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OPTIMIZING PATIENT CARE FOR DIABETES AND HYPERTENSION: THE ROLE OF CLINICAL PHARMACY MEDIATED COUNSELLING IN ENHANCING KNOWLEDGE, ATTITUDE, PRACTICE, AND MEDICATION ADHERENCE

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ABSTRACT:

Pharmacist play a pivotal role in offering counselling service to patient with chronic diseases. The objective is to enhance understanding of patient's condition and manage that by promoting adherence of prescribed medications. A prospective interventional study was conducted in a multi-centric tertiary care hospital in south Gujarat from November 2021 to April 2022 with the purpose of evaluating the effectiveness of clinical pharmacy-mediated patient counselling for people with diabetes and hypertension. A total of 107 patients were participated in this study, and their Knowledge, Attitude, and Practice (KAP) were evaluated using KAP survey Questionnaires. Medication Adherence was also assessed using Morisky Medication Adherence Scale (MMAS-4).The results of this study revealed a significant improvement in patient's Knowledge, Attitude, and Practice after receiving counselling. Furthermore, there was a remarkable improvement in Medication Adherence levels. This intervention led to significant improvements in Blood Sugar and Blood Pressure levels.This study exhibits the substantial impact of clinical pharmacist-mediated counselling service on patient's Knowledge, Attitude, and Practice and Medication Adherence in patients having Diabetes with Hypertension. The findings strongly support the incorporation of pharmacist led counselling service into healthcare strategies to achieve definite and improved outcomes in various clinical settings

Keywords: Knowledge, Attitude, Practice, Patient counselling, Medication Adherence, Diabetes, Hypertension

1. INTRODUCTION

The leading causes of mortality and morbidity globally continue to be chronic diseases like diabetes and hypertension, which can lead to life-threatening consequences such as stroke, heart attack, heart failure, renal impairment, and eyesight loss [1]. An astounding 72.96 million cases of diabetes are thought to affect India's adult population. Additionally, diabetes is thought to increase the likelihood of hypertension, with a prevalence that ranges from 40% to 80%. Notably, diabetic people are more likely to develop hypertension, increasing their risk of cardiovascular events considerably [2][3]. This risk is particularly significant because, in addition to having high blood pressure, almost two-thirds of persons with diabetes suffers hypertension too, which puts them at twice the risk of developing heart disease compared to individuals who are dealing solely with high blood pressure [4]. Type 2 diabetes mellitus affect nearly around 90-95% of people with diabetes which is linked to various risk factors such as Family history of (DM), Age, and Obesity, Sedentary lifestyle and race or ethnicity [5]. Although the majority of occurrence of hypertension have no known cause, but individuals with type 1 and type 2 diabetes mellitus both are more prone to develop it [6]. There are

different causes for this connection depending upon a type of diabetes [6]. The co-occurrence of hypertension in diabetic patients complicates treatment strategies, increases healthcare expenses, and significantly raises the risk of macro- and micro-vascular problems [7]. Clinical Pharmacist mediated counselling services plays a crucial role to address these problems and enhance health related outcomes [8]. Frequent communication with patients, whether verbal or nonverbal, can enhance medication adherence and prevent drug-related problems, thereby positively impacting economic, clinical, and humanistic aspects of patient care [9]. It is the duty of clinical pharmacists to consistently provide patients with information about their medications, educate them about adherence, and stress the importance of proper medicine intake [10]. By doing so, the incidence of drug-related problems, such as adverse effects, side effects, drug-drug interactions, and inaccuracies in medication use, can be reduced, ultimately leading to an improvement in the patient's quality of life [11][12].
In light of the factors mentioned above, this study aims to increase understanding of chronic diseases and, through patient counselling which provides crucial information for preventing disease development and encouraging adherence to medications.

2. MATERIALS AND METHOD

1.1 Study design

A prospective pre-post interventional study was conducted over a period of six months in two multispecialty hospital after getting approval of Human Research Ethics committee before conducting trial. Informed consent were also obtain from patients
In this study patients having diabetes with hypertension as a comorbidity of both gender above the age of 18 years were included after signing an informed consent form with willingness. Pregnant and Lactating women, patients with liver disease, and Psychiatric illness were excluded in this study.

1.2 Data collection

A validated case report form was used to collect required data such as demographic details, BMI, Patients history like diagnosis year of Patient, past medical history, past medication history, Family history and social history. Objective evidence such as random blood glucose, Fasting blood glucose, post prandial blood glucose with their ongoing treatment regimen were recorded In the case report form too.

1.3 Questionnaire

A Knowledge, Attitude and Practice (KAP) questionnaire was used to evaluate the level of awareness of the study participants related to disease and its management. The questionnaire contains 25 questions in which 14 questions regarding knowledge, 5 questions regarding attitudes, and rest 6 questions regarding practices. The KAP survey was conducted at interval of 1 month for 3 months. Using Morisky medication adherence survey – 4 questionnaire medication adherence was evaluated. This questionnaire are comprised of 4 questions, each aiming different aspects of adherence such as compliance of patient to treatment, forgetfulness about taking medicines, to stop medicine when they feels better, and to stop medicines when they feel worst by taking that. For each questions, score was given 0 for choosing “yes” and 1 for “no”. A higher total score, ranging from 0 to 4, which indicates higher adherence to poor adherence level. Conversely, a score of 0 indicates good compliance with respective treatment.

1.4 Patient Counselling

Patient counselling sessions were conducted in the regional language at 1 month of intervals over a period of 3 months after obtaining informed consent. During these sessions, the clinical pharmacist provided counselling on various aspects regarding management of diabetes and hypertension, including life style modifications (e.g., smoking cessation, exercise), dietary recommendations, foot care, general pathophysiology of disease and its complications. The above mentioned measures were taken for blood glucose control and blood pressure control. After providing baseline counselling, a printed leaflet related to disease and its management was given to patients in a local language (Hindi and Gujarati).

1.5 Statistical analysis

Data were analysed using Graphpad Prism 9 software. Descriptive statistics such as mean, percentage, standard deviation was computed. The paired T test was used to determine the significance level of data, with a p-value of ≤0.05 considered statistically significant. A paired t-test with 95% confidence interval was used to compare baseline follow-up to 1st and second follow-ups, and also the first to second follow-ups.

2. RESULTS

Table: 1: Demographics details of the patients

Demographic detail	No. of patients	Percentage (%)
AGE 18-30	0	0
30-60	57	53.27
>60	50	46.72
GENDER	50	46.72
Female Male	57	53.27
INCOME 10-25k	57	53.27
25-50k	37	34.57
>50k	13	12.14
EDUCATION Illiterate	4	3.73

Literate	103	96.27
BMI <18.5 18.5-24.9 25-29.9 ≥30	 1 28 53 26	 0.93 26.16 49.53 24.29
SMOKING HABIT Smokers Non-smokers	16 91	14.95 85.03
ALCOHOL HABIT Alcoholic Non-alcoholic	32 75	29.90 70.1
FOOD HABIT Veg Non- veg	65 42	60.74 39.25
FAMILY HISTORY Positive Fhx NOT	81 26	75.71 24.29

In this study, a total of 107 patients were recruited based on particular inclusion and exclusion criteria. The majority of study participants were between the ages of 30 to 60, while the remaining patients were aged more than 60. There were 50 (46.72%) were female and 57 (53.27%) were male. Men were found to be more with diabetes and hypertension than women. By looking at patient's socioeconomic status, 57 (53.27%) patients belonged to middle class with the salary of less than 25k. The educational background of patients reveals that majority of them were literate, with 3.73% were illiterate. In context of social habits, 15% of patients were found to be smoker while 85% were non-smokers. Moreover 30% of patients were alcoholic while remaining 70% were non-alcoholic.

When the patients' Body Mass Index (BMI) was assessed in accordance with WHO classifications, the majority (49%, n=53) were found to be overweight, followed by 26% (n=28) who had a normal BMI, 24% (n=26) who were found to be obese, and only 1% (n=1) who were found to be underweight. Regarding eating patterns, a sizable percentage of patients (60.74%) were vegetarians whereas just 39.25% were non-vegetarian. In the end, when family medical history was examined, 81 individuals had both type 2 diabetes and hypertension in their families, while 26 patients had no family history. These findings provide valuable information regarding the socioeconomic level, distribution of BMI, social history food habits, and family medical history of the enrolled individuals with their age and gender distribution.

2.1 Knowledge, Attitude, and Practice (KAP) assessment:

A KAP questionnaire was used to assess impact of clinical pharmacist mediated patient counselling and awareness regarding chronic diseases like diabetes and hypertension. According to an analysis of the responses it was observed that the percentage of patients who correctly responded during the final follow-up was higher than the baseline follow-up. At the end of the study, overall KAP score for all patients showed a remarkable improvement.

The entire KAP scores were statistically analysed using paired t-test, revealing a significant improvement from the baseline to the first and second follow-ups. The results revealed a statistically significant improvement in the knowledge, attitude, and practices of participants.

Table 2: KAP score of patients

Variables/Score	Baseline	1st follow-up	2nd follow-up	P value

Knowledge/14	6.57±2.30	11.10±2.19	12.80±1.707	<0.0001* <0.0001* <0.0001#
Attitude /15	12.39±1.39	14.20±0.86	14.66±0.67	<0.0001* <0.0001* <0.0001#
Practice/18	12.49±1.93	14.20±1.76	14.50±1.74	<0.0001* <0.0001* 0.1198#^{ns}

(Values are expressed as Mean±SD, n=107, * represent the comparison between baseline with 1st and 2nd follow-up, # represents the comparison between 1st and 2nd follow-up, p value<0.05)

2.2 Assessment of medication adherence level in patients using MMAS-4

In the study, the 4 questioned Morisky medication adherence scale was employed to evaluate the level of medication adherence in patients with comorbid diabetes and hypertension. Patients were asked about forgetfulness of taking medicines, behaviour of non-adherence, difficulties in remembering to take medicines and to discontinuing the medicine when feeling worse or better.

Patients were counselled regarding the necessity of consistent medication adherence, possible effects of non-adherence, suitable dosage and frequency, as well as the rationale behind the medicines they were prescribed. The counselling covered a various aspects of disease management.

As a result, study participant showed a significant improvement in medication adherence level from baseline to final follow-up. At the 5% level of significance ($p<0.05$), Statistical analysis showed a significant difference between the mean baseline and final follow-up. The MMAS-4 score pattern, scores higher (4 scores) for poor adherence while lower scored (0 score) for patient with higher level of adherence, indicates a considerable improvement in medication adherence.

This significant improvement in adherence to medication can be attributed to the patient-specific, individualized counselling that was offered, addressing the concerns while offering them the information they needed to properly manage their disease.

Table 3

Comparison of Morisky medication adherence scale scores

MMAS	Baseline	1st follow-up	2nd follow-up	P value
Score(Mean±SD)	2.31±0.73	1.52±0.82	1.16±0.81	0.0001* 0.0001* 0.0001#

(Values are expressed as Mean±SD, n=107, * represent the comparison between baseline with 1st and 2nd follow-up, # represents the comparison between 1st and 2nd follow-up, p value<0.05)

2.3 Effect of patient counselling on their blood pressure and blood sugar level

In the study conducted, post counselling interventions resulted in significant improvement in both blood glucose and blood pressure levels (p<0.0001*).

The study established a significant difference in the mean systolic as well as diastolic blood pressure value (p<0.0001*).

As many challenges faced by many patients in conducting constant blood glucose monitoring, data was collected on random blood sugar levels. Remarkably, there was significant reduction in the mean RBS level of patients (p<0.0001*).

Table 4: Effect of Clinical pharmacist mediated patient counselling on mean Blood pressure and blood glucose level

Variables	Before	After	p-value
Blood pressure Systolic (mmHg) Diastolic (mmHg)	143.73 ± 16.32 86.62± 7.57	135.30 ± 8.17 82.57 ± 5.46	<0.0001* <0.0001*
Blood glucose RBS (mg/dl)	225.53 ± 56.76	192.38 ± 41.90	<0.0001*

(Values are expressed as Mean±SD, n=107, * represent the comparison between baseline with 1st and 2nd follow-up, # represents the comparison between 1st and 2nd follow-up, p value<0.05)

3. DISCUSSION

Clinical pharmacist plays a pivotal role in offering patients with appropriate information and education regarding their medical condition and the potential side effects and benefit of treatments. It is crucial for clinical pharmacist to conduct a comprehensive assessment on beliefs and experience of the patients regarding the usage of medication. The primary aim of patient counselling is to improve patient's quality of life and deliver optimal healthcare.

The primary purpose of patient counselling is to enhance patients' quality of life and deliver optimal healthcare. Clinical pharmacists help to reduce drug-related problems such as adverse effects, drug interactions, and prescription errors as well as improve patient's health by treating the complications.

A total 107 patients were enrolled in this study and observed a remarkable association between age with the prevalence of diabetes and hypertension. As these conditions were seen in individuals with age of 30 and above, in which highest number of patients were fell into the ages of 30 to 60 and above 60. The prevalence of type-2 diabetes and hypertension was found to be higher in male than in female [13, 14, 15]. As researches indicates that men are more prone to develops hypertension and diabetes as they tend to have more abdominal (visceral) fat that is significantly associated with a higher risk of metabolic syndromes like Type 2 diabetes [16].

Majority of patients were belonged to the middle-class category with an income of <25k. This data aims to assess the affordability to medications and its influence on medication adherence. Moreover, the level of literacy shows a better understanding of patient related to disease and its management [17].

Encouragingly, the majority of patients were non-alcoholic (67%) and non-smokers (83%). Consumption of alcohol and smoking are risk factors that worsen the complications in

individual with diabetes and hypertension [18, 19].

Positive family history and genetic factors contributes to development of disease. Patient's understanding of risk to make life style changes to prevent complications like retinopathy, kidney failure, and cardiac events. Recent studies shows that a positive history of hypertension can expedite development of diabetes [20]. In this study 81 patients were found to have a positive family, while 26 had no history.

Obesity is an independent risk factor for coronary heart disease (CHD), which also contributes to the development of other cardiovascular condition such as diabetes and hypertension, mainly due to insulin resistance. Obese individual possess three times higher risk of developing heart attack comared to those with normal body weight [21,22]. These results emphasize the significance of tackling obesity as a major obstacle to preventing and treating heart disease and other illnesses of a similar nature. It is crucial to promote weight control through lifestyle modifications, such as a balanced diet and consistent exercise, in order to lower the risk of CHD and enhances cardiovascular health. Adopting healthy habits and early intervention can help to lessen the burden of obesity-related cardiac disease.

Diabetes with hypertension has been associated with high morbidity and mortality rate. It is crucial to assessing patient's knowledge, attitude, and practices (KAP) to effectively manage their condition. In this study KAP questionnaire was employed. After evaluation a comprehensive information regarding disease and its management provided to the patients. On analysing the results, it was found that their KAP level improved significantly ($p<0.05$) following two follow-ups which indicates that clinical pharmacist mediated patient counselling has positive impact on disease management. This study emphasises the importance of patient counselling and support in improving their understanding and approach to manage disease effectively.

The study found the pivotal role of medication adherence in treatment of chronic disease, particularly its significance in controlling diabetes [23]. Poor medication adherence was identified as a significant obstacle to effective management of disease and were also associated with higher health care costs [24]. To assess medication adherence among patients, the 4 items Morisky medication adherence scale was employed as a baseline. Following this assessment, counselling sessions were conducted to underscore strategies to adhere to medications, importance of adhering to medication, and potential complications of non-adherence.

Following this assessment, counselling sessions were provided to underscore the importance of adhering to prescribed medication, strategies to ensure adherence, and the potential consequences of non-adherence. Patients faced challenges in medication adherence, which were attributed to factors such as forgetfulness, laziness, or not perceiving the disease as a serious concern. Additionally, age emerged as a contributing factor, as older patients' cognitive decline hindered their ability to remember to take their medications.

There were statistically significant improvement ($P<0.05$) in medication adherence level after conducting two follow-up session among the patients who received counselling. These results highlight the positive effect of patient counselling and support in promoting good medication adherence leading to more effective management of diabetes mellitus and hypertension. Ultimately, addressing medication adherence as an important factor for management of chronic diseases can enhance patient outcome and reduce healthcare costs associated with poorly controlled diseases.

After all the follow-ups, it was observed a significant improvement in both blood glucose level as well as blood pressure after receiving counselling to the patients ($p<0.0001$). Precisely, there was a there was a remarkable difference in mean systolic and diastolic blood pressure ($p<0.0001$). Since some patients faced problem in performing continuous blood glucose monitoring at regular intervals, random blood sugar (RBS) level data was gathered. There was a substantial reduction in mean RBS levels among the patients $p<0.0001$).
These results demonstrate the beneficial effects of counselling on enhancing cardiovascular and metabolic health in those who are managing chronic conditions like diabetes and hypertension. Enhancing treatment outcomes and overall management of diseases can be significantly improved by providing effective patient education and support.

4. CONCLUSIONS

In conclusion, this prospective interventional study proven the substantial improvement of clinical pharmacist mediated counselling on individuals with coexisting Type-2 Diabetes and Hypertension. The counselling sessions led to significant improvements in patient's knowledge of their diseases, attitude, and behaviour towards them as well as better medication compliance. Additionally, the intervention produced significant reductions in blood pressure and blood sugar levels. The importance of clinical pharmacists in patient care and the necessity of incorporating pharmacist-mediated counselling services into healthcare settings are both highlighted by these findings. Pharmacists can help patients with chronic diseases like diabetes and hypertension to manage their symptoms and achieve better results by offering assistance and education.

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Authors Contribution
Samaresh Pal Roy: Conceptualization, Methodology, Formal analysis, Writing - Original Draft, Writing - Review & Editing, Supervision, Project administration. **Shreya Patel:** Methodology, Investigation, Formal analysis, Writing - Original Draft. **Nandip Faldu:**
Methodology, Investigation, Formal analysis. **Shivani Raval:** Methodology and Investigation.

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