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Drug Related Problems in Geriatric Patients with Inappropriate Medication Use

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ABSTRACT

Drug related problem (DRP) is an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes. Nowadays geriatric patients are at high risk of DRPs due to polypharmacy and altered physiology or due to older patients cannot manage their medication. DRPs also could arise from age related chronic diseases. The DRPs following hospital discharged cases also increased in elder people with chronic disease. Geriatric patients faces DRPs include inappropriate use of medication, polypharmacy, noncompliance, ADRs, drug-drug interaction, etc. Geriatric patients require more care because DRPs sometimes leads to hospital admission days, cost of the medication, increased morbidity rate and reduce the quality of life etc. So these category people need special consideration while selecting the drug therapy and its pattern. Like other health care services this special category of patients' needs good care or services from a team of health care professionals including clinical pharmacists. This review article aims to understand the risk factors and different types of DRPs that are facing by the elderly people due to inappropriate medication use and pharmaceutical care by clinical pharmacists.

Keywords: Geriatric patients, Polypharmacy, Non-compliance, and Drug related problems

INTRODUCTION

A Drug-Related Problem is an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes. Nowadays geriatric patients are may be at high risk of DRPs due to polypharmacy and altered physiology or due to older patients cannot manage their medication. Geriatric patients means elder person with impaired overall functions, but he or she is more than 60 year old with any chronic illness, altered physiology etc.

Types of drug related problems

According to many articles there are many type of DRPs are identified and classified. The DRPs facing by elderly population are

- Adverse drug reaction(in that side effects with allergy and side effects without allergy)
- Drug choice problem like inappropriate drug, inappropriate duplication of active ingredient, contra indication of drug, no clear indication for drug and no drug given by the physician but the patient have indication.
- Dosing problem which includes too much of the drug, too little of the drug, treatment duration is very high or treatment duration is too low.
- Drug problem like wrong drug given or the patient did not take the drug.
- Other DRPs arises when patient is not satisfied with the treatment or during therapy failure.

What may be the reasons behind the DRPs?

According to the PCNE guidelines the reasons for DRPs are

- Drug or dose selection which include inappropriate selection of drug or its dosage form, availability of costly drugs or pharmacokinetic problems of drug, deterioration or improvement of disease state or the treatment require add-up of a drug with same action, new symptoms arises or new indication shown by the patient
- Drug use process which include if the patient took the drug at a wrong or if the drug is under used , over usage of the drug, abusement of the drug, if the patient cannot be use the drug as per physician's direction or if the therapeutic monitoring is not done properly.
- Sometimes it may happen if wrong information has been provided by health care professionals or any family members etc. or there is an understanding problem by the patient.
- And sometimes the problems may arise when the patient is not willing to change the drugs, or he is afraid of the financial problem etc.

This review article aims to understand the risk factors and different types of DRPs that are facing by the elderly people due to inappropriate medication use and pharmaceutical care by clinical pharmacists.

DISCUSSION

According to Barbara J. Courtman and Sylvia B. Stallings studies, they are telling that drugs may directly or indirectly become the cause of hospital admission. In case of geriatric population hospital admission becomes so common due to their altered pharmacokinetics and pharmacodynamics. We can see adverse drug reactions are one of the common DRP found in geriatric population but we are neglecting them because they are incorrectly attributed to aging of elderly people or may think as the problem is due to severe disease condition thus they are neither detected nor reported by the family members or health care professionals. According to them 96.8% of the DRPs were potentially avoidable and involved commonly prescribed drugs. They have done a study on drug related problems in geriatric patients who were admitted in medical ward and they told that 31% of admission cases were due to DRPs. And they mention that polypharmacy is one of the main risk factor for their admission to the medical ward. And also they clearly mentioned that if the patients given with appropriate medicine for their illness they could prevent the incidence of DRPs and following hospitalization. [1]

According to an article which assess the problems of elder people with chronic disease in a rural set up by R. ADEPU and P. K. ADUSUMILLI; it tells that, many of the physicians are unaware about the medications in which the patients are taking and also sometimes they are not disclosing the alternate medicine or non-prescribed drugs to their physician. Because of this hesitation there is a chance of drug and herbal content interaction which is same as drug- drug interaction because the herbal products containing a mixture of various plant products which are therapeutically active. Hence a pharmacist's service is very much essential in a hospital to identifying and resolving these common DRPs. Also in their studies they mention that in rural areas people with chronic disease, there is a chance of taking over the counter drugs more than prescribed drugs. Hence a pharmacist's service is very much essential in a hospital to identifying and resolving these common DRPs. Such patients have a high chance of DRP compared to hospitalized patients. If such problems are identified and resolved by the clinical pharmacist the therapeutic outcome of the budget will become much better. And the authors of this article done a cost analysis in those patients to identify the burden of patients due to DRP hence they are telling that if the DRPs are identified and resolved

it will reduce the expenditure of the patient. [2]

They've done a prospective study and in their study the most common problem was failure to receive drugs. They applied one mathematical formula to find out the societal cost saving in their study subjects and the formula is;

Number of identified DRPs × (% avoided primary care visits× societal cost/visit) + (% avoided hospitalizations× societal cost per hospitalization day × number of days).

They got a total of 90 DRPs in which the incidence rate is 41.8% and prevalence rate is 9.07%. [2]

In this study they classified the DRPs into minor, moderate and major.

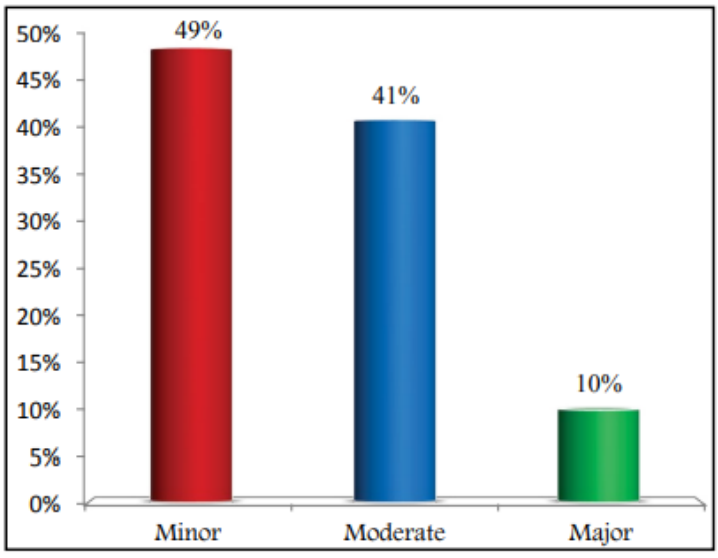

Figure No: 1- Significance level of drug related problems-Adapted from reference No: 2

The result of their study gives information which may be used in designing measures to minimize DRPs in patients with chronic diseases in rural areas of the community.

According to a study conducted by Mannu Meria Wincen, D. Potrilingam, Anagha V. Sajith Chacko Jacob, Andhuvan G on Drug related problems in patients with chronic diseases in the general medicine units of a tertiary care hospital they have found that drug choice problem is the most common DRP among the patients and also they found that the DRP is mostly related to anti diabetic drugs. [3]

The incidence rate of DRP was found in between 50-59 years of age patients. As per the article by these people DRP can occur at any stage of or any phase of medicine use; starting from medicine prescribing stage to dispensing stage.

Also improper history collection or lack of follow up details also leads to DRP. These people were used the PCNE guidelines to identification and classification of the DRP.

They've done a prospective interventional study and it was conducted in a multi-speciality hospital, South India over a six month period of time. Also they found the association between the factors and the occurrence of DRPs using chi-square method or Pearson's correlation test and followed by an odds ratio to measure the correlation.

A total number of 137 subjects participated in their study and among these subjects mostly they are suffering with cardiovascular diseases and endocrinological disorders.

Out of 137 patients 66 patients were found to have DRPs and a total of 84 types of DRPs were found and they classified the

DRPs according to PCNE guidelines. The patients suffered from DRPs mostly due to anti-diabetic drugs followed by cardiovascular agents and anticogulants. In this study they identified various factors that related with drug related problems. It include age, gender, length of hospital stay,number of drugs prescribed and social habits.[3]

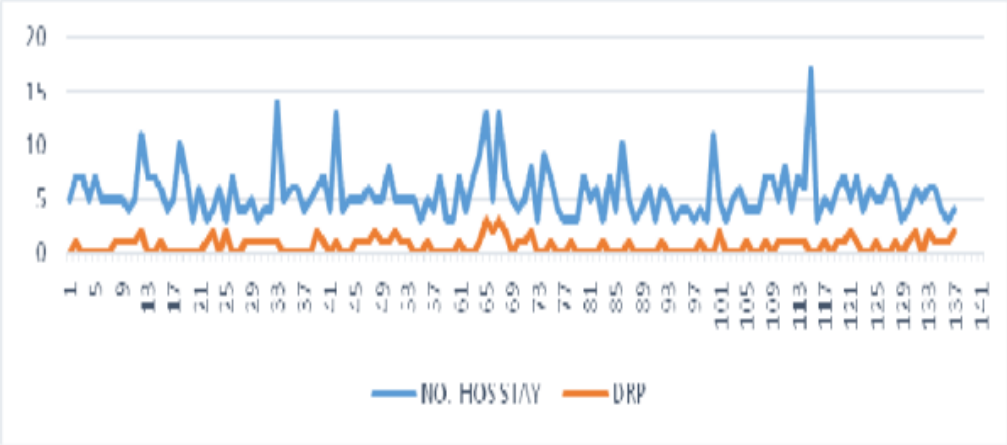

Figure No: 2 Correlation between length of hospital stay and incidence of DRPs- Adapted from reference No: 3

The study subjects had shown a great variability in DRPs while staying at the hospital. Also some social habits directly linked with DRPs including alcohol consumption, smoking and tobacco and betel nut chewing. Also found causes of each DRP and they identified according to PCNE guidelines. The major drug related problem found was choice of drug selection followed by improper information channelling. In this study they put forward some intervention in each level including patient level and prescriber level.

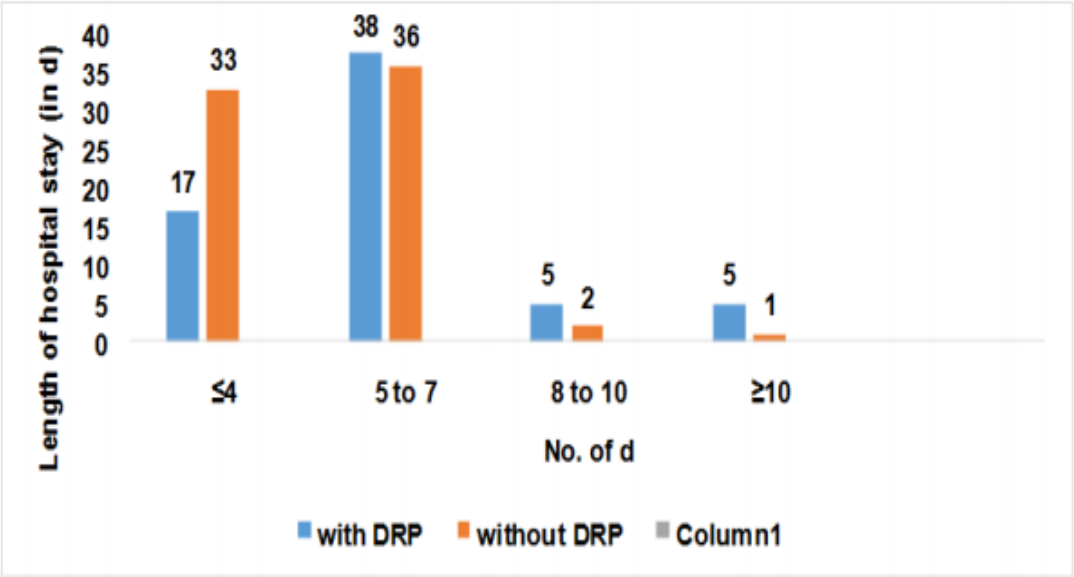

Figure No: 3- DRP and hospital stay- Adapted from reference No: 3

In their studies the result shows male predominance than female dominance. it may be due to the social habits including alcohol consumption, smoking and betel nut chewing etc. and they conclude the study by telling that the most common DRP found

was drug choice problem followed by adverse drug reaction and also they found that incidence of DRP increases according to increase in the length of hospital stay and number of prescribed medicine.

We found many geriatric patients are suffering from drug related problems nowadays and we need more pharmacist intervention to prevent these DRP

Influence of pharmacist intervention on drug safety of geriatric inpatients: a Prospective, controlled trial is a study conducted by Angela Nachtigall, Hans J. Heppner and Petra A. Thürmann. [4]

In their study they are telling that polypharmacy is associated with drug related problems and increased disease rate in geriatric patients.

The objective of their study is to reduce the incidence of the drug related problems by the influence of pharmacist intervention and to measure its rate.

It's a prospective randomized controlled design and it was conducted in geriatric department of teaching hospital in Germany. They've done a study over a period of 1 year. They included patients of a minimum age of 70 and all gender included. In most of the industrialized countries elder people represents the growing part of the population. Due to the physiological changes most of the drugs leads to side effects in elder population compared to younger generation.

According to this study poly-pharmacy is Poly-pharmacy is frequently and conveniently defined as the intake of five or more drugs per day on a regular basis however, the uncontrolled use of many drugs without appropriate monitoring may also be understood as poly-pharmacy. Polypharmacy associated with drug-drug interaction, a risk for potentially inappropriate medication, adverse drug reaction, drug omission and increased disease rate and last death rate.

They've used different tools and intervention to reduce the poly-pharmacy condition. The objective of their study was to reduce DRPs in older inpatients by a structured pharmacist's intervention and to measure the acceptance rate of the pharmacist's suggestions. Study followed an open, prospective, quasi randomized design and it was conducted in a teaching hospital, Germany.

They selected all kind of patients with a minimum age of 70 years and who were taking a minimum of 5 drugs in a day and they excluded terminally ill patients and patients with cognitive impairment. They informed the inpatients regarding their study. The research group divided the inpatients into intervention group and controlled group and the administration of medication was done in the presence of a pharmacist.

Results of medicine analysis were documented. In this study they used Narenjo algorithm. After the medication analysis they made recommendations to physicians who were treating the intervention group. The recommendations were classified using the 'pharmacotherapy problem categories' according to Hoth et al.

For the study, they recruited 411 inpatients and the pharmacist detected 1657 pharmaceutical problem in the medication of the intervention group. In this 94 problems and its recommendation cannot be discussed due to early discharge.

Most recommendation proposed to diuretics (9.5), analgesics (7.6%), antithrombotic drugs (7.5%) and antacid drugs, usually proton-pump inhibitors (7.4%). 25% of recommendations were given for pantoprazole, metoprolol, metamizole which are available in Germany, furosemide/torasemide, ramipril and simvastatin. Pharmaceutical recommendations were given to 243 different drugs and in these37% of pharmacist's recommendation received a high priority, 55% moderate und 8%low priority. The common reasons for a pharmaceutical recommendation were monitoring of side effects and toxicity (28.6%), drug prescribed without indication (18.1%) and DDI (10.4%).

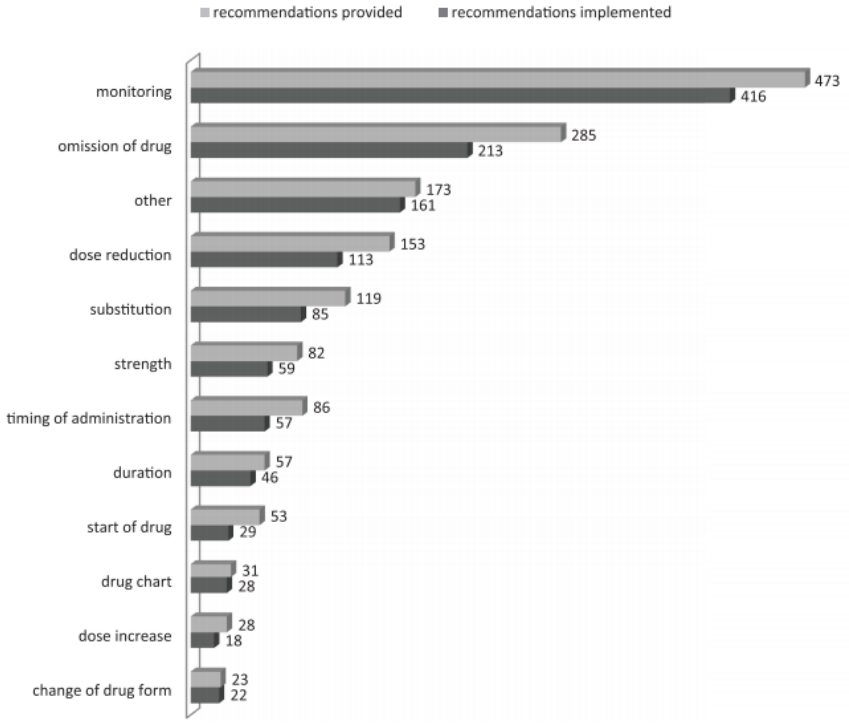

Figure No: 4- Type of pharmaceutical recommendation according to Hoth et al. and rate of acceptance- Adapted from reference No: 4

In this study they had shown the influence of pharmacist intervention in geriatric population to decrease the drug related problems. Also they were discussing their limits in this study including, the study was only quasi-randomised study so there is a chance of allocation bias in the study. Next they initiated a change in the medicine without follow up details.

According to a research article, Development of a pharmaceutical care program in progressive stages in geriatric institutions by Conxita Mestres, Marta Hernandez, Anna Agustí, Laura Puerta, Blanca Llagostera and Patricia Amorós [5], they introduce and develops pharmaceutical programme in order to reduce the DRPs in older patients.

In this a long-term and sub-acute care hospitals (HSS) and Health care teams attending nursing homes (EARs) were used. Participants include patients attended in HSS and EARs during different periods between 2010 and 2016.

So many programmes were implemented and have been on-going for several decades. These programmes mainly aiming in the reduction of drug related problems in older people and the morbidity and mortality. The implementation of these pharmacy care programmes is an important challenge to pharmacy services because of the complexity of the institution and elder people with polypharmacy and minimum budget or staff.

They conducted a study in which retrospective-description of the implementation of pharmaceutical care activities in increasing complexity stages. And they mainly focused in pharmacist's interventions to improve the quality of prescriptions, from 2010 till 2017.

Group Mutuam carried out their activities of pharmaceutical care in 2010 and it directed to reducing the prescription of inadequate medicine in geriatric people according to Beer's criteria. And a total of 854 subjects were included in the study. It considered as an important step and in their study they concluded that choosing a step wise process is very useful in case of pharmaceutical programme of elderly patients.[5]

Figure No: 5 -The main step of pharmaceutical care programme development- Adapted from reference No: 5

Drug related problems in admitted geriatric patients: the impact of clinical pharmacist interventions- a research article by Berhane Yohannes Hailu and team.[6]

In this article they are discussing about the impact of clinical pharmacist in managing the DRPs in older patients. They also discussing the same opinion that these elder people or geriatric people will have co morbidities as well as they are under poly pharmacy and it may lead to different types of drug related problems. So these patients often excluded from premarketing clinical trial due to greater chance of occurrence of drug related problems.

They've conducted a prospective interventional study and conducted among geriatric patients admitted in the medical and surgical wards of Jimma University Medical Center from April to July 2017. And they conducted the study such a way that clinical pharmacist reviewed the patient drug therapy or prescription and identified the DRP and provide the intervention then.

A total of 200 patients were included as subjects in this study. The mean age of the subjects taken as 67.3 years. And in this a total 380 DRP were found.

Some of the causes of DRPs in patients admitted in the hospital are:

Drug selection causes include new indications for the drug, no indication for the drug, inappropriate drug selection and drug from cause include in appropriate drug form, patient uses unnecessary drug and some times patients cannot afford the drug.

The most occurred DRP found was effect of drug gtreatment not optimal followed by untreated indication and no effect of drug treatment. After the identification and classification of the DRPs interventions were given by the clinical pharmacist. The intervention provided at the prescriber level, patientr level or caregiver level. They are telling that polypharmacy is the main cause of drug related problems. The polypharmacy and drug related problem association due to increased health care cost for the multiple medication, drug interaction and non adherance to medicine.[6]

According to Pharmacist involvement to decrease drug-related problems among geriatric patients in indonesian primary health centers by Desi suryani, Anton bahtiar, Retnosari andrajati [7] also discussing the same matters as mentioned above. They've used PCNEv6.2 for the classification of DRP and the drug therapy can effectively improve quality of life and treat, prevent, or alleviate the symptoms of a disease, but undesirable reactions and DRPs are common in geriatrics. This is due to the fact that geriatrics often has multiple comorbidities and are therefore prescribed many medications. Pharmacist's involvement is important in improving the ability of prescriber's to prevent, identify and resolve the drug related problem. In this study they found that the most common drug related problem was inappropriate drug selection. Also they were telling that pharmacist involvement decreases the drug related problem in geriatric patients. When a pharmacist identifies the DRPs it helps the physician to resolve problem therefore to reduce the DRP in geriatric patients. The DRPs classification system helpful in documenting the DRPs among the geriatric patients and it helps the pharmacist to plan and reduce the DRP.

An article which tells about Methods to reduce prescribing errors in elderly patients with multimorbidity, they are

discussing about different methods to reduce the prescribing errors. In their study they are telling

According to the UN, an "older person" is 60 years or older, with persons aged 80 years being referred to as the "oldest old".

Classification of prescription errors include omission error, commission error, dosing error, frequency error, form error, substitution error and duplication error. Prescribing errors are common in geriatric patients with multiple diseases and polypharmacy, leading to adverse drug reaction and events that in turn cause higher levels of morbidity, rehospitalization, and disease rate. Screening for and detection of prescribing errors is a growing challenge facing healthcare professionals who deal with older multimorbid people who experience polypharmacy. [8]

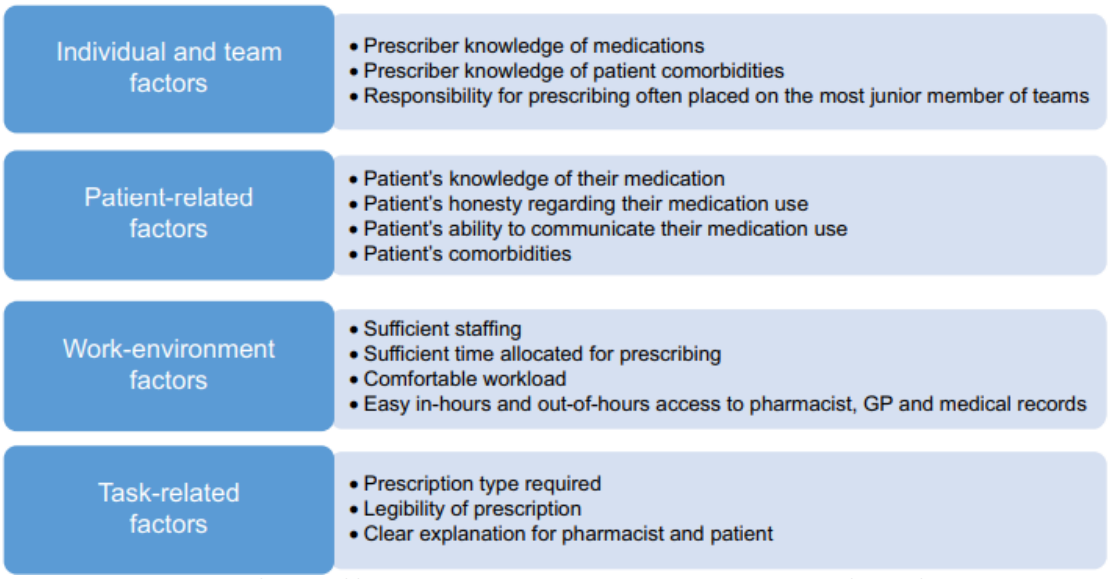

Figure No: 6- Classification of factors that predispose to prescribing errors-Adapted from reference No: 8

Assessment of Medication-Related Problems in Geriatric Patients of a Rural Tertiary Care Hospital by Ramanath KV, Nedumballi S is an article which discuss about medication problem facing by the geriatric patients due to their altered physiological changes. It is a prospective observational study conducted in medicine department. Out of 163 patients, 77.9% were in the age group of 60–70 years and 3.1% were in the age group of 80–90, among77.9% outpatients were 86.9%, more when compared to inpatients 68.4%. In this study they also lists some social habits that associates with the DRPs including alcohol consumption, smoking etc.[9]

In their study, they concluded that older population who have multimorbidity that leads to prescribe more medicines by the physicians, which may be responsible for polypharmacy (45.4%). Current prescribing practices of this geriatric population also showed an inappropriate medication, increasing drug interactions, the complicated medication regimens, and an inability to recall the drug dosage regimen, lack of patient education about their medication, poverty, etc. were the risk factors for DRP/non-adherance. This study suggested that there are more existences of DRP (83.4%) in geriatrics. Hence, this study clearly showed that pharmaceutical care is very much important for geriatric population of rural population.

In the article, Identification of drug-related problems of elderly patients discharged from hospital it discuss about drug related problem following hospital discharge cases among the elderly people suffering from multiple diseases and polypharmacy. They've done an observational study among 340 people with

an age limit of patient of above age of 60 years and having a polypharmacy record. In those patients they identified 992 potential DRPs include drug was not prescribed for a clear indication and improper drug selection.[10]

Drug-related problems in hospitalized patients on polypharmacy: the influence of age and gender is an article which describes about drug related problems in hospitalized patients. In this study Yvonne Koh, Fatimah Bte Moideen Kutty and Shu Chuen Li investigated the occurrence of DRPs and adverse drug reaction. They conducted a retrospective cross sectional study. Mann-Whitney test was used to test for significant difference between the age and gender of patients and their risk of acquiring DRPs. [11]

CONCLUSION

A Drug-Related Problem is an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes. Nowadays geriatric patients are may be at high risk of DRPs due to polypharmacy and altered physiology or due to older patients cannot manage their medication. Drug related problems may occur all stages of medication process starting from prescribing stages to dispensing stage. Lack of follow ups and reassessments of medical treatment also contribute to DRPs. Older adults represent a growing part of the population in most of the industrialized countries and suffer frequently from multiple illness and resulting polypharmacy.

Pharmaceutical care implemented in different stages of healthcare. Pharmaceutical care is a co-operative activity between healthcare professionals provided directly to patients and adds to the effectiveness of improving the quality of patient care.

Pharmaceutical care identifies and resolves actual or potential DRPs. Pharmacist intervention will decrease the incidence rate of drug related problems. Many of the research studies were used Pharmaceutical Care Network Europe (PCNE), Hepler and strand classification etc.

Incidence of DRP increased by number of prescribed medicines and length of hospital admission days. All the articles discuses about various drug related problems suffering by the geriatric population. The most common medication related problem includes improper drug selection, adverse drug reaction etc. and polypharmacy is one of the main factor associated with drug related problem in geriatric patients. Most article points that polypharmacy and multimorbidity condition in geriatric population leads to DRPs in both ambulatory patients as well as hospitalized patients. The impact of pharmacist care or their influence will helpful in reducing the drug related problems or it helps the physician to identify and resolve the problem.

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REFERENCES

1. Courtman BJ, Stallings SB. Characterization of drug-related problems in elderly patients on admission to a medical ward. The Canadian journal of hospital pharmacy. 1995 Jun 29;48(3).
2. Adepu R, Adusumilli PK. Assessment of Drug related problems in patients with chronic diseases through Health Status Survey in a South Indian Rural Community setting. Indian Journal of Pharmaceutical Sciences. 2016 Jul 2;78(4):537-41.
3. WINCENT MM, Potrilingam D, Anagha V, JACOB SC, Andhuvan G. Assessment of drug related problems in patients with chronic diseases in the general medicine units of a tertiary care hospital. Age. 2017;54:39.
4. Nachtigall A, Heppner HJ, Thürmann PA. Influence of pharmacist intervention on drug safety of geriatric inpatients: a prospective, controlled trial. Therapeutic

advances in drug safety. 2019 Apr; 10:2042098619843365.
5. Mestres C, Hernandez M, Agustí A, Puerta L, Llagostera B, Amorós P. Development of a pharmaceutical care program in progressive stages in geriatric institutions. BMC geriatrics. 2018 Dec 1;18(1):316.
6. Hailu BY, Berhe DF, Gudina EK, Gidey K, Getachew M. Drug related problems in admitted geriatric patients: the impact of clinical pharmacist interventions. BMC geriatrics. 2020 Dec;20(1):1-8.
7. Suryani D, Bahtiar A, Andrajati R. Pharmacist involvement to decrease drug-related problems among geriatric patients in indonesian primary health centers. Asian Journal of Pharmaceutical and Clinical Research. 2017 Oct 1;10(Special Issue October):102-7.
8. Lavan AH, Gallagher PF, O'Mahony D. Methods to reduce prescribing errors in elderly patients with multimorbidity. Clinical interventions in aging. 2016;11:857.
9. Ramanath KV, Nedumballi S. Assessment of Medication-Related Problems in Geriatrie Patients of a Rural Tertiary Care Hospital. Journal of Young Pharmacists. 2012 Oct 1;4(4):273-8.
10. Ahmad A, Mast MR, Nijpels G, Elders PJ, Dekker JM, Hugtenburg JG. Identification of drug-related problems of elderly patients discharged from hospital. Patient preference and adherence. 2014;8:155.
11. Koh Y, Kutty FB, Li SC. Drug-related problems in hospitalized patients on polypharmacy: the influence of age and gender. Therapeutics and clinical risk management. 2005 Mar;1(1):39.

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