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EVALUATION OF DRUG UTILIZATION PATTERNS IN GERIATRIC PATIENTS WITH HYPERTENSION AND TYPE 2 DIABETES MELLITUS AT A TERTIARY CARE RURAL HOSPITAL

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Keywords:

WHO core indicators, HTN, DM, Drug utilization patterns

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ABSTRACT: Introduction: The elderly population has been defined as people who are older than 60 years. Essential Hypertension and Type 2 diabetes mellitus are rapidly emerging as public health problems among the geriatric population. WHO Core Drug Prescribing Indicators are used to measure Drug Utilization Patterns because it serve as the foundation for implementing changes to drug dispensing policies at the local and national levels. Irrational drug use can lead to adverse outcomes such as a decline in medication adherence, and the risk of drug-drug interactions, all of which can invariably lead to an increased risk of hospitalization, fatality rate, and healthcare costs. **Objectives:** To study the drug utilization patterns in Geriatric patients having Hypertension and Type 2 Diabetes Mellitus using WHO core drug prescribing indicators. **Methods:** This is an Observational, Cross-sectional study, data was collected in the Case record form from Medicine OPD. Geriatric Patients with HTN, Type-2DM both HTN and Type 2 DM were included in the study. This study found out Drug prescribing patterns using WHO core drug prescribing indicators. Ethical Committee number: IEC/MIMER/2024/INST/1011. **Results:** In the present study total of 150 cases were studied with age => 60 years of both sexes. There was a higher prevalence of DM (37.3%) over HTN (32.6%), with a significant portion (30%) affected by both, and gender differences showed a high prevalence of individual conditions in females where whereas co-occurrence was higher in males. Most patients were on a two-drug regimen, with a strong preference for Amlodipine in HTN and Metformin in DM, supporting established therapeutic guidelines. The high reliance on tablets (97.43%) versus injections and the use of over 65% of Essential Drug List (EDL) medications suggested a cost-effective approach suitable for chronic disease management in the geriatric population. **Conclusion:** The study observed drug utilization patterns among geriatric patients of both sexes having HTN, type 2 DM, and Co-occurrence of both conditions.

INTRODUCTION: The geriatric population is defined as people 60 years of age and older [1]. Essential Hypertension (HTN) and Type – 2 diabetes mellitus (DM) both are rapidly emerging as public health problems among the geriatric population in developing countries [2]. Hypertension is one of the most common condition seen in elderly and Reducing blood pressure with life style changes and antihypertensive medications can effectively reduce the burden of this disease from our state and the nation [3].

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia [5]. Various classes of anti-diabetic drugs are being used in the treatment of diabetes, which act by various mechanisms to reduce the blood glucose levels to maintain optimal glycemic control [5].

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The utilization study of these medications is important in clinical practice because it serves as the foundation to implement changes to drug dispensing policies at the local and national levels [6].

Irrational drug use can lead to adverse outcomes including an increased risk of hypoglycemia, a decline in medication adherence, the risk of drug-drug interactions, all of which can invariably lead to an increased risk of hospitalization, fatality rate, and healthcare costs [6]. The WHO Core Drug prescribing indicators are used to measure the performance of healthcare providers in several key dimensions for appropriate drug usage [7, 8].

Hence, the aim of this study is to evaluate drug utilization patterns in patients of geriatric age group with hypertension or type 2 diabetes mellitus or both hypertension and type 2 diabetes mellitus using WHO Core Indicators.

MATERIALS AND METHODS:

Study Setting: Study was conducted at MIMER medical college and BSTR hospital, Talegaon Pune, which followed ethical principles and Good Clinical Practice guidelines.

Study Design: Observational, Cross-sectional study.

Sample Size: Considering the percentage of drugs prescribed as reported in previous studies at Type 1 error $\alpha = 0.05$ and allowable error of 10% the minimum required sample size was 150.

$$n = (z\alpha^2 pq) / l^2 = 150$$

$p = 72.17\%$

$\beta = 10\%$

$z\alpha = 1.96$ at $\alpha = 0.05$

$q = 100-p$

$l = 10\%$ of $p = 7.2$

Subject Selection:

Inclusion Criteria: Patients of both sexes more than 65 years of age having:

- Essential Hypertension attending the Medicine OPD on treatment with at least one antihypertensive drug, for a minimum period of 1 month with systolic BP ≥150 mmHg or a diastolic BP (DBP) of ≥90 mmHg
- Type 2 Diabetes Mellitus patients diagnosed with DM and started on Anti- Diabetic medications.
- Both Essential Hypertension as well as type 2 Diabetes Mellitus with the criteria mentioned above.

Exclusion Criteria:

- Critically ill patients having conditions such as heart failure, respiratory failure, etc.
- Patients with other coexistent causes of hyperglycemia (e.g., Cushing's syndrome, pancreatic cancer, hormone-secreting tumors, or Patients on long term steroid therapy).

RESULTS: Fig. 1 shows the individuals suffering from three conditions, Hypertensive patients (HTN), Diabetic Mellitus patients (DM), and the patients suffering from co-occurrence of both conditions. DM was the most prevalent condition with 37.3% of the individuals being affected by it followed by HTN which was 32.6%.

The prevalence of those suffering from HTN and DM both was the lowest that is 30%. This graph emphasizes the burden of each of the conditions including both diabetes and high blood pressure. The burden of diabetes appears to be the most while that of the two diseases combined is observed to be the least.

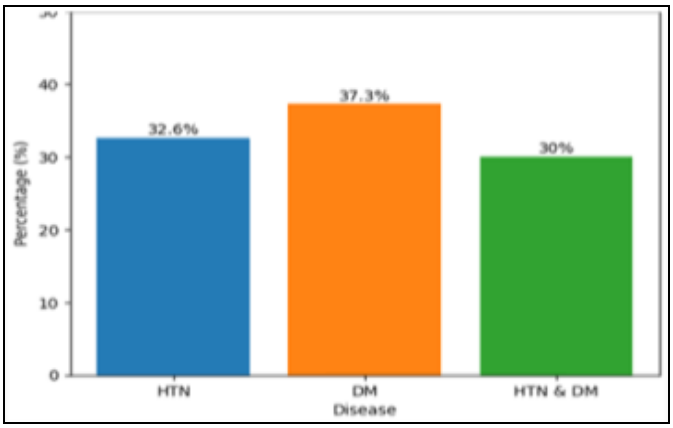

FIG. 1: PERCENTAGE OF HTN, DM, AND CO-OCCURRING CONDITIONS

TABLE 1: GENDER-BASED COMPARISON OF HTN, DM, AND CO-OCCURRING CONDITIONS

Gender	HTN	DM	HTN with DM	Total
Male	12.0%	16.7%	18.0%	46.7%
Female	20.7%	20.7%	12.0%	53.3%
Grand Total	32.7%	37.3%	30.0%	100.0%

Table 1 depicts occurrences HTN and DM, and those suffering from both diseases (HTN and DM) within the male and female populations. This information indicates that females (20.7 %) suffer from HTN more than males (12.0%). With DM is concerned again the majority of females (20.7 %) show a higher prevalence of this disease than the males (16.7 %). Co-occurrence of HTN and DM, was more in males (18.0 %) than Females (12.0 %).

All of this data suggests that individual conditions were more in females while males were suffering more from the combined condition.

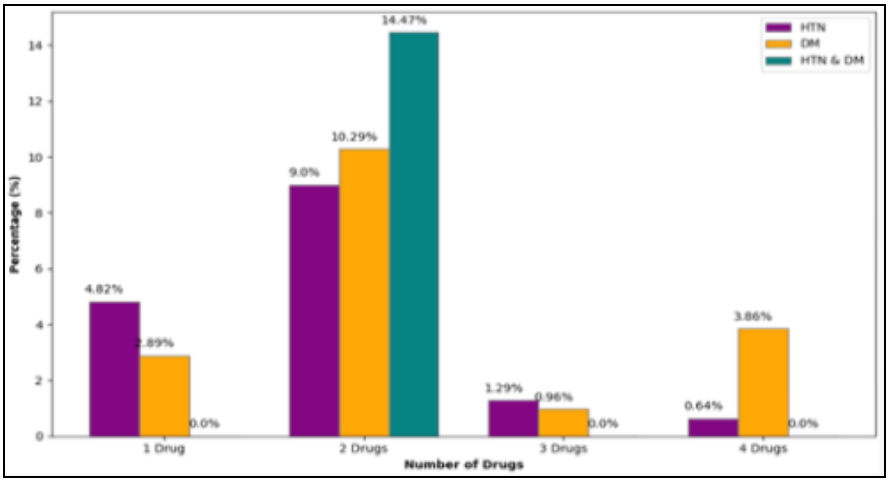

FIG. 2: PERCENTAGE OF NUMBER OF DRUGS IN HTN, DM, AND CO-OCCURRING CONDITIONS

Fig. 2 shows the number of drugs prescribed to treat hypertension (HTN), diabetes mellitus (DM), and both diseases. For those taking a single drug, HTN was the most common condition which contributed by 4.82% while DM accounted for only 2.89% of the respondents although no respondent reported having both HTN and DM. When the number of drugs increased to two there was a substantial rise in the percentage for combined HTN & DM which was 14.47% and DM and HTN were at 10.29% and 9.0% respectively. It was also observed three drugs were prescribed by 1.29% for HTN and 0.96% for DM and no patients were prescribed three drugs in combined conditions. Four drugs were prescribed to 0.64 % of hypertensive individuals while 3.86% to diabetic individuals. This indicates two drugs were prescribed more commonly.

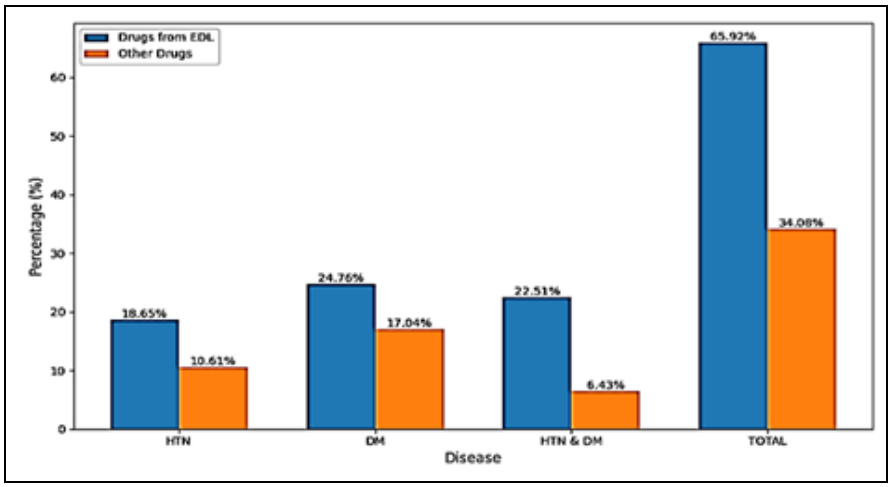

FIG. 3: PERCENTAGE OF DRUGS PRESCRIBED FROM ESSENTIAL DRUG LIST

Fig. 3 shows the proportion of drugs that were prescribed from the Essential Drug List (EDL) against non-EDL drugs for Hypertension (HTN) and Diabetes Mellitus (DM) and both HTN and DM combined. It was observed that for all disease categories, drugs obtained from EDL were prescribed at a greater percentage than those not obtained from the list. The greatest proportion of EDL drugs used was among the DM group (24.76%), while the least usage of EDL drugs was among individual HTN patients (18.65%). From aggregate data, 65.92 % of all the drugs prescribed were from EDL and 34.08 % were not prescribed from EDL. This indicates most of the drugs were prescribed from EDL for these disease conditions.

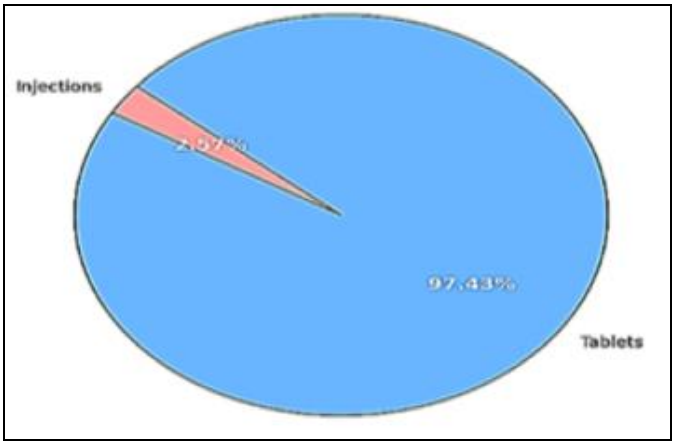

FIG. 4: PERCENTAGE OF NUMBER OF INJECTIONS PRESCRIBED

Fig. 4 showed that 97.43% of tablets were prescribed, while only 2.57% of injections were prescribed. This means that tablets were the most common dosage form of drug administration.

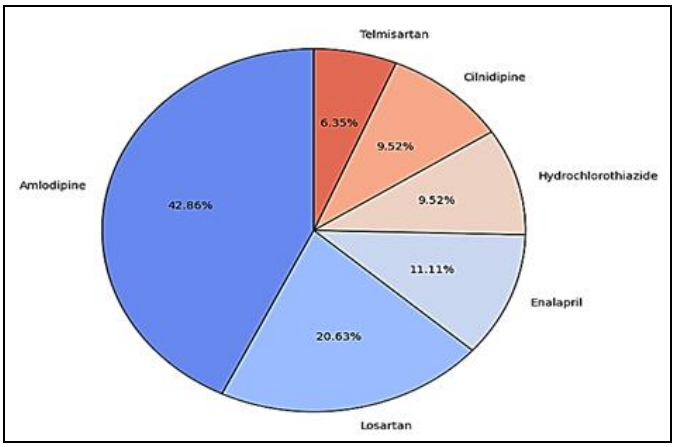

FIG. 5: PERCENTAGE OF DRUGS PRESCRIBED IN HYPERTENSION

Fig. 5 shows the percentage of various antihypertensive drugs prescribed to hypertensive patients. From the chart, we can understand that amlodipine was the most prescribed medication, contributing to about 42.86% of the prescriptions which was followed by losartan which was 20.63%. Enalapril accounted for 11.11% of the prescriptions, and hydrochlorothiazide and cilnidipine both constituted about 9.52%. Telmisartan was the least prescribed drug, with contribution of 6.35%. The chart shows that amlodipine was the most commonly prescribed antihypertensive drug.

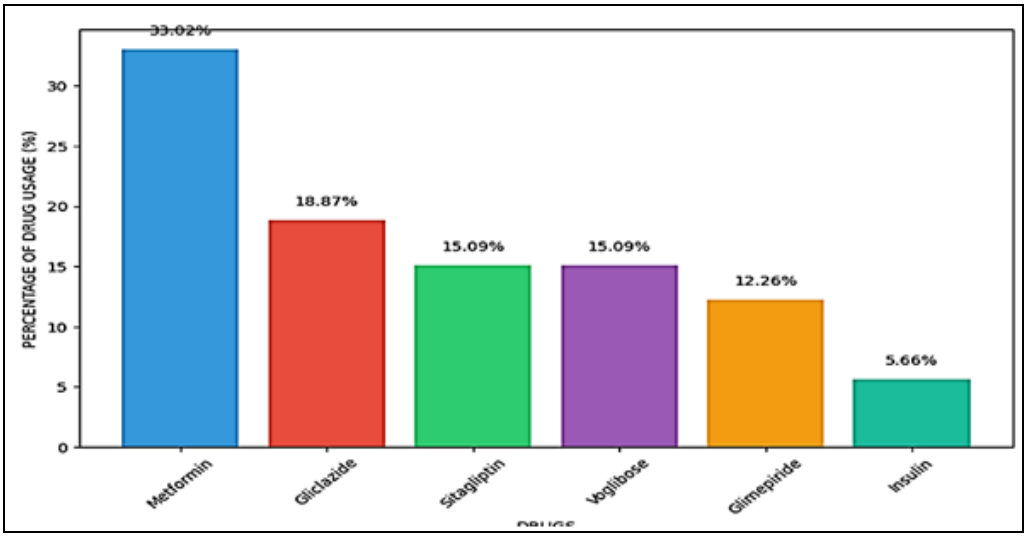

FIG. 6: PERCENTAGE OF DRUGS PRESCRIBED IN DIABETES MELLITUS

Fig. 6 shows the percentage distribution of drug usage for managing diabetes. Metformin was the most commonly prescribed drug, which accounted for 33.02%, followed by gliclazide which was

18.87%. Sitagliptin and voglibose each contributed 15.09%, while glimepiride contributed 12.26%. Insulin was the least used medication, representing only 5.66% of total drug usage. The data highlights that metformin was the most common drug for diabetes management.

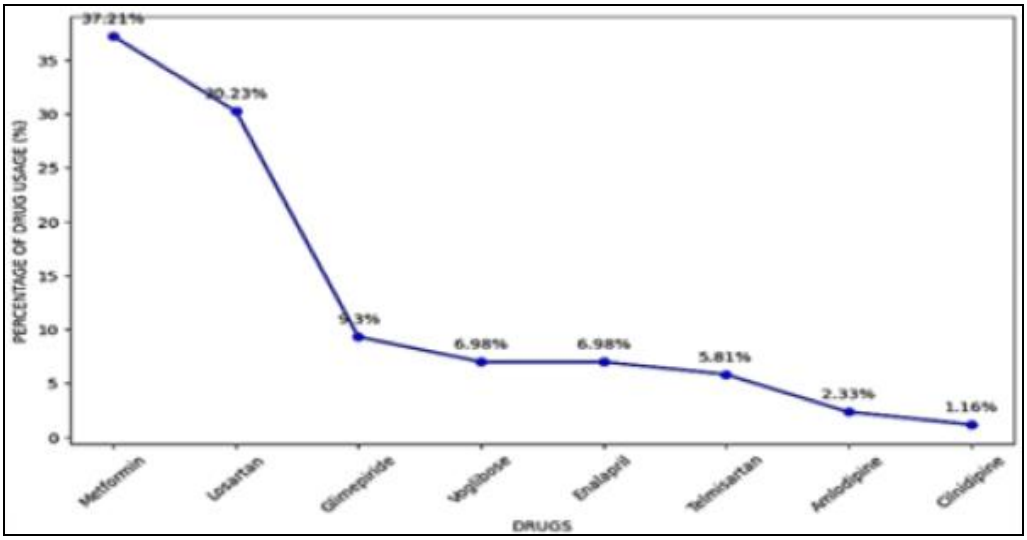

FIG. 7: PERCENTAGE OF DRUGS PRESCRIBED FOR DIABETES MELLITUS AND HYPERTENSION

Fig. 7 shows in percentages the various medications that were used in patients having co-occurring HTN and DM. Metformin was prescribed by 37.21%, followed by losartan with 30.23%. glimepiride (9.3%), voglibose (6.98%), and enalapril (6.98%). Telmisartan (5.81%), amlodipine (2.33%), and clinidipine (1.16%), were the least used drugs. This indicates that metformin and losartan were the most commonly used medications.

DISCUSSION: In our study, we found out that Diabetes Mellitus (37.3%) was more common than Hypertension (32.6%), with 30% being affected by both. It is observed that in terms of gender, women had a higher rate of individual cases than males and co-occurrence of these conditions was more pronounced in men. Most of the people were on a two-drug regimen and had a distinct preference for amlodipine in HTN and metformin in DM. Still, those with both co-occurring conditions receive metformin combined with losartan. Beta-blockers were avoided in patients prescribed anti-diabetic drugs as it prolongs the hypoglycemia caused by anti-diabetic medications. The use of tablets (97.43%) was higher than injections (2.57%), and the use of over 65% of Essential Drug List (EDL) medications indicates a cost-effective approach to managing these conditions among geriatric populations. In a previous drug utilization study conducted by Ramadas S, Sujatha MB, Andrews MA, Sanalkumar KB, it was seen that Calcium channel blockers (42.8%) were most commonly prescribed, followed by ACE Inhibitors (32.4%) and Angiotensin Receptor Blockers (29.2%), these results were similar to our study as in our study Amlodipine which is a Calcium Channel Blocker was also the most prescribed medication for hypertension [3]. Number of drugs prescribed per encounter in this study was 1.4, there were no injectable drugs prescribed and 82.5% of drugs were prescribed from EDL [3]. Metformin was the single most commonly prescribed antidiabetic agent in the previous study conducted by Hannan A, Sinha SR, Ganiyani MA, Pustake M, these results were also similar to our study which indicates Metformin is the most preferred medication in diabetic individuals [6]. In their study injectable drug prescribed was insulin which contributed about 7%, whereas in our study 2.57% of individuals were given insulin [6].

Limitation: The study had a small sample size, and research on medication adherence and polypharmacy's effects on outcomes would provide more information on treatment strategies.

CONCLUSION: WHO Core Drug prescribing indicators were used and the percentage of average number of drugs prescribed per prescription, the percentage of prescriptions with injections, and the percentage of drugs prescribed from the Essential

Drug List or local formulary were noted in patients of geriatric age group having HTN, DM and patients having co-occurrence of both DM and HTN at a tertiary care rural hospital.

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Ethical Approval: The Institutional Review Board of MAEER'S MIT Pune's MIMER Medical College and B.S.T.R Hospital approved this study. Ethical Approval No. IEC/MIMER/2024/INST/1011, Date: 02/08/2024

Declaration of Patient Consent: Appropriate patient consent was obtained during the study.

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CONFLICT OF INTEREST: Nil

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