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Assessment of Clinical Pharmacist Intervention in Drug Therapy in Patients with Diabetes Mellitus in a Tertiary Care Hospital in Calicut

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ABSTRACT

Objective: To study the various reactive interventions made by a clinical pharmacist in a tertiary care hospital and to identify and categorize the different drug-related problems (DRPs) among diabetes mellitus inpatients. **Method:** Study followed a prospective interventional study pattern and data was collected from patient's case sheets, case records, medication charts, laboratory reports, medication history interviews etc., during participation in ward rounds and screened for any drug-related problems and classification of drug related problems were done on the basis of Pharmaceutical Care Network Europe classification. The duration of the study was 6 months from October 2016 to March 2017. **Results:** A total of 267 diabetic cases were observed during the course of the study from which 43 interventions had been found out. Out of 43 interventions, 29 were accepted and 14 were not accepted by the physician in charges. **Conclusion:** The study mostly justifies the role of clinical pharmacist services in patient's care can significantly help in identifying, resolving and preventing the DRPs in the hospital thereby enhancing better patient outcomes.

INTRODUCTION

Intervention is defined as step taken by pharmacist to optimize therapeutic management in order to enhance the quality of patient care[1].Diabetes mellitus (DM)is a chronic progressive metabolic disorder characterized by hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from absolute (Type 1 DM) or relative (Type 2 DM) deficiency of insulin hormone or both[2]. Uncontrolled glucose levels result in the development of acute and chronic complications and are associated with disease progression, hospitalization, premature disability and mortality [3]. Comprehensive diabetes care is an extremely complex task that takes an entire team of healthcare professionals to work together to provide optimal, multidisciplinary care for patients. The essential element in the management of diabetes mellitus includes therapeutic management, self-care management, and patient adherence to the prescribed medication and lifestyle modifications [4].

Morbidity due to diabetes is sometimes severe and includes diabetic nephropathy, the leading cause of blindness in people between 20 and 74 years of age, diabetic nephropathy, the leading cause of dialysis for end stage renal disease, and others[5]. The prevalence of diabetes for all age groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030. The total number of people with diabetes is projected to rise from 171 million in 2000 and 269 million in 2030[6].

Studies show, that clinical pharmacist with excellent and dynamic background on disease states and therapeutic knowledge on drugs including pharmacokinetic and pharmacodynamic characteristics of medications such as dosing, interactions, indications, characteristics of medications, such as dosing, interactions, indications, side effects and alternatives based on the patient's situation can crucial role in pharmacotherapeutic management[7].

The objective of the study was to determine the various reactive interventions made by clinical pharmacists in a tertiary care hospital and to identify and categorize the different drug related problems (DRPs) among the diabetes mellitus inpatients.

MATERIALS AND METHODS

This prospective interventional study was carried out for 6 months from November 2021 to March 2022in the diabetes patientsin the wards of PVS Hospital (P) LTD, a 350-bedded multispecialty tertiary care hospital in Calicut, Kerala.

Data was collected from the patient case sheets, case records, medication charts, laboratory reports, medication history interviews etc., and the patients undergoing treatment for less than one day in hospital were excluded.

The drug related problems identified were classified based on Pharmaceutical Care Network European Classification and was notified to the physician and discussed with the physician for the most suitable suggestion. Further the optimal interventions for the drug-related problems were given to the physician in charge. Relevant evidences for the intervention was produced along with the intervention. Physician acceptance was recorded and documented appropriately. The severity of drug-related problems was analyzed based on three criteria: minor, moderate and major [8].

- Minor: Problems requiring small adjustments and optimization to therapy, which are not expected to significantly alter hospital stay, resource utilization or clinical outcome.
- Moderate: Problems requiring adjustments, which are expected to enhance effectiveness of drug therapy producing minor reductions in patient morbidity.
- Major: Problems requiring intervention, expected to prevent or address very serious drug-related problems, with a minimum estimated effect on reducing hospital stay less than 24 hours.

The study was conducted after the approval of the Institutional Ethics Committee P.V.S Hospital (P) LTD, Calicut, Kerala. The study results were interpreted descriptively.

RESULTS

The various drug-related problems (DRPs) were encountered during the routine case sheet review and on the basis of that appropriate recommendations were made to the medical professionals.

A total of 267 diabetic cases were observed during the study from which 43 drug related problems were found.

Out of 43 interventions made from the DRPs, 29 were accepted and 14 were not accepted as those interventions needed furthermore clarifications or were controversial.

Demographic characteristics

Among the 43 cases it was found that 67.44% of the drug-related problems were in the age group above 60 years followed by 30.23% in age group between 30-60 years. The demographic details of the patient are summarized in table 1.

Table 1: Demographic characteristics of the patients with DRP

Parameters	**Characteristics**	**Numbers and Percentages**
Gender	Male	19 (44.18%)
	Female	24 (55.8%)
Age (in years)	< 30	1 (2.32%)
	30-60	13 (30.23%)
	>60	29 (67.44%)

The interventions related to polypharmacy was found to be 88.3% in the case of patients provided with more than or equal to 4 drugs, whereas 11.62% of the patients received less than 4 drugs. The occurrence of DRPs were low in patients prescribed with less than <4 drugs compared to patients prescribed ≥4 drugs. As the number of drugs prescribed to a patient increase, the chances of adverse drug reactions and medication-related errors increases. Table 2 represents the effect of polypharmacy on DRPs.

Table 2: The effect of polypharmacy

No. of drugs	**DRPs**	**No of DRPs**	**Percentage**	**Total DRPs (%)**
<4	ADR	3	6.9%	5 (11.62%)
	Medication error	2	4.65%	
	Untreated indication	-	-	
	Therapeutic drug duplication	-	-	
≥4	ADR	24	55.8%	38 (88.37%)
	Medication error	8	18.6%	
	Untreated indication	4	9.3%	
	Therapeutic drug duplication	2	4.6%	

Comorbidities

Among the 43 cases with DRPs 26 patients had comorbidities. Hypertension (37.2%) was the most common observed comorbidity, followed by hypertension with cardiovascular disease (13.9%) and hypertension with chronic kidney disease (9.3%). Comorbidity-wise distribution is shown in table 3.

Table 3: Comorbidity-wise distribution of the patients

Comorbidity	Numbers and percentages
Hypertension	16 (37.2%)
Hypertension with Cardiovascular disease	6 (13.9%)
Hypertension with Chronic kidney disease	4 (9.3%)

Types of drug-related problems observed

The most common drug-related problem was adverse drug reaction which accounted for 62.50%, followed by medication errors 23.2%, untreated indication 9.3%and finally therapeutic drug duplications comprised of 4.6%. DRPs based on Pharmaceutical Care European Network Foundation (PCNE) V6 classification are shown in figure 1.

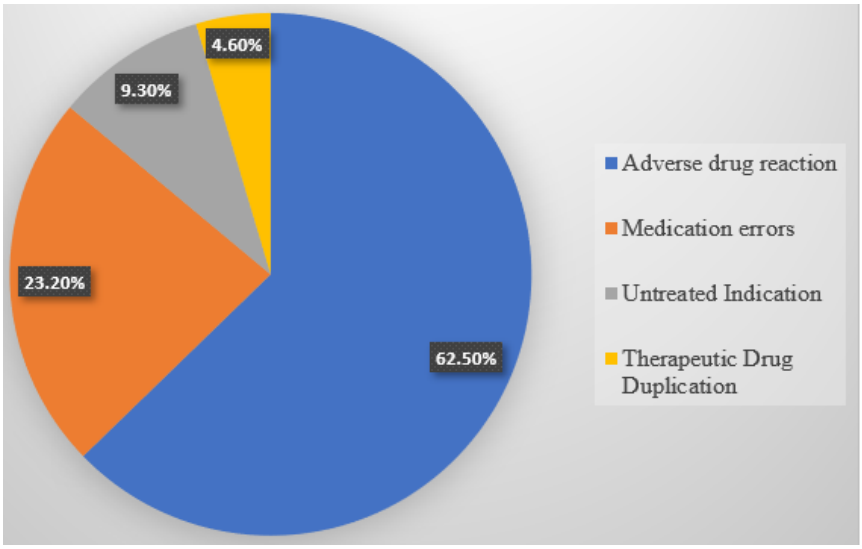

Figure 1: Types of drug-related problems as per as PCNE V6 classification

The severity of drug-related problems

Out of 43 reactive interventions 67% were minor, 26% moderate and 7% were major. The level of significance of DRPs is shown in figure 2.

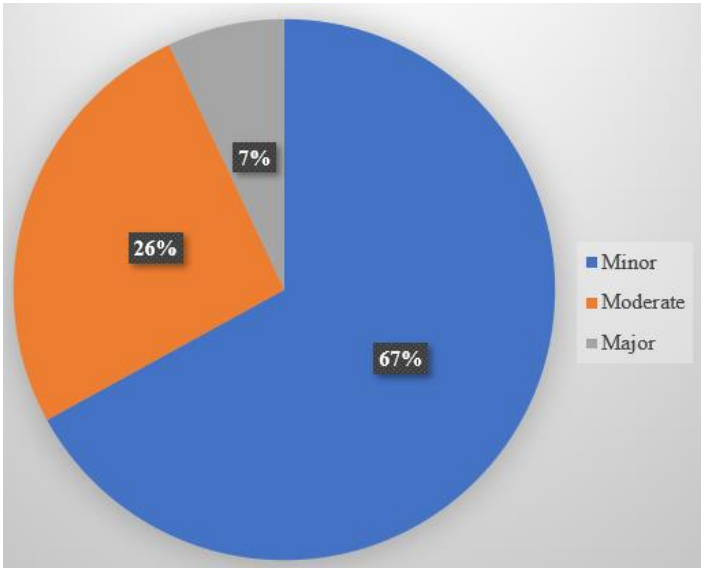

Figure 2: Significance of level of drug-related problems

Intervention Recommendation

The most frequent recommendation provided by the clinical pharmacist was drug discontinuation 46.51% (n=20), followed by drug addition20.90% (n=9), drug discontinued with drug change/symptomatic management 13.9% (n=6), dose change 6.97% (n=3), change of frequency 4.65% (n=2) and other interventions such as changes made inpatient laboratory investigation reports, 2.32% (n=1),clinical monitoring parameters 2.32% (n=1) and prescription errors 2.32% (n=1). The result of the intervention recommendation is shown figure 3.

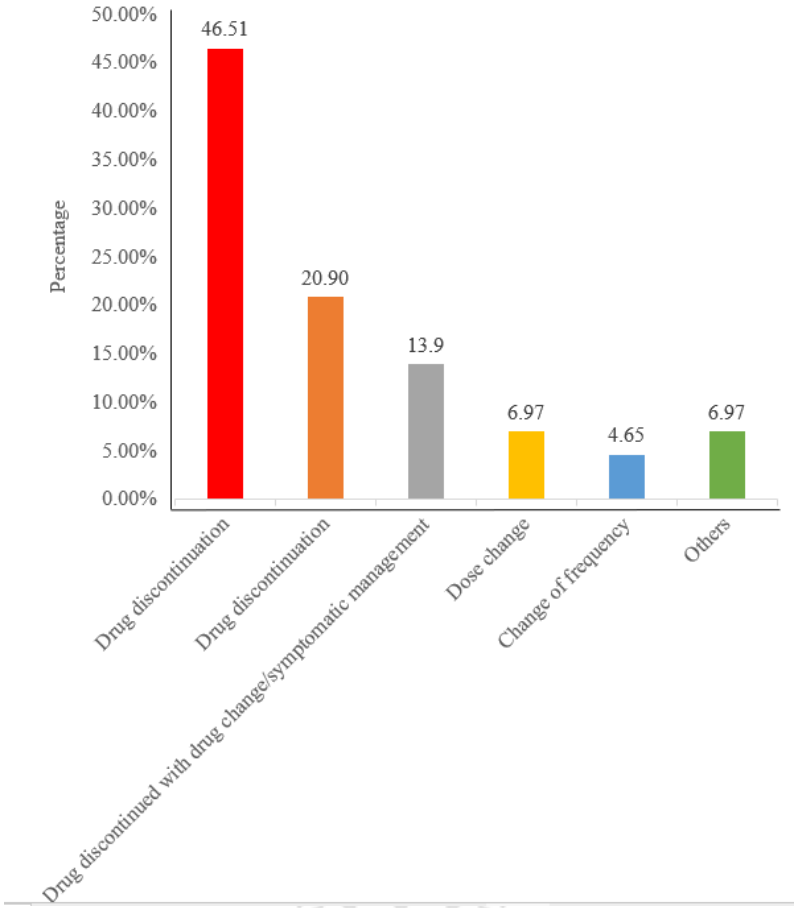

Figure 3: Intervention recommendation by the pharmacist.

Acceptance of interventions

The acceptance rate of clinical pharmacist recommendations and was found to be high (n=29) 67.4%. However, 32.5% of recommendations provided by the clinical pharmacist was not accepted and the therapy was not changed. This may be because the suggestion might be insignificant or the physician denied changing the prescription immediately without close monitoring. The result of the clinical pharmacist recommendation is shown in table 6.

Table 4: Reason of non-acceptance of interventions

Reasons for non-acceptance	Numbers (%)
Intervention insignificant	6 (13.9%)
Interventions need close monitoring	8 (18.6%)

Impact of clinical pharmacist intervention

A follow up was carried out in order to study the impact and it was found that out of 29 accepted interventions complete recovery occurred in 10 cases and in the remaining the patient condition was improved. The impact rate in the case of patients completely recovered was found to be 34.48% and in patients whose condition improved was found to be 65%.

Table 5: Impact of clinical interventions

Impact of interventions	Number	Percentage
Patient completely recovered	10	34.48%
Patient condition improved	19	65%

DISCUSSION

The occurrence of drug related problems in female patients (55.8%) are more than in male patients (44.18%). These observations are similar to the study conducted by Muhammad Umair Khan *et. al.*,[9] which showed drug-related problems (DRPs) to be about 55.44%.

Majority of the drug related problems occurred in patients with age group of above 60 years. It was observed in the study that more drug related problems were seen in the geriatric population than in other age groups. These findings were similar to the result of studies conducted by Mahesh Kumar S *et. al.*,[10]. The present study found that the incidence of drug related problems to be higher among patients who are receiving multiple drug therapy or polypharmacy. These findings were similar to the result of studies conducted by Satish Kumar B.P *et. al.*,[8].

From table-2 it is evident that occurrence of DRPs increases with number of drugs**.** For <4 drugs 11.62% of DRPs occurred and for ≥4 drugs 88.37% of DRPs were found. These findings were similar to the study conducted by Rijo Mary George *et. al.*, [10].

Hypertension was the most common co-existing condition in about 37.2% of diabetic patients. Among the group of hypertensive diabetics were 13.9% cases of cardiovascular

disease. The occurrence of chronic kidney disease as comorbidity was found to be 9.3%. These findings were similar to results of the studies conducted by Ogbonna B.O *et. al.*,[11].

The most common types of drug related problem was adverse drug reaction 62.5% (n=27). This observation is similar to the results of the study conducted by Muhammed Umair Khan *et. al.*,[9].

Medication error was the second common cause of drug related problems and this finding coincides with the study conducted by Ogbonna B.O *et. al.*, [12].

In our study, untreated indication accounted for third cause of drug-related problems. The present study is similar to the results of study conducted by Bhupathy Alagiriswami*et. al.*, [13]. Few examples of untreated indication were identified in the study where no drug was administered for the patient in the case of anemia, hyponatremia and diabetes. In this study, it accounted for about 7% of the study.

In our study, a total of 5% of therapeutic drug duplications was found as another drug related problem. The present study is similar to the results of study conducted by Bhupathy Alagiriswami *et. al.*,[13].

In this study, out of 43 drug related problems (67%) were rated to be minor, (26%) were moderate and (7%) were rated as the significance level of DRPs. This result was similar to the study conducted by Sathish Kumar BP *et. al.*,[8].

On the basis of the study it was found out that the most frequent intervention provided by the clinical pharmacist was drug discontinuation 46.5%, followed by drug addition 20.90%, drug discontinuation with drug change/Symptomatic management 13.90%, dose change 6.97%, changes made on patient laboratory investigation reports, clinical monitoring parameters and prescription errors 6.97% and change of frequency 4.65%. These findings of the study were similar to Rijo Mary George *et. al.*,[11].

Acceptance rate for clinical intervention recommendation were found to be higher (67.4%) than that of intervention not accepted due to the insignificance of interventions (13.9%), and intervention that needs close monitoring (18.6%) These findings were similar to the result of the study conducted by Sathish Kumar BP *et. al.*,[8].

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CONCLUSION

Diabetes mellitus is a major healthcare condition that affects the majority of people worldwide. So DRPs associated with diabetes mellitus is a vital factor that affects the health-related quality of life worldwide. The study mostly justifies the role of clinical pharmacist services in patient care can significantly help in identifying, resolving and preventing the DRPs in the hospital thereby enhancing the patient outcomes. Furthermore, the collaboration between others and healthcare professionals and pharmacists can provide better health-related quality of life to the patient. The study vitalizes the role of clinical pharmacists in the health-related quality of life of patients.

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