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Determinants of polypharmacy among ambulatory cardiovascular disease patients in Iluababora and Buno Bedele Zones, Ethiopia: prospective observational study

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Abstract

Background Cardiovascular disease is still the largest cause of disease in the world. Polypharmacy among cardiovascular disease patients has increased as the population ages and multimorbidity rates grow. This has a negative impact on one's health and may result in drug interactions. Despite, the potential harm that polypharmacy might bring, little has been done to investigate the prevalence of polypharmacy and its determinants among cardiovascular disease patients, particularly in Ethiopia.

Objective To determine magnitude of polypharmacy and its determinants among ambulatory cardiovascular disease patients at public hospitals in Iluababora and Buno Bedele Zones, Southwest Oromia, Ethiopia.

Method and participants A prospective observational study was conducted from November 1, 2022 to August 30, 2023, at public hospitals in Iluababora and Buno Bedelle Zones. Sample size was 1169 cardiovascular disease patients and consecutive sampling technique was used for recruiting these study participants. The Data was analyzed using statistical software package version 25.0. Bivariable and multivariable logistic regressions were used to identify the determinants of polypharmacy among cardiovascular disease patients and statistical significance was considered at a p-value < 0.05.

Results The prevalence of polypharmacy was 31.8% in cardiovascular patients while cardiovascular disease specific polypharmacy was 9.6%. The mean age was 60.52 years ± 14.11.The determinants of polypharmacy among Cardiovascular disease were those who had a history of chewing khat [AOR = 4.08, 95%CI= (1.67–9.95)], age greater than 64 years old [AOR = 4.74, 95%CI= (2.19–10.27)] and those who had a history of cigarette smoking [AOR = 2.86, 95%CI= (1.33–6.15)].

Conclusion Polypharmacy was common among ambulatory cardiovascular disease patients in the study area. Chewing khat, being above the age of 64years, and smoking cigarettes were associated factors for polypharmacy among cardiovascular disease patients. Hence, to overcome these problems, clinical pharmacists, physicians, and other health professionals have to work in collaboration.

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Keywords Polypharmacy, Cardiovascular disease, Heart failure, Hypertension, Mattu university, Ethiopia

Introduction

Cardiovascular diseases (CVDs) remain the leading cause of morbidity and mortality globally, and their burden is steadily rising in low- and middle-income countries, including Ethiopia [1]. As the population ages and concomitant illnesses increase, the pharmacological therapy of cardiovascular disease has gotten more complicated [2]. It is common for patients with cardiovascular disease to have several coexisting diseases, including diabetes, hypertension, dyslipidaemia, and chronic renal disease, which makes using numerous drugs necessary [3]. Polypharmacy is the practice of taking five or more medications at the same time that has significantly increased as a result of different comorbid medical condition [4]. Appropriate polypharmacy poses significant hazards even if it can be crucial for better clinical results and the best possible disease control [5]. Furthermore, fragmented care and inadequate drug reconciliation methods may make polypharmacy worse, especially for older persons who make up a significant section of the CVD population [6].

Polypharmacy has a complex impact on patients with CVD. According to clinical research, patients who take several medications are more likely to experience adverse effects that could impair the effectiveness of their therapy and their general quality of life [7]. Polypharmacy has also been associated with cognitive decline, falls, and hospitalizations, particularly among elderly patients [8]. Additionally, the complexity of managing multiple medications may lead to poor adherence, ultimately reducing the effectiveness of treatment regimens and leading to suboptimal health outcomes [9].

In healthcare system, polypharmacy increases hospital stays, increases hospital admissions, and increases the financial strain on healthcare systems [10]. In order to reduce these risks and guarantee efficient illness care, efforts must be made to optimize pharmaceutical regimens through deprescribing and medication reconciliation techniques [11]. Even though, polypharmacy is common, more research is needed to fully understand its effects on patients with CVD, especially with regard to clinical outcomes, medication adherence, and quality of life [12]. Additionally, medical professionals struggle to strike a balance between the advantages of multi-drug therapy and the dangers of over prescription and improper medication use [13].

The prevalence of polypharmacy ranges from 9 to 39% globally, and it has recently grown even more, likely as a result of the increased accessibility of new treatment options, particularly for the elderly population and the global rise in chronic diseases [14–17]. While polypharmacy can be clinically appropriate, it is frequently associated with significant risks such as adverse drug reactions, drug-drug interactions, decreased medication adherence, increased healthcare costs, and higher rates of hospitalization, particularly in elderly populations with multiple comorbidities [18]. In Ethiopia, where healthcare systems are already strained, these risks can have amplified consequences on both patient outcomes and health service delivery.

Data on polypharmacy among CVD patients in Ethiopia is scarce, despite the fact that the pooled prevalence of polypharmacy among older persons in Ethiopia was 37.10% [19]. In Ethiopia, polypharmacy was found in 24.8% of cardiovascular outpatients and 9.2% of cardiovascular patients at the University of Gondar [20]. To the best of our knowledge, not much research has been done on the prevalence and contributing factors of polypharmacy in patients with cardiovascular disease. Furthermore, no multicenter study with a sizable sample size has been conducted at public hospitals spread across two zones. Therefore, the purpose of this study is to evaluate the prevalence of polypharmacy and its contributing factors among patients with CVD at public hospitals in the South West Oromia, Ethiopia, Iluababora and Buno Bedele Zones. This study aims to give insights that will help medical practitioners improve drug management and guarantee better health outcomes for patients with CVD by identifying contributing factors to polypharmacy. The study will explore understanding how the number of prescribed drugs affects patient compliance can lead to interventions that improve adherence and overall treatment success. This study will be valuable for clinicians, pharmacists, and policymakers in designing evidence-based strategies to manage polypharmacy in cardiovascular patients. This study can also lead to the development of deprescribing protocols and better healthcare policies to optimize medication use.

Methods and participants

Study area, period and study design

A Hospital-based multicentre prospective observational study was conducted at six hospitals in the Iluababora and Buno Bedele zones, South Western Oromia, Ethiopia, namely, Mettu Karl Comprehensive Specialized Hospital (MKCSH), Bedele General Hospital (BGH), Darimu Primary Hospital, Chora Primary Hospital, Didessa Primary Hospital and Chawaka Primary Hospital from November 1, 2022 to August 30, 2023. The outpatient department's ambulatory care is given for hypertensive, heart failure, diabetic, and asthmatic, epileptic, psychiatric other chronic disease patients.

Population and eligibility criteria

Study population were all cardiovascular disease adult patients attending ambulatory clinic of public hospitals in Iluababora and Buno Bedele Zones, during the study period and fulfilled inclusion criteria. Patients diagnosed with CVDs and on follow up at public hospitals in Iluababora and Buno Bedelle Zones and adult of 18 years and above were included in this study. Whereas, pregnant mothers, those who refused to participate in the study and patients with incomplete medical records that had missed necessary information were excluded from this study.

Study variables

Polypharmacy in Cardiovascular disease patients was the primary outcome or dependent variable. The independent variables were age, gender, residence, social drug use, cost coverage method, Physical activity, Family history of CVD, comorbid conditions, patient's medication belief, number of years with CVD since diagnosis, duration of disease since diagnosis, duration of treatment.

Operational definitions

Polypharmacy: the regular intake of five or more medicines in most of the literatures [19].

Cardiovascular disease: Cardiovascular disease (CVD) is a general term that describes a disease of the heart or blood vessels. Blood flow to the heart, brain or body can be reduced because of a: blood clot (thrombosis) build-up of fatty deposits inside an artery, leading to the artery hardening and narrowing (atherosclerosis) https://www.jacc.org/doi/10.1016/j.jacasi.2021.04.007.

Sampling technique and sample size determination

A consecutive sampling technique was used to collect 1169 participants confirmed with cardiovascular disease and on follow up at study areas from November 1, 2022 to August 30, 2023. Study subjects were 344, 230, 163, 155 147 and 130 from Mettu Karl Comprehensive Specialized Hospital, Bedelle General Hospital, Darimu primary Hospital, Didessa Primary Hospital, Chora Primary Hospital and Chawaka Primary Hospital respectively.

Data collection procedure

Patients were approached while waiting for their appointment in the waiting area of the ambulatory or outpatient follow up clinic. Consecutive sampling technique was used to recruit participants into the study. Before participating, all individuals were provided with a clear explanation of the study's purpose, and written informed consent was obtained. A semi-structured data collection tool, comprising a questionnaire and data abstraction checklist, was developed to extract all relevant information about determinants of polypharmacy in cardiovascular outpatients. The data collection for this study was carried out by six pharmacists, one pharmacist at each study site. Data collectors directly fill the questionnaire by searching the relevant information available on patients' medical records.

Outcome measures

Polypharmacy among cardiovascular disease patient is defined as the regular use of 5 or more medications at the same time and this medication could be medication for comorbid medical condition other than cardiovascular disease. On the other hand polypharmacy specific to cardiovascular medication only is regular use of five or above medications used for cardiovascular disease only.

Data quality management

Initially, the questionnaire was prepared in English and later translated into the local language (Afan Oromo and Amharic) and back-translated into English to ensure consistency in meaning. To maximize the quality of the data, training was given for data collectors for 1 day. Prior to the actual data collection, a pre-test was conducted on a 5% of 1169; that was 59 patients, and the questionnaire was assessed for face validity. Based on the findings, slight amendments were made to the questionnaire. At the end of data collection, the completeness of filled questionnaires was checked, before formal analysis.

Data processing, analysis, and presentation

Data was entered into Epidata version 4.6.0.4 and exported to the Statistical Package for Social Sciences (SPSS) version 25 statistical analysis. First, the data was edited and checked for completeness and consistency. Then, exported into SPSS for analysis. Categorical variables were described by frequencies and percentages. Continuous variables were presented by means and standard. Univariable logistic regression was done to assess the association between polypharmacy in cardiovascular disease and independent variables. Those variables with a p value < 0.25 in univariable analysis were introduced into multivariable analysis. Variables with a p-value of < 0.05 were considered statistically significant.

Ethical considerations

Ethical approval was requested and obtained from the ethical review committee of the School of Pharmacy, Mattu University. Written consent was also obtained from each respondent after explaining the purpose of the study. Participant's confidentiality was guaranteed by not recording their identifiers on the questionnaire.

Table 1 Socio-demographic characteristics among ambulatory CVD patients attending the outpatient clinic of public hospitals in Iluababora and Buno Bedele Zones, from November 1, 2022 to august 30, 2023 (*N* = 1169)

Socio-demographic characteristics and behavioral measures	Frequency (%)
Sex (male)	625(53.5)
Age, years (Mean ± Standard Deviation(SD))	60.52 ± 14.11
Age group	
<=47	245(21)
48–63	358(30.6)
>=64	566(48.4)
Educational level	
No formal education	697(59.6)
Primary education	361(30.9)
Secondary education and above	111(9.5)
Occupational status	
Unemployed	205(17.5)
Farmer	637(54.5)
Merchant	298(25.5)
Government employee	29(2.5)
Marital status	
Single	160(13.7)
Married	707(60.5)
Divorced	235(20.1)
Widowed	67(5.7)
Residence	
Urban	577(49.4)
Rural	592(50.6)
Cost coverage method	
Insurance	600(51.3)
Out of pocket	569(48.7)
Social drug use	
Khat chewing(yes)	513(43.9)
Alcohol drinking(yes)	607(51.9)
Smoking(yes)	450(38.5)
Medication belief	
Positive	770(65.9)
Negative	399(34.1)
Family history of CVDs(yes)	295(25.2)

SD Standard deviation, *CVD* Cardiovascular disease

Results

Socio-demographic characteristics and behavioral measures

Among 1169 study participants included in this study, 625 (53.5%) were male and the mean age was 60.52 years ± 14.11. About 295(25.2%) of patients were history of positive CVDs and more than half of patients were farmers. About More two thirds of (59.6%) of participants had no formal education (Table 1).

Clinical and medication characteristics of cardiovascular disease patients

The mean age of respondents at the diagnosis of Cardiovascular disorders were 60.52 + 14.11 years. The mean number of years living with CVDs and since starting medication treatment was 4.04 ± 2.41 years and 3.89 ± 2.35 years, respectively (Table 2). The mean number of medications per patient was 3.79 ± 1.47, while the cardiovascular medications per prescription were 2.92 + 1.12. CHF accounted for more than one–thirds of the primary cardiovascular diagnosis and followed by hypertension (18.8%) (Fig. 1). Type-2 Diabetes Mellitus and chronic kidney disease were the two most commonly presented co-morbidities along with CVDs in, 149(33.8%) and 129(29.5%) of patients, respectively (Fig. 2). Diuretics (70.7%) and angiotensin converting enzyme inhibitors (65%) were the three most prescribed cardiovascular groups of medications (Fig. 3).

Prevalence of polypharmacy in cardiovascular disease patients

The prevalence of polypharmacy was 31.8% in cardiovascular outpatients while cardiovascular drugs specific polypharmacy was 9.6%. The prevalence of polypharmacy and cardiovascular drugs specific polypharmacy in the elderly population (greater than 65 years old) were 31.3% and %, 12.9% respectively.

Table 2 The student t-test of polypharmacy and cardiovascular specific polypharmacy among different clinical characteristics of cardiovascular disease patients attending the outpatient clinic of public hospitals in iluababora and buno bedele zones, from november 1, 2022 to august 30, 2023 (*N* = 1169)

Variable	Total(mean ± SD)	Polypharmacy(mean ± SD)		Cardiovascular specific polypharmacy(mean ± SD)	
		Yes	No	Yes	No
Age of the patient	60.52 ± 14.11	59.45 ± 14.62	61.02 ± 13.88	63.07 ± 12.23	60.25 ± 14.29
Duration since diagnosis	4.04 ± 2.41	3.77 ± 2.06	4.17 ± 2.55	2.43 ± 2.09	4.21 ± 2.38
Duration since treatment	3.89 ± 2.35	3.63 ± 1.99	4.02 ± 2.49	2.37 ± 1.99	4.06 ± 2.33
Number of total medication	3.85 ± 1.52	5.62 ± 0.76	3.02 ± 0.99	6.00 ± 0.95	3.62 ± 1.39
Number of Cardiovascular medication	2.92 ± 1.12	4.00 ± 0.83	2.41 ± 0.84	5.07 ± 0.25	2.69 ± 0.91

SD Standard Deviation

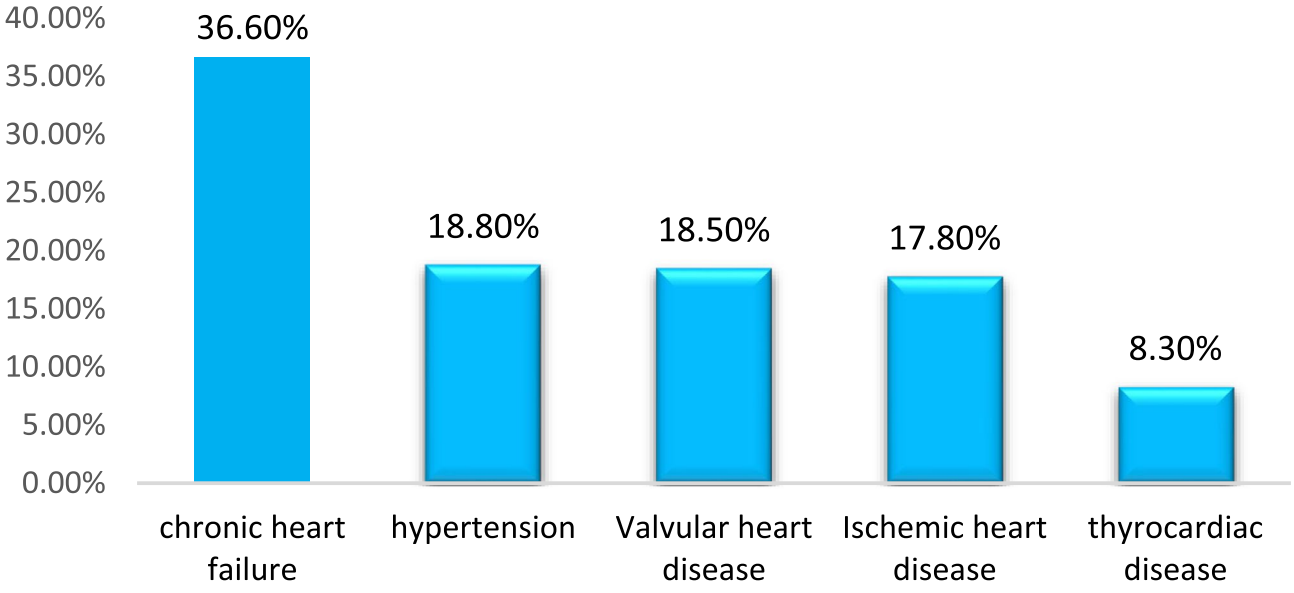


Fig. 1 Primary diagnosis of the cardiovascular patients attending the ambulatory clinic of public hospitals in Iluababora and Buno Bedele Zones, from November 1, 2022 to August 30, 2023 (*N* = 1169)

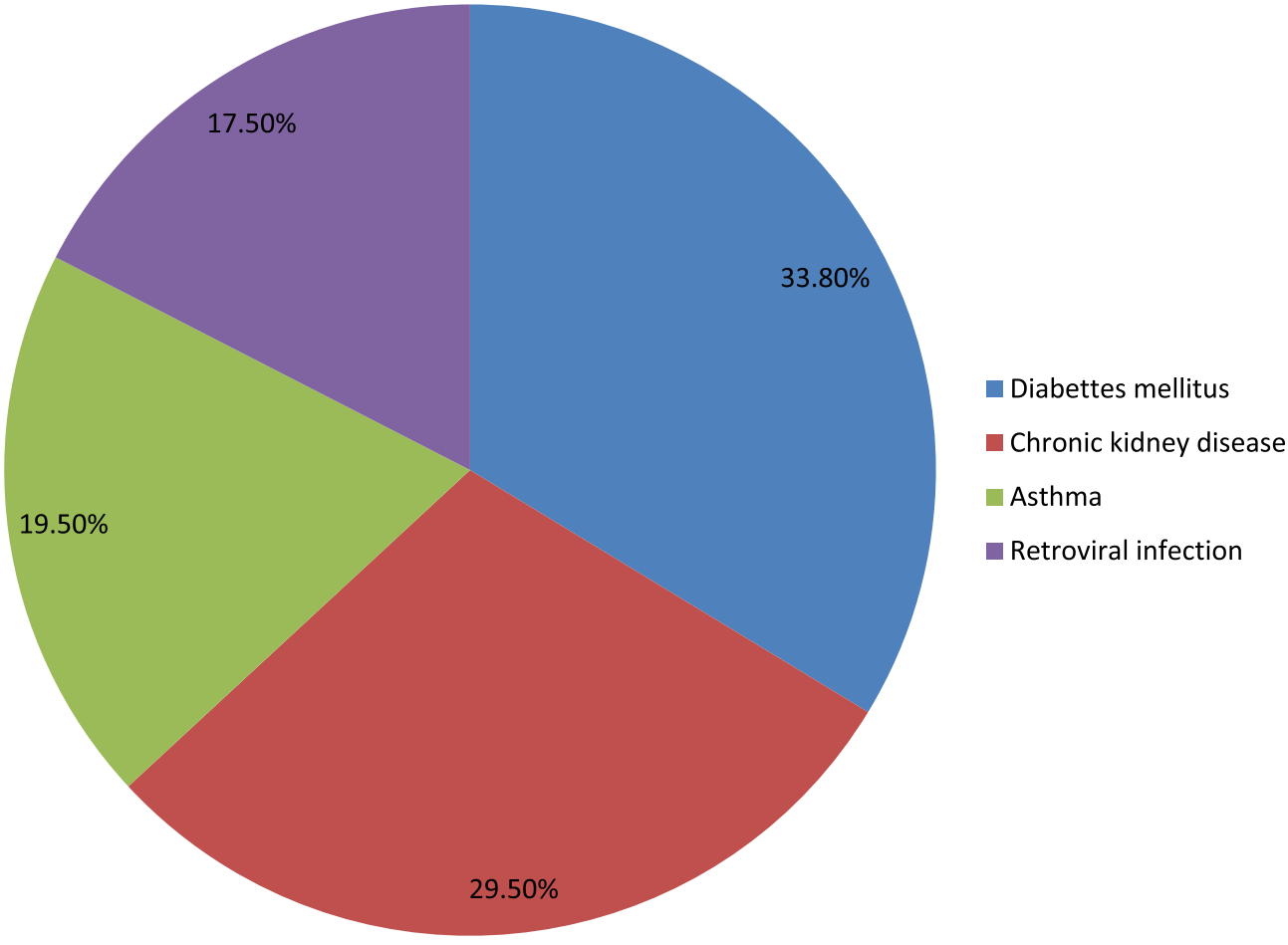


Fig. 2 Co-morbidities in the cardiovascular patients attending the ambulatory clinic of public hospitals in Iluababora and Buno Bedele Zones, from November 1, 2022 to August 30, 2023 (*N* = 1169)

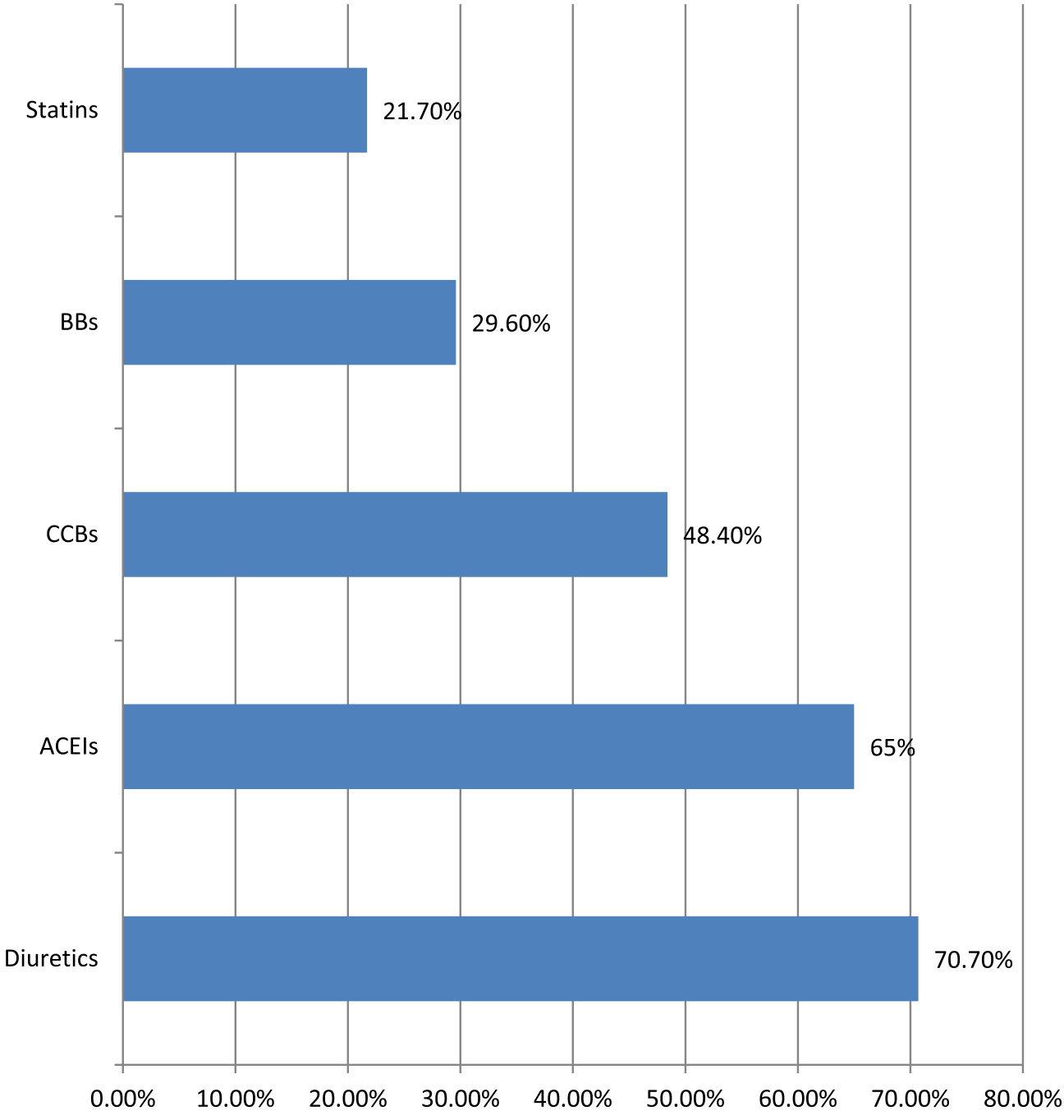


Fig. 3 Pharmacological class of most prescribed cardiovascular medications at ambulatory clinic of public hospitals in Iluababora and Buno Bedele Zones, from November 1, 2022 to August 30, 2023 (*N* = 1169). Note: ACEIs = Angiotensin Converting Enzyme inhibitors, BBs = Beta Blockers and CCBs = Calcium Channel Blockers

Factors associated with polypharmacy in cardiovascular patients

Univariable and multivariable logistic regression were carried out to determine predictors of polypharmacy among CVDs patients. Univariable was done and for variables that had a p-value less than 0.25, multivariable logistic regression was done. The result of multivariable analysis of independent variables and polypharmacy in CVDs patients revealed that history of khat chewing, cigarette smoking and age greater than 60 years old were significantly associated with polypharmacy in CVDs (Table 3). The likelihood of having polypharmacy in CVDs (AOR = 4.07, 95%CI:1.68, 9.97) were about four times in patients who had a history of chewing khat as compared to those who had no history of khat chewing. It was found that patients whose age greater than 60 years

Table 3 Bivariate and multivariate analysis of independent factors associated with polypharmacy among cvds patients attending the outpatient clinic of public hospitals in iluababora and buno bedelle zones, from november 1, 2022 to august 30, 2023(*N* = 1169)

Variable	COR	*P*-value	AOR	*P*-value
Sex(ref.female)	0.38(0.23, 0.65)	< 0.001	0.45(0.24, 0.84)	0.013
Age group (60.52 ± 14.11)				
<=39				
40–59	0.59(0.23, 1.38)	0.29	0.61(0.23, 1.61)	0.35
>60	4.83(2.39, 9.77)	< 0.001	4.72(2.17, 11.17)	< 0.001
Residence(ref.urban)	0.36(0.21, 0.61)	< 0.001	0.49(0.24, 0.91)	0.022
Cost coverage method (ref.insurance)	0.75(0.48, 1.32)	0.24	0.63(0.26, 1.48)	0.27
Physical activity (ref.no)	1.81(1.02, 2.94)	0.014	0.37(0.19, 0.72)	0.003
Khat chewing(ref.no)	1.52(0.94, 2.45)	0.08	4.07(1.68, 9.97)	**0.003**
Alcohol drinking(ref.no)	1.44(0.86, 2.35)	0.14	1.75(0.94, 3.29)	0.08
Cigarette smoking(ref.no)	1.75(1.01, 2.89)	0.03	2.85(1.35, 6.18)	**0.007**
Medication belief(positive)	0.55(0.34, 0.93)	0.02	0.4(0.18, 0.95)	0.05
Family history of CVDs(ref.no)	0.94(0.57, 1.59)	0.77		
Comorbid condition(ref.no)	1.32(0.79, 2.19)	0.33		
Duration of disease since diagnosis (ref.no < 4years)	1.07 (0.68, 1.74)	0.83		

ref. to mean reference, ref.no = to mean reference no for yes no question, *OR* Adjusted Odd Ratio, *COR* Crude Odd Ratio, *CVD* Cardiovascular disease and *p*-value < 0.005 indicates statistical significance

old were about five times more likely to have polypharmacy in CVDs (AOR = 4.72, 95%CI:2.17, 11.17). Moreover, the likelihood of having polypharmacy in CVDs (AOR = 2.85, 95%CI: (1.35, 6.18) were about three times in patients who had a history of cigarette smoking as compared to those who had no history of khat chewing.

Discussions

The incidence of polypharmacy among patients with CVD is highlighted in this study. According to one study, a sizable fraction of patients with CVD are prescribed numerous drugs, which reflects the difficulty of managing comorbid illnesses such as valvular heart disease, hypertension, and chronic heart failure [21]. These results align with existing literature, which recognizes polypharmacy as a necessary yet challenging aspect of CVD management [22]. While polypharmacy are essential for optimizing cardiovascular outcomes, they also raise concerns regarding drug-drug interactions, increased healthcare burden, and patient compliance issues [7]. According to this study, diuretics and ACEIs were the most prescribed class of cardiovascular drugs. This was consistent with the research done at the UGCSH [23].

The prevalence of cardiovascular drugs-specific polypharmacy among CVD outpatients was 9.6%, while overall polypharmacy was observed in 31.8% of the study population. This finding is consistent with previous studies conducted at UGCSH (24.8%) and (9.2%) [20] that was overall polypharmacy and cardiovascular drugs specific polypharmacy respectively, and is somewhat comparable to a UK study reporting 22.8% [24]. However, it is notably higher than the prevalence reported in a Swedish study (11.8%) [25]. These differences could be explained by variations in prescribing practices, study populations, healthcare systems, and definitions of polypharmacy. Cardiovascular patients, in particular, are more likely to be prescribed multiple medications due to the chronic and often multi-morbid nature of their condition. This implies that the high prevalence of polypharmacy in this population highlights the need for regular medication reviews to minimize potential drug-related problems, ensure therapeutic effectiveness, and reduce adverse events.

Furthermore, compared to Korea, where 86% of CVD patients had polypharmacy, our study's prevalence of polypharmacy was much lower [26]. Given that the Korean study concentrated on hospitalized patients, who generally have more complex medical demands and a higher incidence of polypharmacy than outpatients, this discrepancy may result from variations in socioeconomic position, healthcare infrastructure, and study settings. Likewise, a research at Addis Ababa's Yekatit 12 Hospital discovered a greater frequency of 42.7% [27]. This might be due to difference in study participants meaning study at yekatit 12 had been done on geriatrics only. The findings of this study have several important implications. The relatively high prevalence of polypharmacy in CVD outpatients suggests a need for improved medication management practices, including regular medication reviews and the implementation of clinical guidelines to prevent inappropriate prescribing.

The results of the multivariable logistic regression analysis indicated that age ≥ 60 years, khat use, and cigarette smoking were independent predictors of polypharmacy among CVD patients. Specifically, patients with a history of khat chewing and cigarette smoking were significantly more likely to experience polypharmacy. This finding is consistent with studies conducted in Switzerland, Greece,

and Iran, which also identified smoking as an independent predictor of polypharmacy in cardiovascular patients [25, 28, 29]. One possible explanation is that cigarette smokers are at increased risk of developing various comorbid conditions—such as hypertension, respiratory disease, and vascular disorders—which may require multiple medications. However, further research is needed to explore the direct mechanisms linking smoking behavior to polypharmacy, especially in outpatient settings. Being 60 years or older was identified as an independent predictor of polypharmacy among CVD patients in the ambulatory clinic in the current study. This finding is consistent with previous research conducted in Ethiopia, the United States, Ireland, and the United Kingdom [20, 30–32]. The association may be explained by the fact that aging is often accompanied by an increase in chronic health conditions, leading to a greater need for multiple medications. These results highlight the significance of including behavioral risk variables, such as smoking and chewing khat, in polypharmacy risk assessments for patients with cardiovascular disease. Furthermore, in order to lower the risk of drug interactions and side effects, age-specific methods to medication management are essential, especially for older persons. Overall cardiovascular outcomes can be enhanced by customized interventions that focus on lifestyle factors and encourage sensible prescribing among high-risk behavioral groups and the elderly. Processes, particularly in outpatient settings, that connect smoking behavior to polypharmacy.

Limitation of the study

We did not evaluate the appropriateness of the polypharmacy in this study. Therefore, assessing the appropriateness of polypharmacy prescriptions in cardiovascular disease patients with treatment guideline adherence is warranted to evaluate the proper indication of each medication for some patients may take appropriate polypharmacy.Therefore, haven't focused on appropriateness or inappropriateness of polypharmacy. It cannot establish causality—only associations between polypharmacy and factors like age, khat chewing, and smoking because of nature of crossectional study design. Variables such as Khat chewing and smoking history may rely on self-reported information, which is prone to recall bias and social desirability bias, potentially leading to under-reporting. A consecutive sampling technique was also another limitation of this study.

Conclusion

One third of cardiovascular disease patients attending the outpatient clinic were on polypharmacy. The elderly age, history of Khat chewing and history of cigarette smoking were the predictors of polypharmacy in cardiovascular disease patients. Therefore, implementing regular medication reconciliation and review sessions, especially for elderly CVD patients are crucial. Integrating behavioral interventions and counseling focused on khat chewing and cigarette smoking cessation. Clinicians should train on the hazards of polypharmacy and its predictors, with a focus on careful prescribing for older patients and those with drug use histories.

Abbreviations

USA	United States of America
CVD	Cardiovascular disease
NCD	Non-communicable disease
OR	Odds ratio
SSA	Sub-Saharan Africa
SPSS	Statistical package for social science
MKCSH	Mettu Karl Comprehensive Specialized Hospital

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12872-025-04929-9.

Supplementary Material 1.

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Clinical trial number

Not applicable.

Authors' contributions

B.S.S. conceived the idea and was involved in the proposal development, data analysis, interpretation, and manuscript writing. T.S.H.A. conceived the idea, developed the study proposal, facilitated data collection, did data analysis, and interpreted the findings. M.D. did data analysis and interpreted the findings. G.G.A. conceived the idea, developed the study proposal, facilitated data collection, and did data analysis. All the authors reviewed the manuscript. All authors read and approved the final manuscript.

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Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Ethical clearance was obtained from the technical and ethical review committee of the College of health sciences, Mattu University (Phar199/16). Participation of patients in this study was entirely voluntary and confidential. Private information like name and address were protected. Non-participation didn't affect participants' care at the ward. Each participant was asked to sign a written informed consent before data collection. The right of participants to withdraw from the interview or not to participate was respected. All methods were performed in accordance with the relevant guidelines and regulations (Declaration of Helsinki).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

1. Gaziano TA. Cardiovascular diseases worldwide. Public Health Approach Cardiovasc Dis Prev Manag. 2022;1:8–18.
2. Fleg JL, Aronow WS, Frishman WH. Cardiovascular drug therapy in the elderly: benefits and challenges. Nat Reviews Cardiol. 2011;8(1):13–28.
3. Leong P, Macdonald MI, Ko BS, Bardin PG. Coexisting chronic obstructive pulmonary disease and cardiovascular disease in clinical practice: a diagnostic and therapeutic challenge. Med J Aust. 2019;210(9):417–23.
4. Rambhade S, Chakarborty A, Shrivastava A, Patil UK, Rambhade A. A survey on polypharmacy and use of inappropriate medications. Toxicol Int. 2012;19(1):68.
5. Muth C, Blom JW, Smith SM, Johnell K, Gonzalez-Gonzalez AI, Nguyen TS, et al. Evidence supporting the best clinical management of patients with Multimorbidity and polypharmacy: a systematic guideline review and expert consensus. Wiley Online Library; 2019. pp. 272–88.
6. van Sluisveld N, Zegers M, Natsch S, Wollersheim H. Medication reconciliation at hospital admission and discharge: insufficient knowledge, unclear task reallocation and lack of collaboration as major barriers to medication safety. BMC Health Serv Res. 2012;12:1–12.
7. Alhozim BMA, Almutairi ET, Albutyan ZY, Alzahrani NA, Alonizy MM, Albutyan LY, et al. The impact of polypharmacy on drug efficacy and safety in geriatric populations. Egypt J Chem. 2024;67(13):1533–40.
8. Scheel J, Luttenberger K, Graessel E, Kratzer A, Donath C. Predictors of falls and hospital admissions in people with cognitive impairment in day-care: role of multimorbidity, polypharmacy, and potentially inappropriate medication. BMC Geriatr. 2022;22(1):682.
9. Ingersoll KS, Cohen J. The impact of medication regimen factors on adherence to chronic treatment: a review of literature. J Behav Med. 2008;31:213–24.
10. Molokhia M, Majeed A. Current and future perspectives on the management of polypharmacy. BMC Fam Pract. 2017;18:1–9.
11. Haroun JA, Sneed K, Pathak Y. Optimizing medication and patient health through deprescribing practices. Nur Prim Care. 2023;7(6):1–8.
12. Volpe M, Chin D, Paneni F. The challenge of polypharmacy in cardiovascular medicine. Fundam Clin Pharmacol. 2010;24(1):9–17.
13. Gronde Tvd, Uyl-de Groot CA, Pieters T. Addressing the challenge of high-priced prescription drugs in the era of precision medicine: a systematic review of drug life cycles, therapeutic drug markets and regulatory frameworks. PLoS ONE. 2017;12(8):e0182613.
14. Muntner P, Miles MA, Jaeger BC, Hannon L III, Hardy ST, Ostchega Y, et al. Blood pressure control among US adults, 2009 to 2012 through 2017 to 2020. Hypertension. 2022;79(9):1971–80.
15. Laslett LJ, Alagona P, Clark BA, Drozda JP, Saldivar F, Wilson SR, et al. The worldwide environment of cardiovascular disease: prevalence, diagnosis, therapy, and policy issues: a report from the American college of cardiology. J Am Coll Cardiol. 2012;60(25S):S1–49.
16. Walckiers D, Van der Heyden J, Tafforeau J. Factors associated with excessive polypharmacy in older people. Archives Public Health. 2015;73:1–12.
17. Veehof L, Stewart R, Haaijer-Ruskamp F, Jong BM-d. The development of polypharmacy. A longitudinal study. Fam Pract. 2000;17(3):261–7.
18. Lavrador M, Cabral AC, Castel-Branco M, Figueiredo IV, Fernandez-Llimos F. Polypharmacy and medication adherence. Aging: Elsevier; 2023. pp. 435–53.
19. Kitaw TA, Haile RN. Prevalence of polypharmacy among older adults in ethiopia: a systematic review and meta-analysis. Sci Rep. 2023;13(1):17641.
20. Tefera YG, Alemayehu M, Mekonnen GB. Prevalence and determinants of polypharmacy in cardiovascular patients attending outpatient clinic in Ethiopia university hospital. PLoS ONE. 2020;15(6):e0234000.
21. Dunlay SM, Chamberlain AM. Multimorbidity in older patients with cardiovascular disease. Curr Cardiovasc Risk Rep. 2016;10.
22. Committee W, Birtcher KK, Allen LA, Anderson JL, Bonaca MP, Gluckman TJ, et al. 2022 ACC expert consensus decision pathway for integrating atherosclerotic cardiovascular disease and Multimorbidity treatment: a framework for pragmatic, patient-centered care: a report of the American college of cardiology solution set oversight committee. J Am Coll Cardiol. 2023;81(3):292–317.
23. Abebe SM, Andargie G, Shimeka A, Alemu K, Kebede Y, Wubeshet M, et al. The prevalence of non-communicable diseases in Northwest ethiopia: survey of Dabat health and demographic surveillance system. BMJ Open. 2017;7(10):e015496.
24. Rawle MJ, Richards M, Davis D, Kuh D. The prevalence and determinants of polypharmacy at age 69: a British birth cohort study. BMC Geriatr. 2018;18:1–12.
25. Castioni J, Marques-Vidal P, Abolhassani N, Vollenweider P, Waeber G. Prevalence and determinants of polypharmacy in switzerland: data from the CoLaus study. BMC Health Serv Res. 2017;17:1–9.
26. Kim H-A, Shin J-Y, Kim M-H, Park B-J. Prevalence and predictors of polypharmacy among Korean elderly. PLoS ONE. 2014;9(6):e98043.
27. Assefa YA, Kedir A, Kahaliw W. Survey on polypharmacy and drug-drug interactions among elderly people with cardiovascular diseases at Yekatit 12 hospital, Addis Ababa, Ethiopia. Integr Pharm Res Pract. 2020:1–9.
28. Pappa E, Kontodimopoulos N, Papadopoulos A, Tountas Y, Niakas D. Prescribed-drug utilization and polypharmacy in a general population in greece: association with sociodemographic, health needs, health-services utilization, and lifestyle factors. Eur J Clin Pharmacol. 2011;67:185–92.
29. Mohsenzadeh P, Ardekani A, Poustchi H, Mohammadi Z, Abdipour Mehrian SR, Bazrafshan Drissi H, et al. Population-based pattern of medication use and prevalence of polypharmacy among patients with cardiovascular diseases: results of the Pars cohort study from Iran. BMC Cardiovasc Disord. 2022;22(1):435.
30. Sheikh-Taha M, Asmar M. Polypharmacy and severe potential drug-drug interactions among older adults with cardiovascular disease in the united States. BMC Geriatr. 2021;21:1–6.
31. Moriarty F, Hardy C, Bennett K, Smith SM, Fahey T. Trends and interaction of polypharmacy and potentially inappropriate prescribing in primary care over 15 years in ireland: a repeated cross-sectional study. BMJ Open. 2015;5(9):e008656.
32. Woudstra OI, Kuijpers JM, Meijboom FJ, Post MC, Jongbloed MR, Duijnhouwer AL, et al. High burden of drug therapy in adult congenital heart disease: polypharmacy as marker of morbidity and mortality. Eur Heart journal-Cardiovascular Pharmacotherapy. 2019;5(4):216–25.

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