

## Drug Utilization Evaluation On Antidiabetic, Thyroid And Antithyroid Drugs

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To evaluate the drug utilization of antidiabetic, thyroid and antithyroid drugs at an endocrinology speciality hospital among the ambulatory patients. This was a prospective observational study conducted for a period of 6 months. Patients who were diagnosed with either diabetes mellitus (both type-I & type-II) or thyroid disorders and receiving their respective pharmacological therapy irrespective of age and gender were included in this study. Pregnant, lactating women and patients with endocrine problems other than diabetes mellitus and thyroid disorders were excluded from this study. The total number of cases collected and analyzed during a period of 6 months was 246 in which 139 (56.5%) were diabetes mellitus and 107 (43.5%) were thyroid disorders. Among the parenteral hypoglycaemic agents, long acting-insulin glargine and intermediate acting + short acting- NPH + regular insulin were prescribed in almost similar frequency. In case of mono therapy, teneligliptin was the most commonly prescribed medication and this was the unique finding in this study which signified that the trend in prescribing pattern is changing and updating from time to time. In dual combination therapy Glimepiride + Metformin and in triple combination Glimepiride + Metformin + Voglibose combinations were the most commonly prescribed medication. In hypothyroidism, supplementation with levothyroxine was the only treatment alternative as it is related to the underactive thyroid, secreting insufficient amount of hormone. Irrespective of many classes of drugs available in treating hyperthyroidism carbimazole was the most frequently prescribed drug in this study. It was observed that some changes in the prescribing pattern of antidiabetic drugs that signified the trend in drug utilization pattern. Clinical pharmacists should play a key role in observing and identifying the trends in prescribing patterns by performing the drug utilization evaluation studies thereby providing a better pharmaceutical care in collaboration with the other health care professionals.

**Keywords:** Diabetes, Endocrinology, Teneligliptin, Thyroidism.

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Diabetes mellitus and thyroid dysfunction are the common conditions among the endocrine disorders with potentially devastating health consequences that affect all populations worldwide, which would be a significant health burden to the present society (Ramachandran A *et al.*, 2009). The

epidemic status of Diabetes mellitus states that in the year 2018, a total of 406 million people were living with diabetes worldwide. Among them half of the population belong to the three countries that include China [130 million], India [98 million] and US [38 million]. Compared to 2015 WHO statistics

of diabetes mellitus, there is a quite increase in the number of population suffering from diabetes mellitus with 19.9% in 2018 which is an important note to be considered. In India, around 5% of the population suffers from diabetes mellitus and 3.4 million deaths are due to the high blood sugar. The International Diabetes Federation assesses that the number of Indians with diabetes mellitus may soar to 336 million by 2030 (Sarah W *et al.*, 2004).

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. A number of drug formulations are available to handle these health problems successfully and novel approaches are being discovered which is on an alarming rise (Khalam A *et al.*, 2012). In view of the above situation, Drug Utilization Evaluation of antidiabetic, thyroid and antithyroid medication in health care settings had a valid significance to evaluate the utility of drugs (Sudha S *et al.*, 2016, Kaisa J *et al.*, 2017, Roland N *et al.*, 2017, Sultana G *et al.*, 2001, Canaris G.J *et al.*, 2000, Upadhyay D.K *et al.*, 2007, Gajra B *et al.*, 2011). Drug prescription trend studies of antidiabetic, thyroid and antithyroid drugs can be a powerful exploratory tool to establish treatment guidelines and have an insight about commonly prescribed drugs by the health care providers (Veronesi M *et al.*, 2007, Venturini F *et al.*, 1999).

Drug Utilization Evaluation (DUE) program plays a key role in helping managed healthcare systems understand, interpret, evaluate and improve the prescribing, administration and use of medicines (Abdi S.A.H *et al.*, 2012). It is valuable since the results are used to foster more efficient use of scarce health care resources. Pharmacists play a key role in DUE process because of their expertise in the area of Medication Therapy Management (Satish, K.B.P *et al.*, 2013). Hence in this study, we made an attempt in assessing the drug utilization evaluation of antidiabetic, thyroid and antithyroid drugs at an endocrinology speciality hospital among the ambulatory patients.

## MATERIALS AND METHODS

This was a prospective observational study conducted for a period of 6 months at Lalitha

endocare & skin care hospital, Rajahmundry. Patients who were diagnosed with either diabetes mellitus or thyroid disorders and receiving their respective pharmacological therapy irrespective of age and gender were included in this study. Pregnant, lactating women and patients with endocrine problems other than diabetes mellitus and thyroid disorders were excluded from this study. After obtaining the approval from IEC (GSPRJY-IEC/Pharm.D/2018/06), all the necessary and relevant information was collected on a previously designed patient data collection proforma. A total of 256 cases related to the treatment of diabetes mellitus and thyroid disorders were assessed by evaluating the prescriptions from the respective disease conditions.

## RESULTS AND DISCUSSION

### Gender wise categorization of the study population

Table 1 represents gender wise categorization in both diabetes mellitus and thyroid disorders. In this study, a total of 246 cases were considered for Drug Utilization Evaluation of antidiabetic, thyroid and antithyroid drugs. Among them, 139(56.5%) cases were with diabetes mellitus and about 107(43.5%) cases were with thyroid disorders. In case of diabetes, females were more affected when compared to males which was similar to the study done by Gay J Canaris *et al.*, (1995). Similarly in case of thyroid disorders, females were found to be more prevalent when compared to males in our study.

### Age wise categorization of patients with diabetes mellitus

Figure 1 represents the age wise categorization of patients with Diabetes Mellitus. Most of the patients were observed in the age group 51-60 years (32.4%) followed by the age group 41-50 years 26.6%.

### Age wise categorization of the patients with thyroid disorders

Figure 2 represents the age wise categorization of patients with thyroid disorders. Most of the patients were observed in the age group 21-30 years (27.1%) followed by the age group 31-40 (20.6%) and 41-50 years (20.6%) respectively.

**Study results of the patient population with diabetes mellitus**

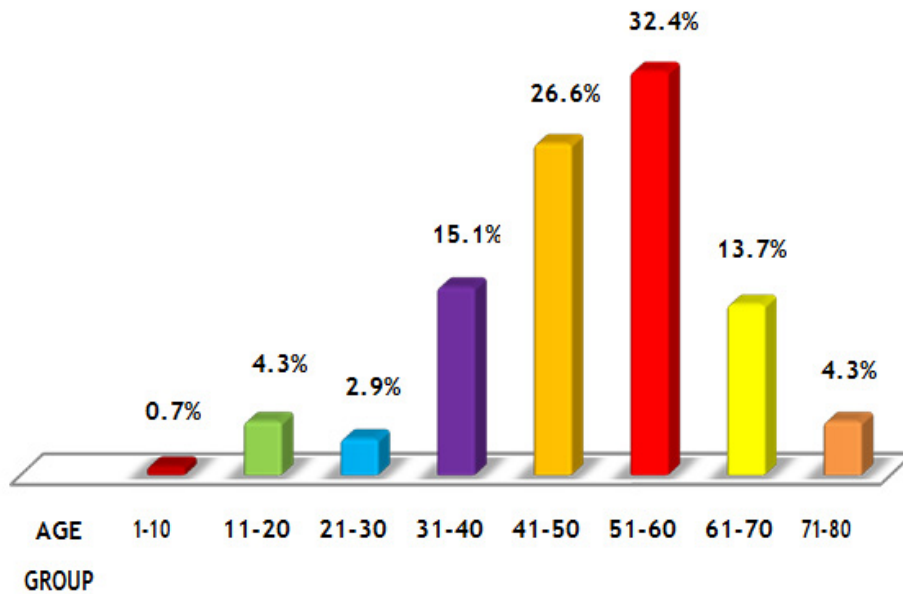
**Co-morbidities observed with diabetes mellitus**

In this study, various co-morbidities were clinically observed in the patients with diabetes

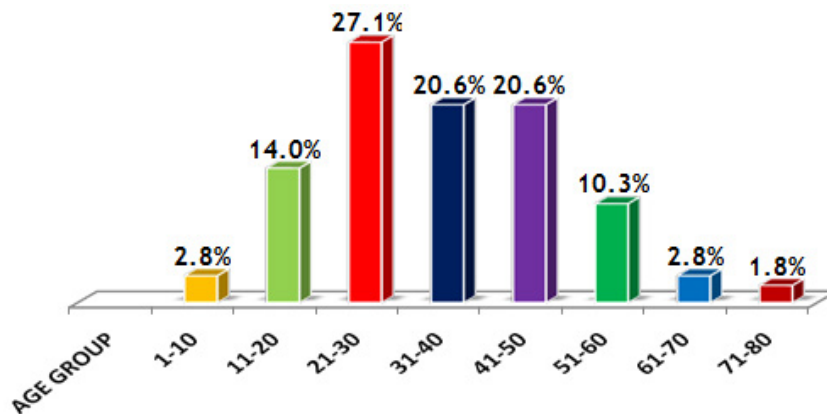
**Table 1.** Gender wise categorization of cases with diabetes mellitus and thyroid disorders

Gender	Male (%)	Female (%)	Total (%)
Diabetes	57(76)	82(48)	139(56.5)
Thyroid	18(24)	89(52)	107(43.5)
TOTAL	75 (100)	171 (100)	246 (100)

mellitus. The commonly observed co-morbidities were hypertension 32(30.2%), obesity 9(8.5%), hypothyroid 5(4.7%), hyperthyroid 1 (0.9%), hypertension associated with obesity 22(20.8%), hypertension associated with hypothyroid 8(7.5%), hypothyroid associated with obesity 3(2.9%), hypertension along with obesity and hypothyroid 7(6.6%) and miscellaneous 19(17.9%). Most of the patients were observed with co-morbidity hypertension (30.2%) followed by hypertension associated with obesity (20.8%).



**Fig. 1.** Age wise categorization of patients with diabetes mellitus



**Fig. 2.** Age wise categorization of patients with thyroid disorder

### Drug utilization and evaluation of anti-diabetic drugs

In our study, Insulin Glargine (Long acting) 100 IU (48.6%) was most commonly prescribed followed by NPH + Regular Insulin (Intermediate acting + short acting) 30/70 IU (47.4%) among the parenteral hypoglycemic agents. Table 2 represents the commonly prescribed monotherapy in Diabetes Mellitus. In our study, Teneligliptin (50.1%) was the most commonly prescribed antidiabetic drug followed by Metformin 500 mg(12.9%). Table 3 represents the commonly prescribed dual combination therapy in Diabetes Mellitus. In our study, Glimepiride + Metformin (38.2%) was the most commonly prescribed dual combination followed by Teneligliptin + Metformin(34.8%). Table 4 represents the commonly prescribed triple

combination therapy in Diabetes Mellitus. In our study, Glimepiride + Metformin + Voglibose (70.4%) was the most commonly prescribed triple combination followed by Glimepiride 1 mg + Metformin 500 mg + Pioglitazone 15 mg (29.6%).

### Study results of the patient population with thyroid disorders

#### Co-morbidities observed with thyroid disorders

Different co-morbidities were associated with thyroid disordered patients. Hypothyroid patients with hypertension were 2(8.3%), obesity were 7(29.2%), anaemia were 3(12.5%), hypertension along with obesity were 4(16.6%) and miscellaneous were 8(33.4%). While in hyperthyroid patients, hypertension was the only associated co-morbid condition found in our study. Most of the hypothyroid patients were observed

**Table 2.** Commonly prescribed monotherapy in Diabetes mellitus

Class of drug	Drugs	Dose	Frequency (%) (N=54)
Sulphonylureas1 (1.8) Meglitinide analogues1 (1.8) Dipeptidyl peptidase-4-inhibitors 30 (55.5)	Gliclazide	30 mg	1 (1.8)
	Repaglinide	500 mg	1 (1.8)
	Vidagliptin	50 mg	1 (1.8)
	Saxagliptin	5 mg	1 (1.8)
	Linagliptin	5 mg	1 (1.8)
	Teneligliptin	20mg	27 (50.1)
Biguanides11 (20.4)	Metformin	500 mg	7 (12.9)
	Metformin	850 mg	4 (7.5)
Thiazolidinediones2 (3.7) á-glucosidase inhibitors3 (5.6)	Pioglitazone	15 mg	2 (3.7)
	Voglibose	0.2 mg	3 (5.6)
Sodium - Glucose Co-Transport inhibitors6 (11.2)	Dapagliflozin	10 mg	2 (3.7)
	Canagliflozin	100 mg	3 (5.7)
	Empagliflozin	10 mg	1 (1.8)
TOTAL			54 (100)

**Table 3.** Commonly prescribed dual combination therapy in Diabetes mellitus

Drug class	Drugs combination	Frequency (%) (N=144)
Sulfonylureas + Biguanides57(39.6)	Glimepiride + Metformin	55(38.2)
	Glipizide + Metformin	2(1.4)
Dipeptidyl peptidase-4-inhibitors + Biguanides67(46.5)	Vidagliptin + Metformin	7(4.8)
	Teneligliptin + Metformin	50(34.8)
	Sitagliptin + Metformin	10(6.9)
Thiazolidinediones + Biguanides3(2)	Pioglitazone + Metformin	3(2.0)
á-Glucosidase inhibitors + Biguanides8(5.6)	Voglibose + Metformin	8(5.6)
Sodium-Glucose Co-transport inhibitors + Biguanides9(6.3)	Dapagliflozin + Metformin	9(6.3)
TOTAL		144(100)

**Table 4.** Commonly prescribed triple combination therapy in Diabetes mellitus

Drug Class	Drugs Combination	Frequency (%) (N=27)
Sulfonylureas + Biguanides + α-Glucosidase inhibitors	Glimepiride + Metformin + Voglibose	19(70.4)
Sulfonylureas + Biguanides + Thiazolidinediones	Glimepiride + Metformin + Pioglitazone	8(29.6)
TOTAL		27(100)

with the co-morbidity obesity (29.2%) followed by HTN associated with obesity (16.6%).

#### **Drug utilization and evaluation of thyroid and anti-thyroid drugs**

Levothyroxine therapy is the usual treatment in hypothyroidism. In our study, Levothyroxine 75mcg (18.1%) was the most commonly prescribed dose followed by Levothyroxine 50mcg (15.7%). In case of anti-thyroid therapy in hyperthyroidism, carbimazole (96%) was most frequently prescribed dose followed by Methimazole (4%) in our study.

#### **CONCLUSION**

Majority of the Diabetes Mellitus cases were observed in the age group of 51-60 years and thyroid disorders were observed in the age group of 21-30 years. Hypertension and obesity were the most commonly associated co-morbidities found in diabetes mellitus patients, obesity with respect to hypothyroidism and hypertension with respect to hyperthyroidism were the most commonly associated co-morbidities found in thyroid disordered patients. With regard to body mass index, obese patients were of the highest proportion in diabetes mellitus which indicates that they require proper life style modifications which would be a great tool in improving their health outcomes. Among the parenteral hypoglycaemic agents, long acting-insulin glargine and intermediate acting + short acting- NPH + regular insulin were prescribed in almost similar frequency. In mono therapy teneligliptin was the most commonly prescribed medication. This was the unique finding in the present study which signified that the trend in prescribing pattern is changing and updating from time to time. In dual combination therapy Glimepiride + Metformin and in triple

combination Glimepiride + Metformin + Voglibose combinations were the most commonly prescribed medication. In hypothyroidism, supplementation with levothyroxine was the only treatment alternative as it is related to the underactive thyroid, secreting insufficient amount of hormone. Since this is a known fact, an attempt was made to know the routinely prescribed doses, it was found that 50 mcg next to 75 mcg were of greatest measure. Irrespective of many classes of drugs available in treating hyperthyroidism carbimazole was the most frequently prescribed drug in this study. Clinical pharmacists should play a key role in observing and identifying the trends in prescribing patterns by performing the drug utilization evaluation studies thereby providing a better pharmaceutical care in collaboration with other health care professionals.

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#### **Conflicts of interest**

The authors declare no conflicts of interest.

#### **Funding source**

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