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RESEARCH ARTICLE

Impact of Polypharmacy on Therapeutic Outcomes in Elderly Cardiac Patients

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Abstract: Polypharmacy refers to taking two or more drugs simultaneously, which is becoming common among older patients with a heart condition because of the comorbidities that they all have. Though mandatory to treat the diseases, polypharmacy can impact the outcomes of the therapeutic process undesirably by exposing the patient to drug-drug interactions, medication non-adherence and adverse drug reactions (ADRs). The aim of the research was to determine the impact of polypharmacy on the clinical outcomes of cardiac elderly patients. This was a prospective observational study which was conducted over a duration of six months and had a sample population of 120 patients aged 65 years and above and was under treatment owing to reasons such as high blood pressure, atrial fibrillation, ischemic heart disease and heart failure. The data about the number of drugs, adherence, ADRs, hospitalization and clinical outcome were collected and analyzed. The results showed high ADR rate (22% vs 8% $p<0.05$) of polypharmatic patients (≥5 medications) compared to non-polypharmatic patients (fewer medications), poor adherence, and high hospitalization rates. Such findings underscore the need to review medication, patient-centered therapy, and patient education in order to maximize the benefits and minimize the risk of older heart patients.

Keywords: Polypharmacy, older adults, heart diseases, treatment effects, and medication compliance, medication side effects, and hospitalization.

INTRODUCTION

Polypharmacy that is generally regarded as taking of five or more drugs at a certain moment has been a common thing in the elderly especially cardiovascular diseases. The occurrences of polypharmacy in this category of individuals are strongly determined by a number of chronic conditions such as; hypertension, atrial fibrillation, ischemic heart disease, heart failure, diabetes mellitus, and dyslipidemia among others. To be able to manage these conditions, complex regimens of medications are frequently required, which is necessary to control the disease, yet, at the same time, the risk of adverse outcomes is also present [1].

Older patients are especially vulnerable to the risks of polypharmacy because of physiological changes associated with age such as changes in pharmacokinetics and pharmacodynamics, declines in renal and hepatic clearance, and cardiac output. Furthermore, the patient might have some cognitive and sensory impairments that influence his or her adherence to complex treatment regimes. All of them are predisposing factors to adverse drug reactions (Padding), drug-drug interactions, medication errors, and hospitalization that are likely to impair the quality of life and treatment outcomes [2].

Polypharmacy is a two-sided process since on the one hand, overlap of the diseases may provoke the necessity of taking multiple drugs simultaneously which are used correctly, on the other hand, overprescription or use of incorrect drugs may also result in a decrease in the pharmacological effect, the appearance of the side effects or inability to adhere to the treatment. In its turn, non-compliance can lead to cardiovascular morbidity and mortality. Further, the hospitalization due to medication related complications, does not only affect the health of a patient, but also come with huge economic and healthcare systems expenses [3].

Although polypharmacy is a common problem in aged cardiac patients, little real-world evidence has been conducted on how polypharmacy directly affects therapeutic outcomes, adherence, and safety. By knowing about such associations, it is important to create interventions aimed at enhancing therapy in a vulnerable group, including medication review programs, deprescribing programs, and educating patients [4].

The following study seeks to explore the effects of polypharmacy on clinical outcomes, adverse drug reactions, and medication adherence in cardiac disease elderly patients. The proposed study will be important in informing the safer, more effective and patient-centred management of polypharmacy in the cardiovascular care by uncovering the factors leading to poor therapeutic outcomes [5].

MATERIAL AND METHODS

Study Design and Setting

The research was a prospective and observational research that took place in a six-month period at Cardiology department of a teaching hospital with a tertiary care hospital. This study was aimed at testing how the polypharmacy interferes with the treatment outcomes of geriatric patients with cardiac illnesses [6].

Study Population

The used population of the study was 120 patients aged 65 years of age and above with the diagnosis of cardiac diseases (hypertension, atrial fibrillation, ischemic heart disease, or heart failure) and taking a variety of drugs [7].

Inclusion Criteria

- Patients aged ≥65 years.
- Has been confirmed to have one or more cardiac conditions that need to be treated with pharmacotherapy.
- Taking at least one drug, prescribed to treat cardiac or comorbid conditions.
- Ready to sign an informed consent and take part in follow-up [8].

Exclusion Criteria

- Patients with a life expectancy that is less than 6 months or terminally ill patients.
- Patients unable to provide credible medication history.
- Other interventional clinical trials within the participants [9].

Data Collection

The demographic data (age, gender), clinical history (type of cardiac disease, comorbidities), medications and the number and types of medications used and the duration of treatment were collected. Polypharmacy was taken to be the use of five (or more) drugs. The degree of patient compliance was measured with the help of Morisky Medication Adherence Scale (MMAS-8) and measuring Adverse Drug Reactions (ADRs) was determined by interviewing the patient, conducting the clinical examination and laboratory tests [10]. Hospitalizations, emergency visits and clinical outcomes concerning cardiac conditions were also recorded.

Outcome Measures

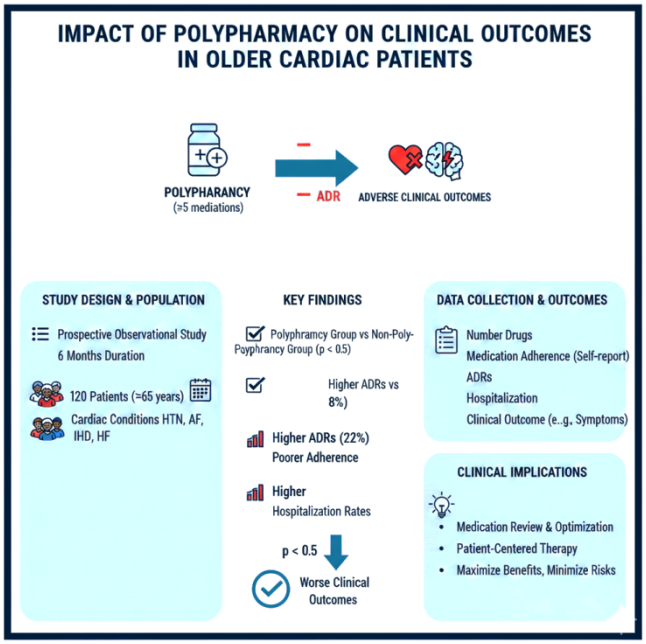
- Primary outcomes: The effect of polypharmacy on the therapeutic outcomes, such as disease control and hospitalization rates.
- Secondary outcomes: ADRs incidence, medication compliance, and determination of factors that lead to poor therapeutic outcomes [11].

Statistical Analysis

The SPSS (version 25.0) software was used to analyze the data. Continuous variables were in terms of mean ± standard deviation (SD) and categorical variables in terms of frequencies and percentages. Categorical variables were analyzed using chi-square test or Fisher exact test whereas continuous variables were examined using student t-test. It was analyzed by correlation to determine how polypharmacy is related to therapeutic outcomes. A p-value of less than or equal to 0.05 was taken as a statistically significant number [12].

RESULTS AND OBSERVATIONS:

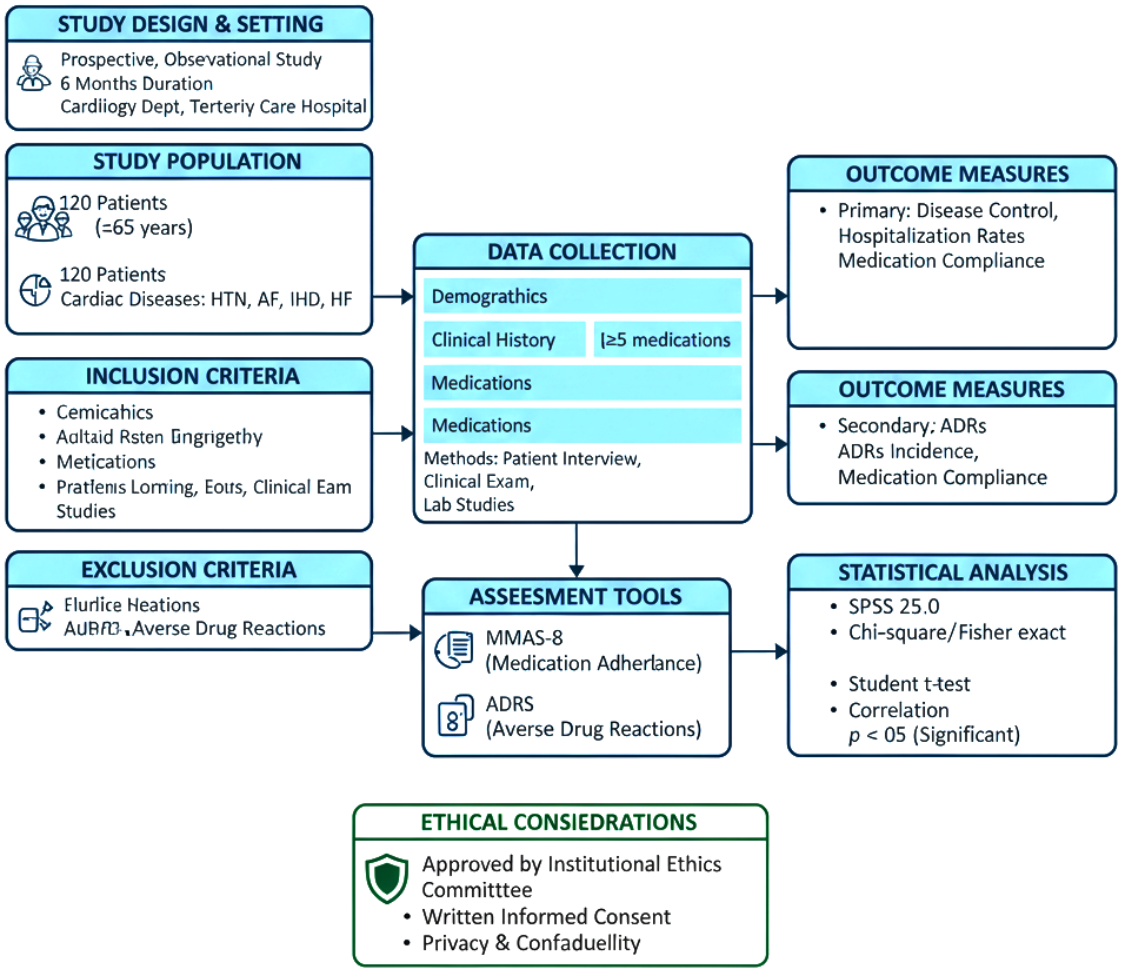
Graphical abstract



ETHICAL CONSIDERATION:

The Institutional Ethics Committee gave consent to the study protocol. All the participants were informed of the study and received written informed consent before enrolment. The study took into consideration patient confidentiality and privacy (Figure 2) [13].

Figure 2: Research Methodology



One hundred and twenty cardiac elderly patients were recruited. Out of them, 68 (56.7) men and 52 (43.3) women with a mean age of 70.4 years old were observed. Most of the patients were polypharmacy as 65 percent were affected with hypertension, 48 percent with diabetes mellitus, ischemic heart disease (35 percent), and chronic kidney disease (15 percent) (Table 1).

Table 1: Demographic and Clinical Characteristics of Study Population (n = 120)

Parameter	Category	Number of Patients (n)	Percentage (%)
Gender	Male	68	56.7
	Female	52	43.3
Mean Age (years)	—	70.4 ± 5.8	—
Comorbidities	Hypertension	78	65.0
	Diabetes mellitus	58	48.3
	Ischemic heart disease	42	35.0
	Chronic kidney disease	18	15.0

Prevalence of Polypharmacy

Sixty-two patients (51.7%), and 58 patients (48.3%) were found to be on polypharmacy (≥5 medications) and on less than five medications, respectively. Polypharmacy patients were still more likely to have multiple co-morbid conditions than patients on smaller amounts of medications (Table 2).

Table 2: Prevalence of Polypharmacy

Polypharmacy Status	Number of Patients (n)	Percentage (%)
Polypharmacy (≥5 medications)	62	51.7
Non-polypharmacy (<5 medications)	58	48.3

Therapeutic Outcomes

The patients who were on polypharmacy were associated with increased incidences of adverse outcomes:

- The prevalence of poor disease control was also noted among 28% of patients taking polypharmacy instead of 12% taking fewer drugs ($p < 0.05$).
- The rate of cardiac-related hospitalizations was greater in polypharmacy group (18% compared to non-polypharmacy group (7% $p < 0.05$).
- The medication adherence, measured by the MMAS-8 scale was significantly less in patients on polypharmacy (mean score 6.2 ± 1.1) than in patients on fewer medications (mean score 7.5 ± 0.9, $p < 0.01$) (Table 3, Figure 2).

Table 3: Therapeutic Outcomes and Adherence

Parameter	Polypharmacy (n=62)	Non-Polypharmacy (n=58)	p-value
Poor disease control	17 (28%)	7 (12%)	<0.05
Hospitalizations (cardiac events)	11 (18%)	4 (7%)	<0.05
Medication adherence (MMAS-8 score, mean ± SD)	6.2 ± 1.1	7.5 ± 0.9	<0.01

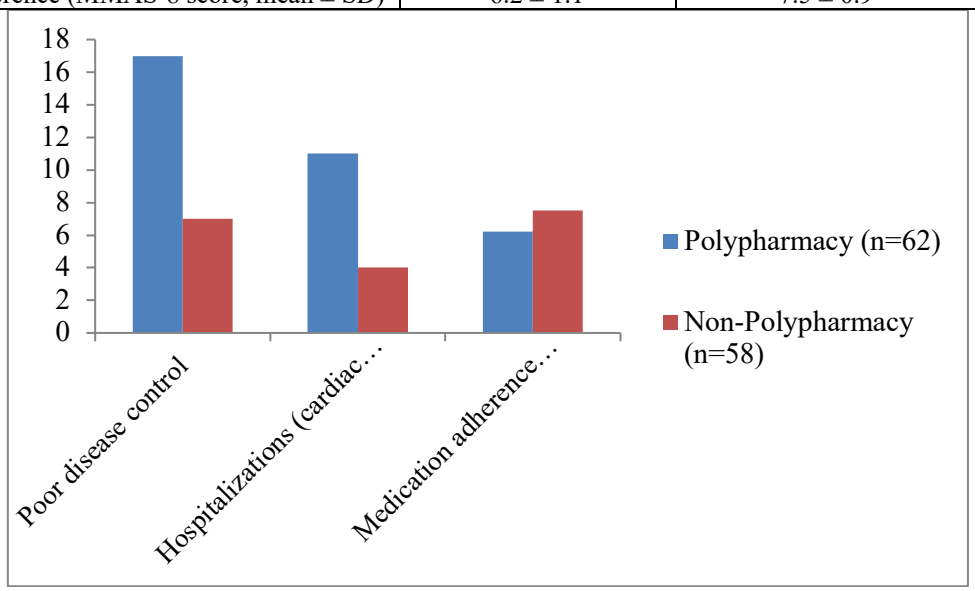


Figure 2: Graphical presentation of Therapeutic Outcomes and Adherence

Adverse Drug Reactions (ADRs)

The ADRs were more common in the polypharmacy group (22%), compared with patients taking fewer drugs (8% $p < 0.05$). Majority of ADRs were mild to moderate with gastrointestinal, dizziness and minor bleeding being most common (Table 4).

Table 4: Incidence of Adverse Drug Reactions (ADRs)

ADR Type	Polypharmacy (n=62)	Non-Polypharmacy (n=58)	Total (n=120)
Gastrointestinal disturbances	8	3	11
Dizziness	5	2	7
Minor bleeding	6	1	7
Total ADRs	14 (22%)	5 (8%)	19 (15.8%)

More than half of the cardiac elderly patients were suffering polypharmacy.Poor therapeutic outcomes, hospitalisations and ADRs were more prevalent in patients on polypharmacy.The number of medications was negatively correlated with medication adherence and the problems in dealing with complex regimens in the elderly.

DISCUSSION

The existing research assessed the effects of polypharmacy on the therapeutic outcome among cardiac patients of advanced age. Polypharmacy was observed to be common among 51.7 per cent of individuals in the study population, which indicates the big burden of medication among aging patients with comorbidities. This observation is congruent with the past reports that indicate that over 50 percent of the elderly cardiac patients are taking five or more drugs, in most cases because of the combined therapy of hypertension, diabetes, ischemic heart disease and other chronic diseases [14].

Patients with polypharmacy fared significantly (28% vs. 12) more poorly in regard to poor disease control and hospitalizations (18% vs. 7) than patients taking fewer drugs did. These findings indicate that polypharmacy can adversely affect clinical outcomes, perhaps due to drug-drug interactions, addition of further complexity to therapy, or accumulation of side effects. There is also a relationship between these issues which is associated with poor disease control among patients with polypharmacy and thus medication adherence is also minimized [15].

The researchers observed less adherence rates in polypharmacy patients because the mean MMAS-8 was 6.2 + 1.1 in polypharmacy patients when compared to 7.5 + 0.9 in under less medication patients. The complex drug regimens, pill burden and cognitive dysfunction in the aged should have contributed to non-adherence, which thus can impair the efficacy of the therapeutic interventions. The findings are and should be in line with the current literature, where the compliance to treatment is reduced with the rise in the quantity of drugs given, and simplified treatment plans and patient education are required [16].

ADRs were higher among polypharmacy patients (22 percent) than among the ones taking fewer medications (8 percent). The gastro-intestinal disturbances, dizziness and minor bleeding were the most common ADRs reported. It is reminiscent of the increased risk of drug-related problems in patients who are taking multiple medications at the same time, particularly the elderly with his/her potential altered pharmacokinetics and pharmacodynamics. Most ADRs were mild-moderate which means that polypharmacy increases the risk but through close observation and early intervention, the negative impacts are minimized to severe ones [17].

These outcomes demonstrate the topicality of regular medication evaluations, deprescribing when and where appropriate, and individual therapy to geriatric heart patients. Some of the measures that can be put in place to ensure that the therapeutic effects are maximized with minimum risks incurred in case polypharmacy is employed are patient counseling, adherence support program and close monitoring of ADRs [18].

It is possible to mention that our findings are in agreement with the existing literature which states that polypharmacy among elderly individuals with heart conditions is associated with the deficit of adherence, ADRs, and hospitalization. The practical research is centered on the fact that polypharmacy is a necessity and a challenge, where patient-centered approach to medications should be taken into consideration [19].
Overall, polypharmacy has a negative impact on the outcomes of the treatment process, adherence, and safety of geriatric patients with cardiac conditions. Proactive measures like optimization of medication, educating the patient and close monitoring should be adopted in order to minimize the risk of multiple concurrent medications [20].

CONCLUSION

The article indicates that polypharmacy are extremely common among older cardiac patients and it is associated with bad therapeutic outcomes. The poor disease control, hospitalizations of the patients, poor medication adherence and adverse drug reactions were also identified in contrast to the patients who were on low number of medications. Such findings indicate that it is important to revise medication on a regular basis, offer personal therapies, and emphasize the interventions that are most likely to contribute to a higher level of therapy and minimize risks. Patient education, simplification of the regimen, and deprescribing of unwarranted drugs can better be employed to implement strategies to improve patient adherence and reducing adverse events and overall clinical outcomes in older cardiac patients.

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