medication-associated burden in cardiovascular patients by posing various routine management, interference with daily activities, side effects, drug interactions, expense, and unfavorable psychosocial experiences related to treatment [15-18].

While factors associated with polypharmacy in elderly cardiovascular patients have not been consistently described, they are often seen as positively associate with development of complications, presence of various morbidities, advanced disease stage, increasing age, living in a rural area, sex, and lifestyle factors [12,17] and also associated with negative outcomes such as acute kidney injury, several adverse effects, and drug interaction risks. More studies on elderly CVDs patients are necessary to produce a more precise and reliable estimate of the prevalence of polypharmacy to understand its burden and associated factors. According to the best of the literature search knowledge, the prevalence of polypharmacy and its associated factors were not done among elderly cardiovascular patients in eastern Ethiopia. Therefore, this study describes the prevalence and associated factors of polypharmacy among cardiovascular patients aged 65 years and older in Hiwot Fana comprehensive specialized hospital, Eastern Ethiopia.

Materials and Methods

Study area and study period

This study was conducted at Hiwot Fana Comprehensive Specialized Hospital (HFCSH) in chronic care clinic. HFSUH serves as a referral hospital for the entire eastern part of the Ethiopia, including Eastern Oromia, Dire Dawa city administration, the Somali regional state and the Harari regional state. Its catchment population is expected to be 5,800,000 of whom 2.85 million are females and 2.95 million are male population. Currently, the hospital has about 238 beds with 294 functional rooms to offer different services for the community. This study was conduct from August 10-September 10, 2023.

Study design

A retrospective cross-sectional study design was conducted.

Population

The source populations were elderly cardiovascular patients who were on follow-up at the chronic care clinic of HFCSH. Elderly patients aged 65 years and above who had a treatment follow-up for cardiovascular disease at the chronic care clinic of HFCSH from January 01, 2014 to December 31, 2022 was considered as the study population.

Inclusion and exclusion criteria

Elderly patients aged 65 years and above who had a treatment follow-up for cardiovascular disease at the chronic care clinic of HFSCH from January 01, 2014 to December 31, 2022 were included. Elderly cardiovascular patients with incomplete information on the medical record (unreadable prescribed medication) were excluded.

Variables

The dependent variable was prevalence of polypharmacy. The patients were classified into two categories, no polypharmacy (concurrent use of fewer than five medications) and polypharmacy (concurrent use of five or more medications). The independent variables were sex, age, residence, comorbidity of CVDs, type of comorbidity of CVDs, number of comorbidities per CVDs patient, primary diagnosis of CVDs, pharmacological class of prescribed CVDs medications, Duration since starting

Sample size determination and sampling technique

The sample size was calculated by using single population proportion formula, $n=(Z^2_{\alpha} P(1-P))/W^2$ by considering 95 CI% (Z=1.96), margin of 5%, and the estimated prevalence of polypharmacy from University of Gonder hospital P=0.314 [5]. Considering these in the equation, the sample size was 331. After addition of 10% contingency, the final total sample size was 364. Convenience sampling technique was employed. All cardiovascular patients' medical records were recruited until the calculated sample size reached.

Data collection methods

A data extraction sheet which is adapted from different literatures was used to record the necessary information from patients' medical records [5]. The data extraction sheet is prepared in English language. The data were collected by two pharmacists under supervision of principal investigators. Data collectors used, the data abstraction sheets to extract relevant socio-demographic, clinical and medication information the patient received during the last visit to the chronic care clinic. To ensure the quality of data; pretest was conducted on 5% of randomly selected medical records of elderly cardiovascular patients to ensure the agreement of the data abstraction format. Any error found during the process of pretest was corrected and modification was made into the final version of the data abstraction format. The data collectors were trained before the process of data collection. Supervision and checking were made by the well-trained supervisor to ensure the completeness and the consistency of the data.

Data analysis and presentation

EPI-data version 3.1 was used to enter the data, which was subsequently exported to SPSS version 22 for additional analysis. To describe the pertinent variables, frequency, percentages, and summary statistics were computed. Cross-tabulation was used in bivariate analysis to see the relationship between each independent variable and the dependent variable, and a Crude Odds Ratio (COR) with a 95% Confidence Interval (CI) was obtained. Then variables observed in the bivariate analysis with P-value <0.25 was subsequently included in the final model of multivariable logistic regression. The multivariable analysis was employed to identify factors associated with polypharmacy. The strength of statistical association was measured by Adjusted Odds Ratio (AOR) and 95% Confidence Interval (CI). P value<0.05 was considered statistically significant. Finally, the result was presented by using texts and tables.

Ethical consideration

The Institutional Health Research Ethics Review Committee (IHRERC) at Haramaya University's college of health and medical sciences provided the letter of ethical clearance. Hiwot Fana specialized university hospital received official letters of collaboration for the study. Before the data was collected, the hospital administrator provided informed, volunteer, written, and signed consent. The hospital administration was also made aware that any information gleaned from medical records was handled in strict confidence.

Results

Participant characteristics

Out of 364 patients' medical records identified, 39 were excluded as their medical information were incomplete during data collection. As a result, a total of 325 patients' medical records were included in the analysis. Of these, 205 (63.1%) were men. The mean (SD) age of the participant is 67.91 ± 3.30 years. About 136 (41.8%) participants were had different comorbidities. The three most often occurring co-morbidities coupled with CVDs were diabetes mellitus 45 (33.1%), HIV/AIDS 16 (11.8%), and Asthma 15 (11.0%). The two major primary diagnosis of CVDs were hypertension 86 (26.5%) and chronic heart failure 73 (22.5%) (**TABLE 1**).

TABLE 1. Characteristics of cardiovascular elderly patients who were on follow-up at the chronic care clinic of HFSCH in Eastern Ethiopia, 2023.

Characteristics		Frequency (%)
Sex	Female	120 (36.9)
	Male	205 (63.1)
Age (Years)	65-70	286 (88.0)
	71-76	25 (7.7)
	≥ 77	14 (4.3)
Residence	Urban	201 (61.8)
	Rural	124 (38.2)
Comorbidity of CVDs	Yes	136 (41.8%)
	No	189 (58.2%)
Type of comorbidity of CVDs (n=136)	DM	45 (33.1)
	Asthma	15 (11.0)
	Depression	9 (6.6)
	Arthritis	10 (7.4)
	CKD	18 (13.2)
	CLD	9 (6.6)
	HIV/AIDS	16 (11.8)
	COPD	7 (5.1)
	Thyroid disorder	5 (3.7)
	Parkinson disease	2 (1.5)
Number of comorbidities per CVD patient (n=136)	One	43 (31.6)
	Two	53 (38.9)
	Three and above	40 (29.4)
Primary diagnosis of CVDs	Hypertension	86 (26.5)
	Chronic heart failure	73 (22.5)
	Ischemic heart disease	61 (18.8)
	Dyslipidemia	47 (14.5)
	Acute coronary syndrome	26 (8.0)
	Stroke	13 (4.0)
	Deep vein thrombosis	19 (5.8)
Number of years since diagnosis with CVDs	<5 years	240 (73.8)
	≥ 5 years	85 (26.2)

Prevalence of polypharmacy

The prevalence of polypharmacy was 20.7% among elderly cardiovascular patients and 10.2% among those on cardiovascular-specific drugs. Angiotensin Converting Enzyme Inhibitors (ACEIs) 163 (50.1%), beta blockers 117 (36%), Aspirins 90 (27.7%), and Calcium Channel Blockers (CCBs) 87 (26.7.32%) were the frequent prescribed cardiovascular drugs. The mean number of years since starting CVD medication treatment was 3.5 ±2.2 years. The mean number of CVD medications per patient was 4.2 ± 2.1 (**TABLE 2**).

TABLE 2. Medication related characteristics of elderly cardiovascular patients in HFCSH, eastern Ethiopia,2023.

Characteristics		Frequency (%)
Pharmacological class of prescribed CVDs medications	ACEIs	163 (50.1)
	Beta blockers	117 (36.0)
	CCBs	87 (26.7)
	Diuretics	31 (9.5)
	Aspirins	90 (27.7)
	Statins	66 (20.3)
	Warfarin	20 (6.1)
Duration since starting CVDs treatment (years)	Mean ± SD	3.5 ± 2.2
	<5 years	262 (80.6)
	≥ 5 years	63 (19.4)
Total number of CVDs medications per patient	Mean ± SD	4.2 ± 2.1
	One	36 (11.1)
	Two	50 (15.4)
	Three and above	239 (73.5)
CVDs medications specific polypharmacy	Yes	33 (10.2)
	No	292 (89.8)
Non-specific CVDs medications polypharmacy	Yes	67 (20.7)
	No	258 (79.3)

Prevalence of polypharmacy

The multivariable logistic regression analysis is shown in **TABLE 3**: Patients who were 77 years or older had a 1.12 times higher likelihood of having polypharmacy than patients who were 65 to 70 years old (95% CI: 1.06-2.21). Presence of comorbidities along with CVD were found to be significant independent factor associated with polypharmacy. Polypharmacy was higher among patients who had a higher number of comorbidities along CVD. Patients who had lived with CVD for five or more years were 2.17 times more likely to have polypharmacy. In addition, patients who had received treatment for their CVD for longer years were more likely to have polypharmacy (95% CI: 1.18-3.71) (**TABLE 3**).

TABLE 3. Multivariable logistic regression analysis of factors associated with polypharmacy.

Variables		Polypharmacy COR		COR	AOR	P value
		No (%)	Yes (%)	(95% CI)	(95% CI)	
Sex	Male	129 (62.9)	76 (37.1)	1.38 (0.87-2.19)	1.25 (0.31-5.14)	0.75
	Female	66 (55.0)	54 (45.0)	1	1	1
Residence	Urban	123 (61.2)	78 (38.8)	1	1	1
	Rural	72 (58.1)	52 (41.9)	0.87 (0.55-1.38)	0.42 (0.15-1.20)	0.11
Age	65-70	178 (62.2)	108 (37.8)	1	1	1
	71-76	10 (40.0)	15 (60.0)	0.41 (0.32-0.78)	0.58 (0.46-1.43)	0.35
	≥77	7 (50.0)	7 (50.0)	0.61 (0.43-0.81)	1.12 (1.06-2.21)	0.01
Comorbidities	Yes	83 (61.0)	53 (39.0)	1.17 (1.03-4.56)	3.44 (1.29-5.78)	0.03
	No	112 (59.3)	77 (40.7)	1	1	1
Number of comorbidities per CVD patients	One	26 (60.5)	17 (39.5)	1	1	1
	Two	23 (43.4)	30 (56.6)	0.50 (0.31-3.42)	1.17 (0.44-3.04)	0.74
	Three and above	26 (65.0)	14 (35.0)	1.21 (1.12-3.78)	1.45 (1.35-4.75)	0.02
Number of years since diagnosis with CVD	<5 years	151 (62.9)	89 (37.1)	1	1	1
	≥ 5 years	44 (51.8)	41 (48.2)	0.63 (0.38-1.04)	2.17 (1.38-4.42)	0.01
Duration treatment for CVD (years)	<5 years	155 (59.2)	107 (40.8)	1	1	1
	≥ 5 years	40 (63.5)	23 (36.5)	1.20 (0.68-2.12)	1.34 (1.18-3.71)	0.03

Discussion

The currents study assessed prevalence of polypharmacy and its associated factors among elderly cardiovascular patients who were on follow-up at the chronic care clinic of Hiwot Fana comprehensive specialized hospital in eastern Ethiopia. This study showed that about 20.7% of the study participants were exposed to polypharmacy (≥5 drugs). Being of advanced age (≥77 years), having comorbidities along with CVDs, having three and above comorbid diseases along with CVDs, living with CVDs for five and above years since diagnosis, and taking CVDs drugs for five and above years were significantly associated with polypharmacy.

The two main primary CVD diagnoses were hypertension (86, or 26.5% of cases) and chronic heart failure (73%, or 22.5% of cases). This result was in line with reports on the findings of other studies [5]. The most frequently prescribed cardiovascular medications in this study were Angiotensin-Converting Enzyme Inhibitors (ACEIs), beta-blockers, aspirin, and Calcium Channel Blockers (CCBs). However, diuretics, angiotensin convertase enzymes inhibitors, and calcium channel blockers were the most commonly given pharmacological class of cardiovascular medications in earlier studies done in the University of Gondar hospital. The discrepancy could be caused by variations in the availability of cardiovascular medications and adherence to clinical guidelines for the management of CVDs.

In this study, the prevalence of polypharmacy was found to be 20.7%, which is lower than the study results from Korea (86.4%), Oman (76.3%), Kuwait (58.4%), Saudi Arabia (55%), Sweden (44%), Italy (40%), United States (39%), and Brazil (32%). Our study indicated a low prevalence of polypharmacy, which could be explained by the low incidence of acute illnesses that might result in the prescription of more medications. Other possible explanation could be some studies used 4 or more medicines simultaneously to define polypharmacy. Similar to earlier research, higher rates of polypharmacy have been found in males. In contrast, several research

have revealed a higher rate of polypharmacy among females. These discrepancies in study results could be explained by variations in how doctors prescribe for different genders as well as variations in how different genders behave in terms of seeking out health information. By excluding all non-cardiovascular drugs utilized for comorbidity management, cardiovascular specific polypharmacy (10.2%) was reduced in half from patient level polypharmacy (20.7%). It indicates that non-cardiovascular drugs significantly contributed to patient-level polypharmacy and that the prevalence of multimorbidity in cardiovascular patients was widespread.

In the current study, polypharmacy significantly increased as the number of comorbidities rose. This agrees with the results of several research. This can be explained by the requirement for more drugs to treat different comorbidities. According to several research, drugs can result in adverse drug events that could increase the number of illnesses that older individuals are suffering from. In the present study, a significant relationship between age and polypharmacy was found using a multivariable analysis, similar to studies done in Funen county and southwestern Finland, demonstrating that age was proportionally associated with polypharmacy rate: The older the patient, the higher the polypharmacy rate. This could be explained by the increased morbidity associated with aging and the resulting tendency to be prescribed a greater number of medications.

In present study, patients who had lived with CVDs for five or more years were 2.17 times more likely to have polypharmacy. In addition, patients who had received treatment for their CVDs for longer years were more likely to have polypharmacy (95% CI: 1.18-3.71). Polypharmacy is naturally associated with taking more pills (pill burden), which may present an additional concern of lack of adherence, especially in the elderly by fear of worsening symptoms with deprescribing [17].

The strength of this study includes, it is the first to examine the prevalence of polypharmacy and its associated factors among elderly cardiovascular patients in eastern Ethiopia. Hence, the results provided by this study can be considered as baseline information on polypharmacy on which future studies can be conducted in the eastern Ethiopia. However, there are certain limitations of includes retrospective a cross-sectional study design was used which does not allow establishing the temporality of the associated factors, because of only cardiovascular elderly patients who visited ambulatory care clinics at one tertiary hospital in Eastern Ethiopia were included in this study, results cannot be extended to all cardiovascular elderly patients throughout Ethiopia and this study was no assessed the appropriateness of polypharmacy occurred in the study participants.

Conclusion

The results of the present study demonstrate that polypharmacy is low among elderly cardiovascular patients who were on follow-up at the chronic care clinic of HFCSH in eastern Ethiopia relative to prior studies across the world, which may lead to serious consequences for this age group. Polypharmacy within the context of cardiovascular illnesses may be justified if used following clinical guidelines, and may not necessarily be associated with adverse outcomes. Being of advanced age (≥77 years), having comorbidities along with CVDs, having three and above comorbid diseases along with CVDs, living with CVDs for five and above years since diagnosis, and taking CVD drugs for five and above years duration were associated with higher odds of polypharmacy. As appropriate care for elderly patients is increasingly challenging, targeted educational programs should be developed for healthcare professionals to raise their awareness of the magnitude and negative impact of polypharmacy. Further research should examine the adverse outcomes associated with polypharmacy among patients with different CVDs.

Author Contributions

SN-designed the research and wrote the first draft manuscript. FD-analyzed the data and edit the final manuscript.

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No funding was received for this work.

Conflict of Interest

The authors declared no competing interests for this work.

Data Availability Statement

Almost all data are included in this study. However, additional data will be available from the corresponding author on reasonable request.

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