

## Original Research Article

# Pharmacoepidemiological assessment of endocrine disorders in a tertiary care teaching hospital

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## ABSTRACT

**Background:** The endocrine disorders such as diabetes mellitus, hypothyroidism and hyperthyroidism along with world's ageing population has increased the burden of health care systems. The present study aimed to assess the prescribing pattern of drugs in endocrine disease like diabetes and thyroid disorder and to evaluate the drug use in given healthcare against programmed criteria and standards.

**Methods:** A prospective observational study was conducted in 220 patients over six months in a tertiary care teaching hospital. Patients who are diagnosed with endocrine disorder in various (general medicine, surgery and Orthopedics) inpatient departments of study hospital.

**Results:** A prospective observational study was carried out by reviewing prescriptions of 220 patients with lifestyle disorders such as, DM (120), hyperthyroidism (50) and hypothyroidism (50). In diabetes, most of the patients were prescribed with biguanides 75 (47.17%) followed by sulfonylureas 56 (35.22%), alpha-glycosidase inhibitors 20 (12.58%), dipeptidyl peptidase 4 inhibitors 5 (3.14%), meglitinides 2 (1.26%) and thiazolidinediones 1 (0.63%). Most of the prescription containing insulin Actrapid and insulin Mixtard 14 (82.35%) followed by insulin Actrapid and insulin NPH 2 (11.76%), insulin Mixtard and insulin Glargine 1 (5.89%). In hypothyroidism most of the patients were prescribed with propylthiouracil 28 (56%) followed by methimazole 26 (44%). Levothyroxine is the best choice of drug for hypothyroid disorder.

**Conclusions:** Our study found that treatment and management of endocrine disorders were not rational. There is a need of clinical pharmacist involvement for a better patient care in these disorders.

**Keywords:** Diabetes mellitus, Drug use, Hyperthyroidism, Hypothyroidism, Prevalence

## INTRODUCTION

The growing prevalence of metabolic disorders such as diabetes mellitus, hypothyroidism and hyperthyroidism along with world's ageing population has increased the burden of health care systems. Type 2 diabetes mellitus patients are associated with thyroid dysfunction later in their life and the prevalence of hypothyroidism is quite high in diabetes mellitus patients above 45 years and more so if their BMI is over 25.<sup>1</sup>

Life style management is apparently the cornerstone of

management of diabetes mellitus. In spite of the underscored importance of lifestyle measures in diabetes therapy, most diabetics cannot escape the value of pharmacotherapy to achieve target glucose concentrations. Different classes of ant diabetic drugs including oral hypoglycemic agents (OHA) and insulin are commonly prescribed in the whole world for the treatment of diabetes, which acts by different mechanism to decline the blood glucose levels to maintain optimal glycemic control.<sup>2</sup>

The currently used anti diabetic drugs are very effective, however because of lack of patient's compliance, clinical

inertia, insulin resistance, lack of exercise and lack of dietary control, it leads to unsatisfactory control hyperglycemia. In India, limited studies have focused on diabetes care and provide an insight into the current profile of patient and their management. More than 50% of people with diabetes have poor glycemic control, uncontrolled hypertension and dyslipidemia, and a large percentage have diabetic vascular complications.<sup>3</sup>

Thyroid disorders are common worldwide. Even in India, there is a significant existence of thyroid disorders. According to a projection from various studies on thyroid disorders, it has been estimated that about 42 million people in India suffer from thyroid disorders. Thyrotoxicosis is a clinical state that result from in appropriately higher hormone action in tissues. Untreated thyrotoxicosis can lead to serious complication such as thyroid storm, arrhythmia, hypertension, cardiac dilation, congestive heart failure and sudden cardiac arrest. The three-principals treatment option for the management of thyrotoxicosis include thioamides or anti thyroid drug (ATDs), radioactive iodine and surgery.<sup>4,5</sup>

Several studies have been carried out regarding the monitoring of drug utilization in metabolic disorders. The association between type 2 diabetes mellitus and thyroid dysfunction has been reported in medical literature since 1979. Many studies have reported varying prevalence (10-24%) of thyroid dysfunction in type 2 diabetes mellitus. So, it is necessary to educate patient for better management of disease. There is an enormous need for creating of awareness among diabetic patients regarding early detection of diabetic complications. In addition, it is essential to create awareness about the disease and its treatment for the thyroid patients where a large number of patients had misconceptions regarding diet and treatment.<sup>6,7</sup>

As there is a lot of studies conducted individually for diabetes mellitus and thyroid disorder, only pharmacoepidemiological assessment of these disorders were carried out in this study. There is a need to assess the prescribing pattern of endocrine disorders with this objective, so we carried out the study entitled "Pharmacoepidemiological assessment of endocrine disease in a tertiary care teaching hospital."

## METHODS

This prospective observational study was conducted for 6 months period. In the inpatients of orthopedics, surgery and general medicine departments of a tertiary care teaching hospital in North Karnataka. The Institutional research ethical clearance for the study was obtained from the institutional research ethical committee (human) of study hospital before commencing the study. This observational study was carried out in 220 cases such as diabetes mellitus (120), hyperthyroidism (50) and hypothyroidism (50). Patients who are diagnosed with endocrine disorder in various (general medicine, surgery

and orthopedics) inpatient departments of study hospital. Data from patient case file were obtained with regard to age, sex, reason for admission, dose, direction, lab investigation, social habits, physical activity, root of administration etc. Pediatric patients, outpatients, casualty patients, mentally impaired patients, pregnant and lactating women were excluded from the study. Data was collected by using specially designed data entry form. The collected data was analyzed using descriptive statistics like total numbers, percentage, mean and standard deviation to describe prescribing pattern. Microsoft word and excel has been used to generate graphs and tables.

## RESULTS

A prospective observational study was carried out by reviewing prescriptions of 220 patients with lifestyle disorders such as, DM (120), hyperthyroidism (50) and hypothyroidism (50). Out of 120 DM patients, 65 (52.63%) were male and 55 (47.37%) were female.

Among the total prescriptions collected on DM, age was taken into consideration by dividing it into 5 age groups being kept an interval of 20 years each. Maximum number of diabetic patients were found in the age group of 60-80 years (41.05%) followed by 40-60 years (12.90%), 20-40 years (7.89%) and 0-20 years (1.05%).

Majority of DM patients were admitted in the hospital due to fever 46 (25.56%), giddiness 31 (17.22%), polyuria 24 (13.33), weakness 17 (8.95), foot ulcer 17 (8.95), tingling and numbness 17 (8.95), eye problems 16 (8.89), polyphagia 7 (3.89) and polydipsia 5 (2.79) respectively.

All 120 subjects were categorized into normal 20 (16.84%), pre-diabetic 26 (22.63%) and diabetic 74 (60.53%) patients based on GRBS range. Oral hypoglycemic agents (62.5%) were more prescribed than combination of oral hypoglycemic agents (28.6%) and lastly by insulin preparation (8.8%) which was depicted in Table 1.

**Table 1: Anti-diabetic drugs prescribed, (n=192).**

Types of anti-diabetic drug	No. of prescriptions	Percentage (%)
<b>Oral hypoglycemic agents</b>	120	62.5
<b>Insulin preparation</b>	17	8.8
<b>Combination of oral hypoglycemic agents</b>	55	28.6

As shown in Table 2, among different types of oral hypoglycemic agents, most of the patients were prescribed with biguanides 75 (47.17%) followed by sulfonylureas 56 (35.22%), alpha-glucosidase inhibitors 20 (12.58%), dipeptidyl peptidase 4 inhibitors 5 (3.14%), meglitinides 2 (1.26%) and thiazolidinediones 1 (0.63%).

**Table 2: Types of oral hypoglycemic agents (n=120).**

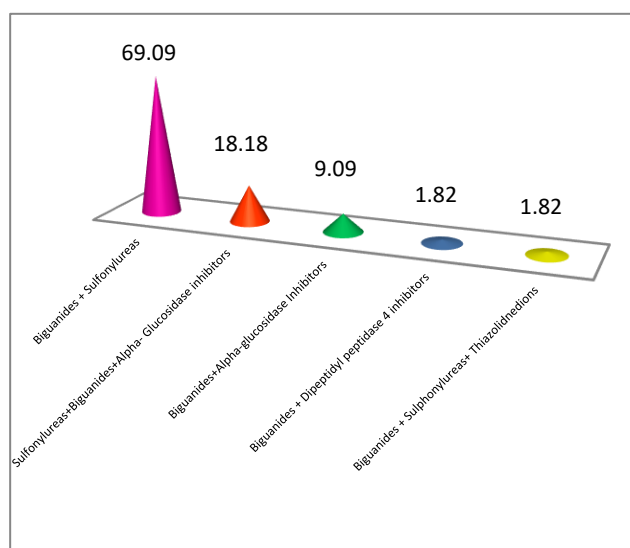
Types of OHA	No. of prescriptions	Percentage (%)
Biguanides	56	47.17
Sulfonylureas	42	35.22
Alpha-Glucosidase inhibitors	15	12.58
Dipeptidyl peptidase 4 inhibitors	4	3.14
Meglitinides	2	1.26
Thiazolidinediones	1	0.63

The information about combination of insulin preparations prescribed in patients was in Table 3. Insulin Actrapid with insulin Mixtard 14 (82.35%) was commonly prescribed combination followed by insulin Actrapid and insulin NPH 2 (11.76%).

**Table 3: Breakdown of combination of insulin preparation (n=17).**

Insulin preparations	No. of prescriptions	Percentage (%)
Insulin Actrapid + Insulin Mixtard	14	82.35
Insulin Actrapid + Insulin NPH	2	11.76
Insulin Mixtard + Insulin Glargine	1	5.89

Distribution of combined OHA was in Figure 1. In which combination of biguanides and sulfonylureas were prescribed more 38 (69.09%) followed by combination of sulfonylureas, biguanides and alpha glucosidase inhibitors 10 (18.18%), Biguanide and alpha glucosidase inhibitors 5 (9.09%), Biguanide and dipeptidyl peptidase 4 inhibitors 1 (1.82%), biguanides, sulphonylureas and thiazolidinediones 1 (1.82%) respectively.



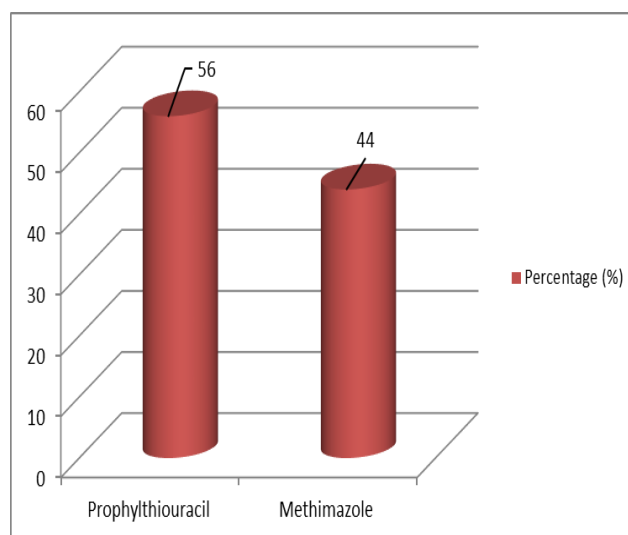
**Figure 1: Combination of OHA (n=55).**

The micro vascular complication of diabetes in study population includes renal disorders 11 (64.70%) followed by eye disorders 3 (17.65%) and neurological disorders 3 (17.65%).

Among 50 hyperthyroidism patients 12 (24%) were male and 38 (76%) were female. Hyperthyroidism patients were admitted in the hospital due to fever 20 (40%), giddiness 31 (62%), insomnia 8(16%), weakness 40 (80%), weight loss 32 (64%), goiter 41 (82%) respectively. Among different types of anti-thyroid agents, most of the patients were prescribed with propylthiouracil 28 (56%) followed by Methimazole 26 (44%), and the same was illustrated in Figure 2.

**Table 4: Anti-hypothyroid drugs prescribed (n=50).**

Drug	No. of prescriptions	Percentage (%)
Levothyroxine	50	100



**Figure 2: Anti-hyperthyroid agents prescribed (n=50).**

**DISCUSSION**

Our study found that male patients are more suffered by DM than that of females, which is similar to the study done by Pramanik et al.<sup>8</sup> This data suggests that middle aged and older adults are at higher risk due to combined effects of increasing insulin resistance and impaired pancreatic islet function with aging associated with age related adiposity and physical inactivity. Most of the patients came with symptoms of diabetes such as polyuria, weakness, non-healing foot ulcer, tingling and numbness, eye problems, polyphagia.

Age was taken into consideration from the prescription collected by dividing into 5 age groups. Maximum number of diabetic patients were found in the age group of 60-80 years (41.05%), which was similar to the studies carried out by Baby et al and Sharma et al and on contrary, studies by Mahmood et al and Patel et al.<sup>9-12</sup>

Most of the patients were on OHA due to the fact that a majority of the study population was in elderly age group and also with long standing disease. Since the current study was done in the inpatients department there by providing the advantage of close monitoring while the patients were been hospitalized. The findings were similar to the studies done by Chowdhury et al and Venkateswaramurthy et al and contradicted to the results published by Ramachandran et al.<sup>4,13,14</sup>

Our study found that majority of patients were prescribed with Biguanides and Sulfonylureas which is supported by the study conducted by Patel et al.<sup>12</sup> These results were contrast to the studies carried out by Ramachandran et al and Agarwal et al.<sup>4,15</sup> It may be due to its advantages like no weight gain, no hypoglycemia etc. and its low cost when compared to other OHA. Combination of insulin was observed in inpatient prescriptions mainly due to the fact that it ensures close monitoring and posing a greater degree of safety to the patients as they are hospitalized.

Patients were mostly prescribed with combination of biguanides and sulfonylureas (dual combination therapy) than other dual and triple combination therapy which may be due to its less side effects and also due to lesser cost. Similar pattern of prescribing was seen in a study conducted by Ramachandran et al.<sup>4</sup>

Insulin Actrapid with insulin Mixtard 14 (82.35%) was commonly prescribed combination followed by Insulin Actrapid and insulin NPH 2 (11.76%) which was in contrast to the study done by Mahmood et al.<sup>11</sup>

We also found that more than half of the patients were suffering with diabetic complications in different system which may be due to their long standing and uncontrolled diabetes mellitus. Concomitant drugs such as antibiotic were prescribed to avoid hospitalized infections and anti-hypertensive according to past medical history like hypertension. Other drugs were prescribed for symptomatic treatment and for other co-morbid complications.

In case of hyperthyroidism, females were more affected with hyperthyroidism than males and they are admitted due to weakness, goiter, giddiness and weight loss etc. We also noticed that the prevalence of hyperthyroidism found more in TSH level decreased patients than normal level patients and in case of T3 and T4 level increased patients than in normal level patients. We also noticed that the prevalence of hyperthyroidism is less in T3 level increased patients than normal level patients.

Most of the patients came with symptoms of hypothyroidism usually presents with weight gain, weakness, fatigue, hair loss, etc. The prevalence of hypothyroidism was found more in TSH level increased patients than normal level patients and in case of T3 and T4 level decreased patients than normal level patients. Levothyroxine is the drug of choice in hypothyroidism

case in our study which was similar to the reports published by Ramachandran et al.<sup>4</sup>

We observed that majority of patients prescribed with propylthiouracil and methimazole which may be due to its advantages like no weight gain, no hypoglycemia etc. These findings were in contrast to the study published by Ramchandran et al.<sup>4</sup> Concomitant drugs such as antibiotic were prescribed to avoid hospitalized infections and anti-hypertensives according to past medical history like hypertension. Other drugs were prescribed for symptomatic treatment and for other co-morbid complications.

## CONCLUSION

Our study found that treatment and management of endocrine disorders were not rational. Drugs were prescribed as per guidelines, but monitoring treatment outcome for both desirable and undesirable effect were not followed. There is a need for clinical pharmacist involvement for patient care in these disorders.

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## REFERENCES

1. Storm BL. *Pharmacoepidemiology*, 3<sup>rd</sup> Edition. London: John Wiley and sons Ltd. 2000.
2. Strom BL. What is pharmacoepidemiology? In: Storm BL, Kimmel SE. (eds.) *A Textbook of pharamacoepidemiology* 4<sup>th</sup> Edition, USA: John Willey and sons. 2006;3.
3. Einarson T. *Pharmacoepidemiology*. In: *A Textbook of clinical pharmacy practice*. Parathasarathi G, Hansen KN, Nahata MC. 5<sup>th</sup> Edition: Universities Press. 2009;416-22.
4. Ramachandran S, Swethanjali D, Bindu MH, Devaki K, Sripada R, Srinivas ED et al. Drug Utilization Evaluation on Antidiabetic, Thyroid and Antithyroid Drugs. *Biomed Pharmacol J*. 2020;13(4):1839-44.
5. Dipiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM. *Endocrinologic disorders*. In: *Pharmacotherapy A pathophysiologic approach*. 7<sup>th</sup> Edition. New York: Mc Grow Hill Medical. 2008;1236.
6. Sherman SI, Talbert RL. *Thyroid disorders*. In: *Pharmacotherapy A pathophysiologic approach*. Dipiro JT, Talbert RL, Yee GC, Matzke GR, Wells

- BG, Posey LM. 7<sup>th</sup> Edition. New York: Mc Grow Hill Medical. 2008;1243-64.
7. Triplitt CL, Reasner CA, Isley WL, Dipiro JT, Talbert RL, Yee GC et al. Diabetes Mellitus. In: Pharmacotherapy A pathophysiologic approach. 7<sup>th</sup> Edition. New York: Mc Grow Hill Medical. 2008;1205-42.
  8. Pramanik S, Gosh S, Mukhopadhyay P, Bhattacharjee R, Mukherjee B, Mondal SA et al. Thyroid status in patients with type 2 diabetes attending a tertiary care hospital in Eastern India. *Indian J Endocrinol Metab*. 2018;22(1):112-5.
  9. Baby N, Tom C, Joseph AA, Abraham A, Nanjwade BK. Prescribing Pattern of Antidiabetic Drugs for Type 2 Diabetic in Tertiary Care Teaching Hospital. *World J Pharm Pharm Sci*. 2017;6(3):1302-15.
  10. Sharma JK, Parmar SP. Prescribing pattern of anti-diabetic drugs in patients suffering from type 2 diabetes mellitus with co-existing hypertension in a tertiary care teaching hospital. *Int J Basic Clin Pharmacol*. 2018;7:761-6.
  11. Mahmood M, Reddy RC, Lahari JR, Fatima S, Shinde P, Reddy SA. Prescription pattern analysis of antidiabetic drugs in diabetes mellitus and associated comorbidities. *Clin investigation*. 2017;8(1):5-12.
  12. Patel B, Oza B, Patel KP, Malhotra SD, Patel VJ. Pattern of antidiabetic drugs use in type-2 diabetic patients in a medicine outpatient clinic of a tertiary care teaching hospital. *Int J Basic Clin Pharmacol*. 2013;2:485-91.
  13. Chowdhury A, Sen N, Banik S. Prescribing pattern of antidiabetic drugs in type 2 diabetic patients of Noakhali city in Bangladesh. *Marmara Pharm J*. 2017;21(4):1010-14.
  14. Venkateswaramurthy N, Md. Shajeem S, Sambathkumar R. Prescribing pattern of antidiabetic drugs in type-2 diabetic patients. *Int J Pharm Sci Res*. 2016;7(11):4550-55.
  15. Agarwal AA, Jadhav PR, Deshmukh YA. Prescribing pattern and efficacy of anti-diabetic drugs in maintaining optimal glycemic levels in diabetic patients. *J Basic Clin Pharma*. 2014;5:79-83.

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