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Journal of Internal Medicine & Pharmacology

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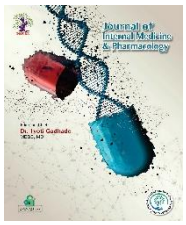

Research Article

Drug Utilization Patterns in Thyroid Disorder Patients with and without Comorbidities: A Cross-Sectional Study in the Outpatient Department of a Tertiary Care Teaching Hospital

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ABSTRACT

Thyroid dysfunction affects approximately 32% of the Indian population, making effective drug utilization crucial for optimal treatment. This study assessed drug utilization patterns in thyroid disorder patients, with and without comorbidities, at a tertiary care hospital. Data from 146 patients' prescriptions were analyzed based on WHO prescribing indicators and checked for alignment with the National List of Essential Medicines (NLEM) 2022. Results showed 74% of patients had hypothyroidism, predominantly treated with Thyroxine, while 26% had hyperthyroidism, mainly managed with Carbimazole. Hypertension was the most common comorbidity. Findings indicate rational drug use, with most prescriptions aligning with the NLEM, supporting standardized, effective treatment in thyroid disorders.

Keywords: Thyroid disorders; Drug utilization; Comorbidities; Hypothyroidism; Prescribing patterns

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Received date: 12-Sep-2024 Revised date: 25-Sep-2024 Accepted date:16-Oct-2024

1. Introduction

Thyroid disorders are among the most common endocrine conditions globally, affecting millions of people and posing significant health challenges. In India, it is estimated that approximately 32% of the population suffers from thyroid dysfunction, underscoring a critical public health concern. These disorders primarily include hypothyroidism, characterized by an underactive thyroid gland, and hyperthyroidism, where the gland is overactive, both of which can lead to various complications if untreated. The presence of comorbidities, such as hypertension, diabetes, and cardiovascular diseases, further complicates treatment, as these conditions often require integrated therapeutic approaches [1-2].

Effective management of thyroid disorders relies on a well-defined drug utilization pattern that not only ensures efficacy but also minimizes adverse effects. Rational prescribing, guided by frameworks such as the World Health Organization (WHO) prescribing indicators and the National List of Essential Medicines (NLEM), can help ensure that patients receive safe, cost-effective, and appropriate medications based on their individual needs and co-existing health conditions. Analyzing drug utilization patterns, therefore, provides valuable insights into current prescribing practices and the potential for improving therapeutic outcomes [3-5].

This study aims to assess the drug utilization patterns among patients with thyroid disorders, both with and without comorbidities, visiting a tertiary care hospital. By evaluating the alignment with WHO indicators and NLEM, this study intends to provide a framework for rationalizing and optimizing treatment approaches in thyroid care [6].

2. Materials and Methods

This cross-sectional, prospective observational study was conducted on patients with thyroid disorders, with or without comorbidities, attending the Medicine Outpatient Department (OPD) of a tertiary care hospital. The study received prior approval from the Institutional Ethics Committee. A total of 146 consecutive patients, diagnosed with thyroid disorders and visiting the OPD between January 2021 and December 2021, were included. Written informed consent was obtained from each participant [7].

Prescription data were analyzed based on World Health Organization (WHO) prescribing indicators. Additionally, all prescribed drugs were evaluated for consistency with the National List of Essential Medicines (NLEM) 2022. Statistical analyses were performed using Microsoft Excel and online tools from GraphPad [8-9].

3. Observations and Results

Among the 146 patients meeting the inclusion criteria, 109 (74%) had hypothyroidism, while 37 (26%) had hyperthyroidism (Figure 1) (Table 1 and 2).

3.1 Hypothyroidism

Out of the 109 patients with hypothyroidism, 30% had no comorbidities, while 70% had one or more comorbid conditions. Hypertension was the most common comorbidity (64.93%), followed by diabetes mellitus (61.03%) and hypercholesterolemia (44.15%). The commonly prescribed drugs for hypothyroidism without comorbidities were Thyroxine (100%), Pantoprazole (25%), Calcium lactate with Vitamin D (15.63%), B-complex (28.12%), and Ferrous sulfate (12.5%). For hypothyroid patients with comorbidities, Thyroxine (100%), Metformin (63.63%), Atorvastatin (42.85%), Acetylsalicylic

acid (37.66%), Enalapril (36.36%), and Glimepiride (33.76%) were frequently prescribed.

All drugs were prescribed by generic names, and no antibiotics or injectables were prescribed. In hypothyroid patients, 100% and 94.62% of the drugs prescribed (without and with comorbidities, respectively) were from the NLEM. Multivitamins were prescribed in 43.75% of cases without comorbidities and in 35.06% of cases with comorbidities [10].

3.2 Hyperthyroidism

Among the 37 patients with hyperthyroidism, 65% had no comorbidities, and 35% had comorbid conditions. Hypertension (69.23%) and hypercholesterolemia (69.23%) were the most prevalent comorbidities, followed by ischemic heart disease (38.46%) and diabetes mellitus (23.07%). Drugs commonly prescribed for hyperthyroidism without comorbidities included Carbimazole (100%), Propranolol (13%), Pantoprazole (8.33%), Calcium lactate with Vitamin D (4.16%), and B-complex (8.33%). For patients with comorbidities, commonly prescribed drugs were Thyroxine (100%), Metformin (63.63%), Amlodipine (42.85%), Atorvastatin (42.85%), and Acetylsalicylic acid (37.66%).

As with hypothyroidism, all prescriptions were written by generic names, and there were no antibiotics or injectables prescribed. For hyperthyroid patients, 100% and 88.33% of drugs prescribed (without and with comorbidities, respectively) were from the NLEM. The use of multivitamins was 12.5% in cases without comorbidities and 23.07% in those with comorbidities [11].

3.3 Drug Utilization Pattern

In this study, we analyzed the drug utilization patterns among patients with thyroid disorders, both hypothyroidism and hyperthyroidism, with or without comorbidities, to assess rational prescribing practices and adherence to the National List of Essential Medicines (NLEM) 2022 [12].

Hypothyroidism

Table 3 outlines the drugs prescribed to hypothyroid patients. Among patients without comorbidities (n=32), Thyroxine was universally prescribed (100%), with additional medications such as Pantoprazole (25%), Calcium lactate with Vitamin D (15.63%), B-complex (28.12%), and Ferrous sulfate (12.5%). In patients with comorbidities (n=77), Thyroxine also remained the primary drug (100%), complemented by Metformin (63.63%), Atorvastatin (42.85%), Acetylsalicylic acid (37.66%), and Enalapril (36.36%). Notably, most prescribed drugs were from the NLEM, reflecting adherence to essential medicine guidelines. The use of generic names was consistent, with a 100% rate, and no antibiotics or injectables were prescribed. Statistical analysis showed that Pantoprazole and other supportive medications had no significant differences in prescription rates between the two groups [13].

Hyperthyroidism

Table 4 presents the drug utilization data for hyperthyroid patients. All patients without comorbidities (n=24) received Carbimazole (100%), while additional drugs included Propranolol (54.16%), Pantoprazole (8.33%), Calcium lactate with Vitamin D (4.16%), and B-complex (8.33%). Among hyperthyroid patients with comorbidities (n=13), Carbimazole was also universally prescribed (100%), with other frequently used medications including Acetylsalicylic acid

(61.53%), Atorvastatin (53.84%), and Amlodipine (38.46%). Similar to hypothyroid patients, most drugs in this group were aligned with the NLEM, and prescriptions were consistently issued by generic names. There was no significant use of antibiotics or injectables, indicating a preference for oral formulations. Statistical differences in prescribing patterns between patients with and without comorbidities were minimal, as shown by the p-values.

Overall, the analysis indicates that the prescribing practices for both hypothyroid and hyperthyroid patients, regardless of comorbidities, largely followed rational and standardized guidelines, with a high proportion of drugs sourced from the NLEM. The study highlights the consistency in drug choices for thyroid disorders in this clinical setting, supporting adherence to essential medicines and promoting safe and cost-effective treatment options [14].

WHO Prescribing Indicators

The prescriptions in this study were evaluated using WHO prescribing indicators to assess the rationality and quality of drug utilization in patients with thyroid disorders, both with and without comorbidities. The indicators examined included the average number of drugs per encounter, the percentage of drugs prescribed by generic name, and adherence to essential drug list guidelines, among others. This analysis provides insight into prescribing patterns and helps in understanding the alignment of current practices with WHO recommendations. The results are summarized in the following table 5.

Discussion

In this study, hypothyroidism was found to be significantly more prevalent than hyperthyroidism among thyroid disorder patients, aligning with findings from studies by Flynn R. et al. and Cannaris G. et al., which reported hypothyroidism in 80% and 81% of cases, respectively, with a smaller proportion of hyperthyroid patients. This pattern highlights the widespread occurrence of hypothyroidism relative to hyperthyroidism, underscoring the need for targeted management strategies in hypothyroid patients.

The association of thyroid disorders with a variety of comorbidities—most commonly hypertension, diabetes mellitus, and hypercholesterolemia—suggests a potential interplay between thyroid dysfunction and chronic lifestyle conditions. This association may stem from shared genetic or environmental factors or may result from altered metabolic processes associated with thyroid dysfunction. Supporting this, Saito I. et al. reported a significantly higher prevalence of hypertension in patients with hypothyroidism, while Giorda C. et al. observed a higher prevalence of type 2 diabetes among hypothyroid individuals, pointing to the need for comprehensive health monitoring in these patients.

In terms of drug utilization, Thyroxine (100%) was the most frequently prescribed medication for hypothyroidism, and Carbimazole (100%) was commonly used for hyperthyroidism. Notably, 100% of prescriptions were issued using generic names, a practice that supports rational drug use and helps reduce the economic burden on patients. The high adherence to generic prescribing reflects a commitment to accessible healthcare, as generic medications are often more affordable than branded alternatives.

More than 80% of prescribed drugs were selected from the National List of Essential Medicines

(NLEM), underscoring the emphasis on essential medicines to ensure availability and reduce costs for patients. The adoption of NLEM-guided prescribing promotes a standardized approach to medication selection, improving the consistency and quality of care provided.

Conclusion

This study focused on the drug utilization patterns among thyroid disorder patients, with and without comorbidities, attending the Medicine Outpatient Department (OPD) of a tertiary care hospital. The findings suggest that the prescribing practices in this setting are rational and largely adhere to essential medicine guidelines, with most drugs included in the NLEM. Conducting similar research across multiple centers could further promote rational medication use and enhance patient care quality by reinforcing the importance of evidence-based prescribing practices.

Acknowledgment

The authors would like to express their gratitude to HBTMC & Dr. RN Cooper Hospital, Mumbai, and the Department of Pharmacology at B. J. Government Medical College and SGH, Pune, for their invaluable support and resources that contributed to the completion of this study. Special thanks go to the senior residents and faculty members for their guidance and encouragement throughout the research process.

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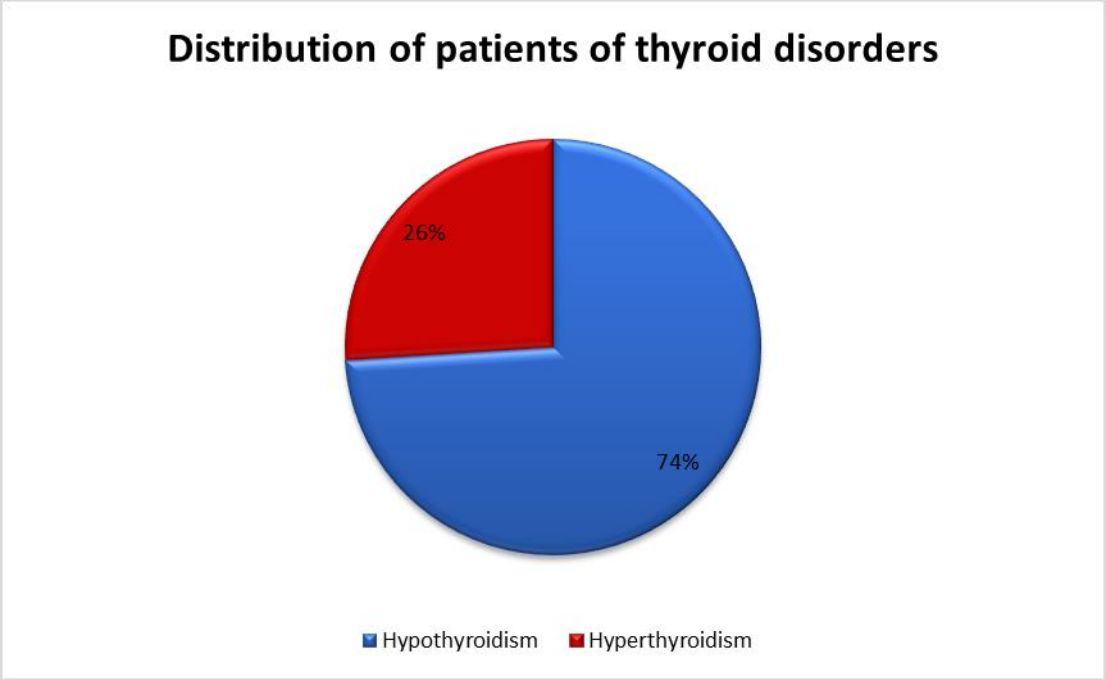

Figure 1: Distribution of patients of thyroid disorders

Table 1: Distribution of patients of thyroid disorders without and with comorbidities.

Thyroid disorder	**Comorbidity**	**Number of patients (%)**	**p-value**
Hypothyroidism	Without comorbidities	32 (30%)	0.0001
	With comorbidities	77 (70%)	
	Total	109 (100%)	
Hyperthyroidism	Without comorbidities	24 (65%)	
	With comorbidities	13 (35%)	
	Total	37 (100%)	

Chi square test, *p<0.05 is significant

Table 2: Distribution of comorbidities in patients of thyroid disorders

Comorbidity	Number of patients with hypothyroidism(%)	Number of patients with hyperthyroidism(%)	p-value
Diabetes mellitus	47 (61.03%)	3 (23.07%)	0.01
Hypertension	50 (64.93%)	9 (69.23%)	0.763
Hypercholesterolemia	34 (44.15%)	9 (69.23%)	0.094
Ischemic heart disease	18 (23.37%)	5 (38.46%)	0.248
Congestive cardiac failure	6 (7.79%)	1 (7.69%)	0.990
Osteoporosis	1 (1.29%)	0 (0%)	-
Rheumatoid arthritis	1 (1.29%)	0 (0%)	-
Epilepsy	2 (3.89%)	0 (0%)	-
Asthma	0 (0%)	1 (7.69%)	-
Trigeminal neuralgia	1 (1.29%)	0 (0%)	-
Total number of patients with comorbidities	77 (100%)	13 (100%)	

Chi square test, *$p<0.05$ is significant

Table 3: Drugs prescribed to hypothyroid patients without and with comorbidities

Sr. No.	Name of drug	Hypothyroidism without comorbidities (n=32) Number (%)	Hypothyroidism with comorbidities (n=77) Number (%)	p-value	Included in National list of essential medicines (NLEM)
1	Thyroxine	32 (100%)	77 (100%)	1.00	Yes
2	Metformin	-	49 (63.63%)	-	Yes
3	Glimepiride	-	26 (33.76%)	-	Yes
4	Glibenclamide	-	3 (3.89%)	-	No
5	Sitagliptin	-	2 (2.59%)	-	No
6	Enalapril	-	28 (36.36%)	-	Yes
7	Amlodipine	-	33 (42.85%)	-	Yes
8	Atenolol	-	10 (12.98%)	-	No
9	Prazosin hydrochloride	-	2 (2.59%)	-	No
10	Furosemide	-	9 (11.68%)	-	Yes
11	Carbamazepine	-	3 (3.89%)	-	Yes
12	Acetylsalicylic acid	-	29 (37.66%)	-	Yes
13	Atorvastatin	-	33 (42.85%)	-	Yes
14	Rosuvastatin	-	2 (2.59%)	-	No
15	Pantoprazole	8 (25%)	11 (14.28%)	0.18	Yes
16	Isosorbide dinitrate	-	3 (3.89%)	-	Yes
17	Calcium lactate + Vitamin D	5 (15.63%)	11 (14.28%)	0.85	Yes
18	B-complex	9 (28.12%)	16 (20.78%)	0.40	Yes
19	Ferrous sulphate	4 (12.5%)	4 (5.19%)	0.18	Yes

20	**Diclofenac sodium**	1 (3.12%)	1 (1.29%)	0.51	Yes
21	**Clobazam**	-	1 (1.29%)	-	Yes

Chi square test, *p<0.05 is significant

Table 4: Drugs prescribed to hyperthyroid patients without and with comorbidities

Sr. No.	Name of drug	Hyperthyroidism without comorbidities (n=24) Number (%)	Hyperthyroidism with comorbidities (n=13) Number (%)	p-value	Included in National list of essential medicines (NLEM)
1	**Carbimazole**	24 (100%)	13 (100%)	1.00	Yes
2	**Propranolol**	13 (54.16%)	4 (30.76%)	0.17	Yes
3	**Metformin**	-	3 (23.07%)	-	Yes
4	**Glimepiride**	-	1 (7.69%)	-	Yes
5	**Telmisartan**	-	1 (7.69%)	-	Yes
6	**Enalapril**	-	4 (30.76%)	-	Yes
7	**Amlodipine**	-	5 (38.46%)	-	Yes
8	**Atenolol**	-	4 (30.76%)	-	No
9	**Prazosin hydrochloride**	-	1 (7.69%)	-	No
10	**Furosemide**	-	1 (7.69%)	-	Yes
11	**Acetylsalicylic acid**	-	8 (61.53%)	-	Yes
12	**Atorvastatin**	-	7 (53.84%)	-	Yes
13	**Rosuvastatin**	-	1 (7.69%)	-	Yes
14	**Pantoprazole**	2 (8.33%)	1 (7.69%)	0.94	Yes
15	**Calcium lactate + Vitamin D**	1 (4.16%)	1 (7.69%)	0.65	Yes
16	**B-complex**	2 (8.33%)	2 (15.38%)	0.51	Yes
17	**Diclofenac sodium**	-	1 (7.69%)	-	Yes
18	**Theophylline**	-	1 (7.69%)	-	No

19	**Salbutamol**	-	1 (7.69%)	-	Yes

Chi square test, *p<0.05 is significant

Table 5: Drug utilization patterns in thyroid disorder patients, with and without comorbidities, in a tertiary care hospital setting.

Sr No.	WHO prescribing Indicator	Hypothyroidism without comorbidities	Hypothyroidism with comorbidities	Hyperthyroidism without comorbidities	Hyperthyroidism with comorbidities
1.	**Average number of drugs per encounter**	1.84	4.58	1.75	4.61
2.	**Percentage of drugs prescribed by generic name**	100%	100%	100%	100%
3.	**Percentage of encounters with antibiotic/s prescribed**	0%	0%	0%	0%
4.	**Percentage of encounters with an injection prescribed**	0%	0%	0%	0%
5.	**Percentage of drugs prescribed from essential drug list**	100%	94.62%	100%	88.33%
6.	**Percentage of encounters with multivitamins prescribed**	43.75%	35.06%	12.50%	23.07%