

Assessment of Degree of Polypharmacy and adverse Drug Events Among Geriatric Patients in a Tertiary Care hospital, a Prospective Observational Study

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ABSTRACT

BACKGROUND: Ageing is a global and complex biological phenomenon, which includes multiple aspects that several physiological changes occur at the tissue as well as whole-organism level, occurring in cascade, especially post-reproduction. Polypharmacy may be unavoidable in the treatment of diseases caused by aging, such as hypertension, diabetes mellitus, dyslipidemia, and depression.

AIM: The study aims to evaluate the degree of polypharmacy, adverse drug reactions, and drug interactions among geriatric patients at a teaching tertiary care hospital.

METHODOLOGY: It was a prospective observational study; a sample size of 159 geriatric patients' prescription and demographic details were checked, and potential ADR and drug-drug interactions were assessed; then, collected data were analyzed by using Microsoft Excel.

RESULT: The clinical data of 159 geriatric patients were assessed; among them, 44.65% of these patients were female, and 55.35% were males. The median number of drugs prescribed to patients was 13.

Potential ADRs caused were also studied and compared for their risks. 34 (21.38%) patients experienced 38 adverse drug reactions during the study. These ADRs were compared and classified (Defined-13.16%, Possible-26.31%, and Probable-60.52%), and the severity of ADRs was assessed and categorized as (Mild-23.68%, Moderate-60.52%, Severe 15.78%). Most of these adverse drug reactions were related to Furosemide (15.78%), Heparin (15.78%), and the combination of piperacillin and tazobactam (10.52%).

Another aspect of this study was to find and assess the severity of drug-drug interactions. Forty-four drug interactions were achieved among 31 (19.49%) patients. The severity of these

interactions was classified as (Mild-9.30%, Moderate-67.44%, and Severe 25.58%).

CONCLUSION: DDI and ADR among older adults continue to be significant issues worldwide. Our study raises awareness of the potential ADRs, identifying and monitoring drug interactions to reduce the cost of morbidity and mortality rate in geriatric patients.

Keywords: Polypharmacy, ADR, Geriatric, DDI.

ABBREVIATION: ADRs – Adverse Drug Reactions, DDI- Drug-Drug Interaction

I. INTRODUCTION

Ageing is a global and complex biological phenomenon, which includes multiple aspects that several physiological changes occur at the tissue as well as whole-organism level, occurring in cascade, especially post-reproduction. Polypharmacy may be unavoidable in the treatment of diseases caused by aging, such as hypertension, diabetes Mellitus, dyslipidemia, and depression.[1]

Polypharmacy is defined as the regular use of at least five or more drugs per day on a regular basis; alternatively, the uncontrolled use of many medications without appropriate monitoring may also be understood as polypharmacy. Polypharmacy has been shown to be associated with drug-drug interactions (DDIs), a risk for potentially inappropriate medications (PIMs), adverse drug reactions (ADRs), drug omissions, and finally, increased morbidity, particularly falls and mortality.[2]

Adverse drug-related events (ADREs) have a challenging and costly public health problem. They lead to 3% to 23% of hospital admissions, prolonged hospitalization, and extremely increased morbidity and mortality rates. In the hospital environment, physicians and nurses have been estimated to detect only between 5% to 15% of ongoing ADREs when systematic computer

surveillance tools or dedicated personnel are not available.[3]

Drug interactions can be potentially life-threatening in geriatrics, who may consume various medications simultaneously for multiple conditions [4]. There is no clear consensus on the quantitative relationship between the number of medications prescribed and potential DDIs. However, various studies have recommended a general, exponential, or linear association between the number of drugs prescribed and the probability of potential DDI [5]. Age-related physiologic changes may lead to an increased risk of chronic disease and consuming various medications; geriatrics are more prone to drug interactions [4]. DDIs are known to be related to adverse drug reactions and hospitalization [5].

II. METHODOLOGY

Study Site:

This study was conducted at a tertiary care hospital (BENGALURU BAPTIST HOSPITAL).

Study Design:

Prospective observational study.

Study size:

A total of 159 patients from the in-patient department who fulfilled the inclusion and exclusion criteria were enrolled.

Study period:

This study was conducted for a period of 6 months.

Source of data and Materials:

1. Direct observation.
2. In-patient medication chart.
3. In-patient case sheet.

Inclusion Criteria:

1. Age \geq 65 years.
2. Both female and male.
3. Patients prescribed with Minimum of five drugs.

Exclusion Criteria:

1. Patient admitted for intentional overdose.
2. Patient with single medication prescription.
3. Age below 65 years;
4. Hospice, respite care, and rehabilitation of patients.
5. Patient in ambulatory care.

III. RESULTS

GENDER EVALUATIONS OF PATIENTS

NO	GENDER TYPE	NO	PERCENTAGE
1	FEMALE	71	44.65%
2	MALE	88	55.35%
3	TOTAL	159	100%

Table 1. Gender evaluations of patients

TABLE 1: Based on the objectives and methods in this study, 159 patients with ages 65 years old or higher ages (geriatric) were located for

the evaluation, where 44.65% of these patients were females, and 55.35% were males.

EVALUATION OF THE NO. OF DRUGS PER PATIENT

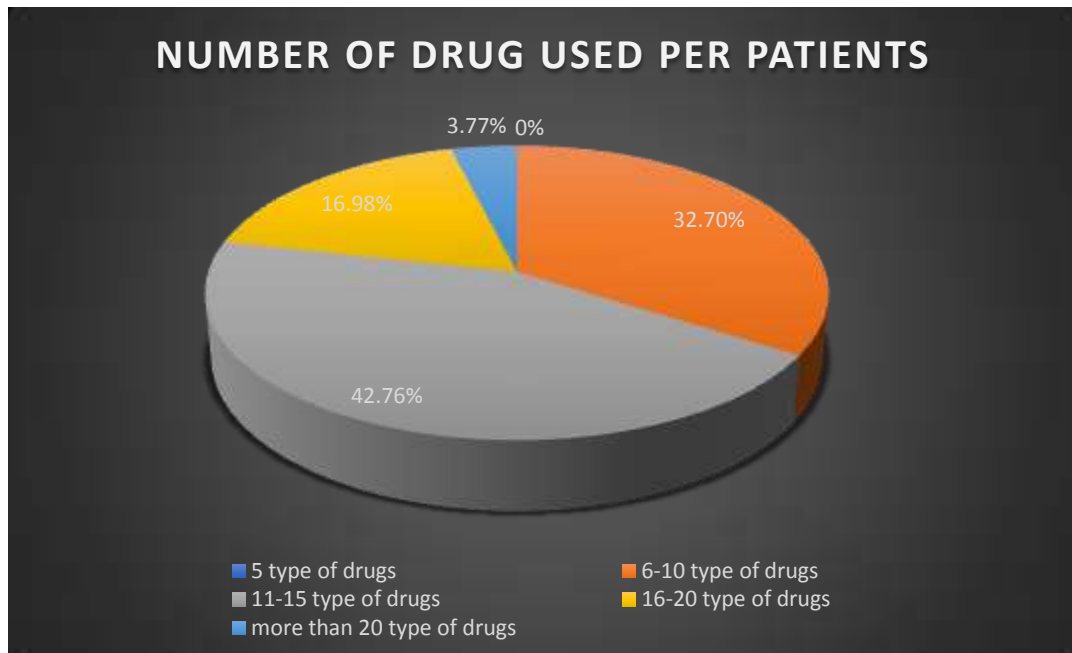


Figure 1. Evaluation of No. Of drugs per patient

FIGURE 1: The degree of polypharmacy is shown in this pie chart. More than 20 types of drugs were prescribed for 3.77% of patients. 16.98% of patients received between 16 and 20

drugs. In the prescription of 42.76% of patients, between 11 and 15 drugs were observed. Between 6 and 10 types of drugs were prescribed for 32.70% of patients. No patient was observed with 5 drugs.

EVALUATION OF ADVERSE DRUG REACTIONS AMONG GERIATRICS

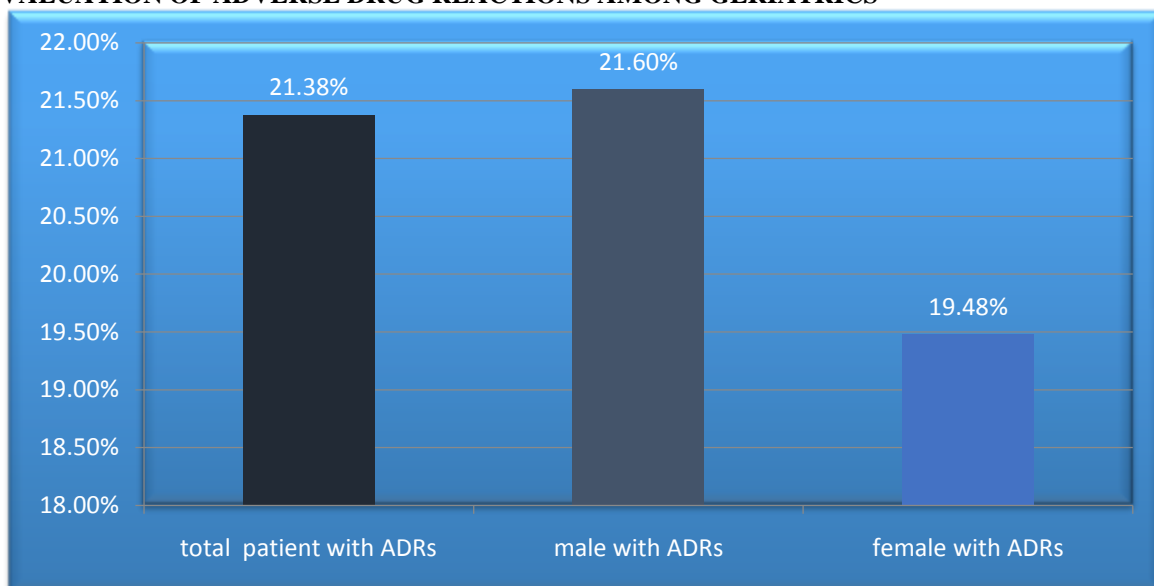


Figure 2. Evaluation of adverse drug reactions among geriatrics

FIGURE 2: Based on this study, among 159 patients, 34 patients (21.38%) were found with

38 ADRs. Out of 34 patients with ADRs, 19 were males (21.60%), and 15 were females (19.48%).

PROBABILITY OF ADVERSE DRUG REACTIONS AMONG GERIATRICS PATIENTS

NO	ADVERSE DRUG REACTIONS CLASSIFICATION	NO OF ADRS	PERCENTAGE %
1	DEFINED	5	13.16%
2	PROBABLE	23	60.52%
3	POSSIBLE	10	26.31%

Table 2. Probability of adverse drug reactions among geriatric patients

TABLE 2: Based on the causality assessment of adverse drug reactions, 38 ADRs were identified in the study population. 10 ADRs (26.31%) were possible, 23 ADRs (60.52%) were probable, and only 5 ADRs (13.16%) were defined.

EVALUATION OF ADVERSE DRUG REACTIONS BASED ON THE SEVERITY

NO	ADVERSE DRUG REACTIONS CLASSIFICATION	NO	PERCENTAGE %
1	MILD	9	23.68%
2	MODERATE	23	60.52%
3	SEVERE	6	15.78%

Table 3. Evaluation of adverse drug reactions based on the severity

TABLE 3: The severity of ADRs was evaluated and categorized as mild (23.68%), moderate (60.52%), and severe (15.78%).

DRUGS RELATED TO ADVERSE DRUG REACTIONS

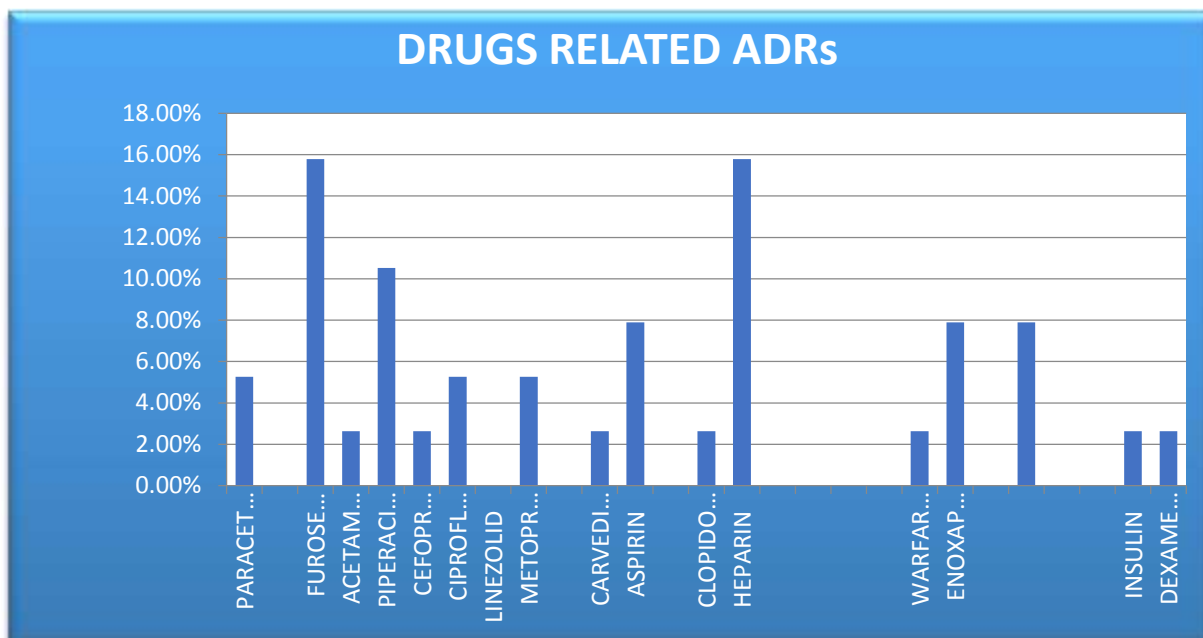


Figure 3. Drugs related to adverse drug reactions

FIGURE 3: This figure demonstrates drugs related to ADRs. The highest rate of ADRs was found in Furosemide and Heparin (15.78%), followed by a fixed-dose combination of Piperacillin and Tazobactam (10.52%).

EVALUATION OF DRUG INTERACTIONS BASED ON THE SEVERITY

NO	INTERACTIONS CLASSIFICATION	NO	PERCENTAGE %
1	MILD	4	9.30%
2	MODERATE	29	67.44%
3	SEVERE	11	25.58%

Table 4. Evaluation of drug interactions based on the severity

TABLE 4: 44 drug interactions were achieved among 31 (19.49%) patients. The severity of DDIs was checked and classified as mild (9.30%), moderate (67.44%), and severe (25.58%) interactions.

IV. DISCUSSION

GENDER EVALUATIONS OF PATIENTS

In the current study, clinical data of 159 geriatric patients was observed; among them, the number of male patients (88) was higher than female patients (71).

EVALUATION OF THE NO. OF DRUGS PER PATIENT

The median No. Of drugs at admission found, 13 (range 11-15), whereas in Angela Nachtigall et al. (2019) study [3], the median number of drugs was about 10.

EVALUATION OF ADVERSE DRUG REACTIONS AMONG GERIATRICS

Totally 34 (21.38%) patients have found with 38 adverse drug reactions during the study. Among these patients, 19 were male, and 15 were female, while in the Bilal Ahmed et al. (2014) study [2], the percentage of adverse drug reactions during the study was 10.5%.

In the current study, the highest percentage of probability and severity of ADRs was found to be probable (60.52%) and moderate (60.52%), respectively, while based on the study conducted by Julia K. Nguyen et al. (2006), [16] the probability and severity of ADRs were observed as possible and moderate respectively.

In our study, the highest rate of ADRs was found in Furosemide and Heparin (15.78%), followed by a fixed-dose combination of Piperacillin and Tazobactam (10.52%).

EVALUATION OF DRUG INTERACTIONS BASED ON THE SEVERITY

Forty-four drug interactions were achieved among 31 (19.49%) patients. The severity of DDIs was checked and classified as mild

(9.30%), moderate (67.44%), and severe (25.58%) interactions. Hence in the current study, the highest rate of severity was moderate. A similar result was observed in a study by Chen-Fang Linet al. (2011) [17], where the highest rate of the severity of DDIs was found to be moderate.

V. CONCLUSION:

DDI and ADR among older adults continue to be significant issues worldwide. Our study raises awareness of the potential ADRs, identifying and monitoring drug interactions to reduce the cost of morbidity and mortality rate in geriatric patients.

In this study, from a total number of 159 patients, the male patients were more than females. The median number of drugs per patient was assessed to be 13.

The current study assessed the ADRs and DDIs in geriatric patients. Of 159 patients, 34 patients (21.38%) developed 38 ADRs, and 44 drug interactions were achieved among 31 (19.49%) patients.

Hence particularly for geriatric patients, the role of the clinical pharmacist is non-negligible to find and avoid adverse events. The quality of treatment can be improved by discussing with the prescribers as well as counseling patients about drugs, their safety, and alternatives.

REFERENCES:

[1]. Maria Cristinam Soares Rodrigues, Cesae de Oliviera. Drug-drug interactions and adverse drug reactions in polypharmacy among older adults: an integrative review. Rev. Latino-Am. Enfermagem. 2016; 24: e2789.

[2]. Bilal Ahmed, Kashmira Nanji, Muhammad Junaid Patel, Rakshinda Mujeeb. Effects of Polypharmacy on Adverse Drug Reactions among Geriatric Outpatients at Tertiary Care Hospital in Karachi: A prospective cohort study. 2014, November; 9(11): e112133.

- [3]. Angela Nachtigall, Hans J. Heppner and Petra A. Thurmann. Influence of pharmacist intervention on drug safety of geriatric in-patients: a prospective, controlled trial. *ThevAdv Drug Safe*, 2019; 10: 1-15.
- [4]. Lisa E. Hines, PharmD; and John E. Murphy, PharmD. Potentially Harmful Drug-Drug Interactions in the Elderly. *The American Journal of Geriatric Pharmacotherapy*. 2011, December; 9: 6.
- [5]. Paolo Gallo, Antonio De Vincentis, Claudio Pedone, Alessandro Nobili, Mauro Tettamanti, et al. Drug-drug Interactions Involving CYP3A4 and P-Glycoprotein In hospitalized elderly patients. *European Journal of Internal Medicine*. 2019; 65(2019): 51-57.
- [6]. Pilotto A, Franceschi M, Leandro G, et al. Proton-pump inhibitors reduce the risk of uncomplicated peptic ulcer in elderly either acute or chronic users of aspirin/Nonsteroidal anti-inflammatory drugs. *Aliment Pharmacother* 2004; 20: 1091-7.
- [7]. Mannesse CK, Derkx FH, de Ridder MA, et al. Contribution of adverse drug reactions to hospital admission of older patients. *Age Ageing* 2000; 29: 35-9.
- [8]. Sinha U, Raha S, Wilkins E. Adverse drug reactions and hospital admission of older patients. *Age Ageing* 2000; 29:551-5.
- [9]. Onder G, Landi F, Cesari M, et al. Adverse drug reactions as cause of hospital admissions: results from the Italian Group of Pharmacoepidemiologic in the Elderly (GIFA). *J Am GeriatrSoc* 2002; 50: 1962-8.
- [10]. Franceschi M, Scarcelli C, Niro V, et al. Prevalence, clinical features and avoids ability of adverse drug reactions as cause of admission to a geriatric unit: a prospective study of 1756 patients. *Drug Safe* 2008; 31: 545-56.
- [11]. Olivier P, Boulbe`s O, Tubery M, et al. Assessing the feasibility of using an adverse drug reaction preventability scale in clinical practice: a study in a French Emergency Department. *Drug Safe* 2002; 25: 1035-44.
- [12]. Ghibelli S, Marengoni A, Djade CD, Nobili A, Tettamanti M, Franchi C, et al. Prevention of inappropriate prescribing in hospitalized older patients using a computerized prescription support system. *Drugs Aging* 2013; 30(10):821-8.
- [13]. Pasina L, Nobili A, Tettamanti M, Salerno F, Corrao S, Marengoni A, et al. Prevalence and appropriateness of drug prescriptions for peptic ulcer and gastroesophageal reflux disease in a cohort of hospitalized elderly. *Euro J Intern Med* 2011; 22(2):205-10.
- [14]. Seyed Reza Hosseini, Ali Zabihi, SeyedehRoghayehJafarianAmiri, Ali Bijani. Polypharmacy among the Elderly. *Babol University of Medical Sciences, Nursing Care Research Center, Babol University of Medical Sciences, Babol, Iran. J Mid-life Health* 2018; 9:97-103.
- [15]. Jean-Baptiste Beuscart, Ségolène Petit, Sophie Gautier, Patrick Wierre, hibautBalcaen, Jean-Marc Lefebvre, Nicolas Kambia, Elisabeth Bertoux, Daniel Mascout, Christine Barthélémy, Damien Cuny, François Puisieux and Bertrand Décaudin. Polypharmacy in older patients: identifying the need for support by a community pharmacist. *University of Lille, EA 2694, Department of Geriatrics, CHU Lille, 2019-19:277.*
- [16]. Julia K. Nguyen, PharmD; Michelle M. Fouts, PharmD; Sharon E. Kotabe, PharmD; and Eunice Lo, PharmD. Polypharmacy as a Risk Factor for Adverse Drug Reactions in Geriatric Nursing Home Residents. *The American Journal of Geriatric Pharmacotherapy*. 2006, March; 4:1.
- [17]. A. Chen-Fang Lin, Chun-Yu Wang, and Chyi-Huey Bai. Polypharmacy, Aging, and Potential Drug-Drug Interactions in Outpatients in Taiwan. *Drugs Aging*-2011; 28(3):219-225