

STUDY ON DRUG UTILIZATION REVIEW OF ORAL HYPOGLYCEMIC DRUGS IN A TERTIARY CARE HOSPITAL

Dr. NIKHILESH ANDHI*, M. SPANDANA², ANNAPOORNA. D³, T. NANDINI⁴, D. BHASKER⁵

Department of Clinical Pharmacy Practice, Samskruti college of Pharmacy, Kondapur, Ghatkesar Medchal District, Telangana -501301, INDIA

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ABSTRACT

Objectives: The main objective of the study was to assess the patient's pharmacological treatment, to determine if there are any drug-disease contraindications and to keep track of the patients continued response to the medication.

Methodology: A prospective interventional study was conducted in General medicine and Diabetology departments (OPD, IPD) of tertiary care hospital. The data was collected from the departments after considering inclusion & exclusion criteria for a period of 6 months and a total of 270 patients were analyzed with data collection forms by interviewing the patients about the Socio demographics & Diabetes Self-Management Questionnaire. Statistical tools like Chi-square test were applied to the data by using SPSS software.

Result: A total of 270 diabetic patients, males 165 (61.1%) patients predominated over female patients 105 (38.9%). Majority of the diabetic patients were under age group of 51-60years 87 (32.2%) & with family history 156 (57.8%). Patients with Past medical history Hypertension 63 (23.3%) & Cardio vascular diseases 51 (19%). Higher no. of patients were treated with combination therapy 180 (66.7%) than monotherapy 90 (33.3%). Metformin is higher utilized drug 162 (60%) certain side effects were observed. Cost of the therapy is analyzed in which metformin is prescribed more as it costs less than Rs.40. Conclusion: Type 2 DM was most commonly seen in patients between 51-60 years with side effects, poor life style changes, symptoms & genetic susceptibility. Combination therapy is most commonly prescribed. Metformin is the highly utilized drug with cost effectiveness, greater therapeutic efficacy. Keywords: Cost effectiveness, Combination therapy, Genetic susceptibility, Monotherapy, Therapeutic efficacy.

Keywords: Diabetes mellitus, HYPOGLYCEMIC

INTRODUCTION

Diabetes mellitus is a chronic metabolic disease that is characterized by excessive blood glucose levels due to reduced production of insulin¹. In the last few years, the prevalence of diabetes has risen to an all-time high in India. It is predicted to affect almost 69.1 million individuals in India. The frequency of macro vascular complications such as retinopathy and nephropathy are lower in Indian population, but the incidence of coronary artery disease is higher. The mortality rate of diabetic patients per 1, 00,000 population has increased from 10.10% in 1919 to 23.1% in 2020. Diabetes is potentially reaching the epidemic proportions, and mortality is increasing². Diabetes Mellitus is usually caused due to genes, overweight, metabolic syndromes³, impaired liver function, broken beta cells⁴.

*Corresponding author:

Dr. Nikhilesh Andhi, Assistant Professor

Department of Clinical Pharmacy Practice,
Samskruti College of pharmacy, Kondapur, Ghatkesar
Medchal District, Telangana 501301 INDIA.

Email: 2016marsn@gmail.com

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The symptoms that appear gradually are increase thirst, frequent urination, increased hunger, fatigue, unintended weight loss, blurred vision, frequent infections, numbness⁵ or tingling sensation in hands or feet, areas of darkened skin usually in armpits and neck. Factors that include the risk of Type 2 DM include increased body weight, improper fat distribution, low physical activity, family history, improper blood lipid levels, age, race, ethnicity⁶. Type 2 DM causes serious and potentially life-threatening complications which include diabetic ketoacidosis⁷, hyperosmolar hyperglycemic state, skin complications⁸, diabetic foot problems, diabetic neuropathy, diabetic retinopathy, cardio vascular diseases⁹, lower extremity amputation¹⁰. Classes of drugs which are under oral hypoglycemic drugs are Sulfonyl Urea's (Glimepiride: 2-5mg, Glibenclamide: 2.5-15mg, Glipizide: 5-20mg),¹¹ Biguanides (Metformin: 500-1000mg)¹², DPP-IV inhibitors (Sitagliptin:100mg, Vildagliptin: 50-100mg),¹³ Meglitinides: (Repaglinide: 1-8mg),¹⁴ Alpha glucosidase inhibitors (Acarbose: 50-100mg, Voglibose: 200-300mg), Thiazolidinediones (Pioglitazone: 15-45mg).¹⁵ Non pharmacological treatment consists of diet control (Mediterranean diet),¹⁶ physical activity¹⁷, reduced alcohol intake also help in the treatment of DM. Life style changes such as behavioral adjustments, stimulation control are important aspects of healthy diet.¹⁸

DUR has been a worthy practice for pharmacists for several years. It is used to assess proper pharmacological therapy and

ensures safety of patients. Certain issues such as drug disease contraindications, drug interactions are addressed by this review¹⁹. For conducting a DUR the following terms must be presented: Dosage, prescription accuracy, drug misuse, duplications of therapy, side effects, ADR's. DUR is a method for assessing and improving the sensible use of drugs²⁰. This results in good patient care through proper therapy, ensuring the treatments are based on current standards of care, to find out the cost effectiveness of therapy²¹.

- The main objective of the study is to assess the pharmacological therapy of oral hypoglycemic drugs in order to lessen side effects and promote rational drug therapy in patients with various co-morbidities²². As a result, DUR aids in reducing drug interactions, assure rational drug therapy, therapeutic action and the use of fewer medications with very less adverse drug effects²³.

MATERIALS AND METHODS

A prospective observational study was conducted in a tertiary care hospital in outpatient and inpatient departments for a period of 6 months. The data was collected from OPD by interviewing the patients and their consent was taken. Data collection format was verified and authenticated by hospital preceptors for the study. Study involved 270 subjects who were diagnosed with Type 2 DM and other underlying co-morbidities. Both male and female patients, patients with 18 years and above are involved in the study.

Patients with gestational diabetes were not allowed to participate in the study. Written informed consent was taken from patients to collect data. Data collection form includes socio demographic information- age, sex, and weight, height, past medical history, social history, family history, diagnosis, personal history, and relevant lab data.

RESULTS

In our present study around 270 cases were included as per our criteria. Table -1 specifies socio demographic background of diabetic patients. There were male patients - 61.1% predominant over females - 38.9%. Out of various age groups 51-60 years of patients were recorded higher percentage - 32.2%. Figure - 1 represents family history in which patients without family history of diabetes were - 42.2% & with family history - 57.8%. Figure - 2 represents percentage of patients who performed physical activity rarely - 46.7%. Figure - 3 indicates that the patients were observed with various symptoms in which polyphagia - 32.2% recorded highest. Patients with social history-116 patients were alcoholics, 52 patients were smokers, 21 patients were both alcoholics and smokers. 270 patients were followed low-salt and low-fat diet. Chi square test was performed between variables like side effects vs therapy (0.002), side effects vs symptoms (0.001), medication adherence vs side effects (0.008), diet vs glucose levels (0.001), medication adherence vs age (0.009), medication adherence vs therapy (0.001), therapy vs symptoms (0.005), therapy vs glucose levels (0.009) and P-value was clinically significant (<0.005).

CATEGORY	SUB-CATEGORY	NO.OF PATIENTS	STANDARD DEVIATION	P-VALUE
GENDER	Male	165	0.488	0.0051
	Female	105		
AGE	30-40 yrs	09	1.146	0.0126
	41-50yrs	51		
	51-60yrs	87		
	61-70yrs	69		
	71-80yrs	48		
	81-90yrs	06		
FAMILY HISTORY	With family history	156	0.495	0.0052
	Without family history	114		
SOCIAL HISTORY	Alcohol	116	-	-
	Smoking	52		
	Both	21		
	None	81		
PHYSICAL ACTIVITY	Regular	33	-	-
	Rare	126		
	Very rare	60		
	Never	51		
DIET	Low salt	270	0.001	0.0037
	Low diet	270		
SYMPTOMS	Polyphagia	87	-	-
	Polydipsia	51		
	Polyuria	36		
	Poor wound healing	27		
	Fatigue	36		
	Blurred vision	33		

The socio demographics of 270 patients are mentioned in the above table and standard deviation and P-value has been calculated.

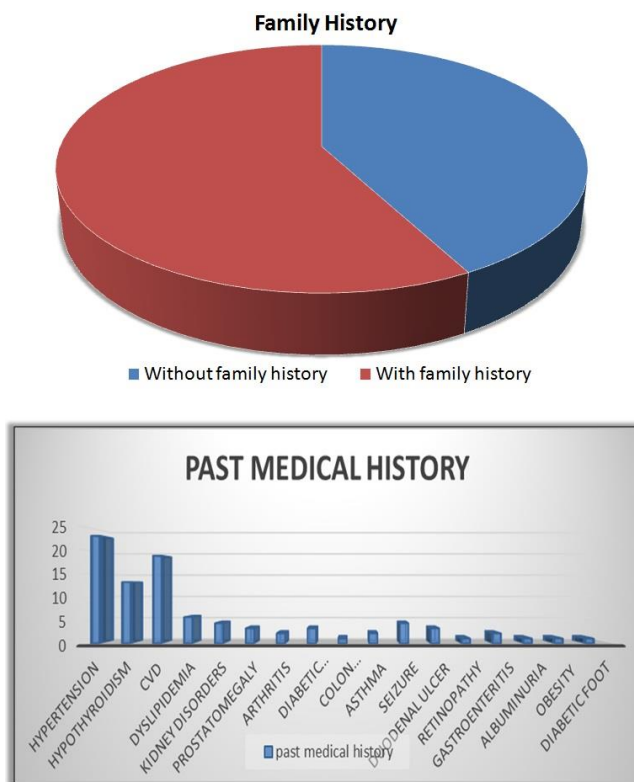


Fig-1: PERCENTAGE GRAPH OF FAMILY AND PAST MEDICAL HISTORY

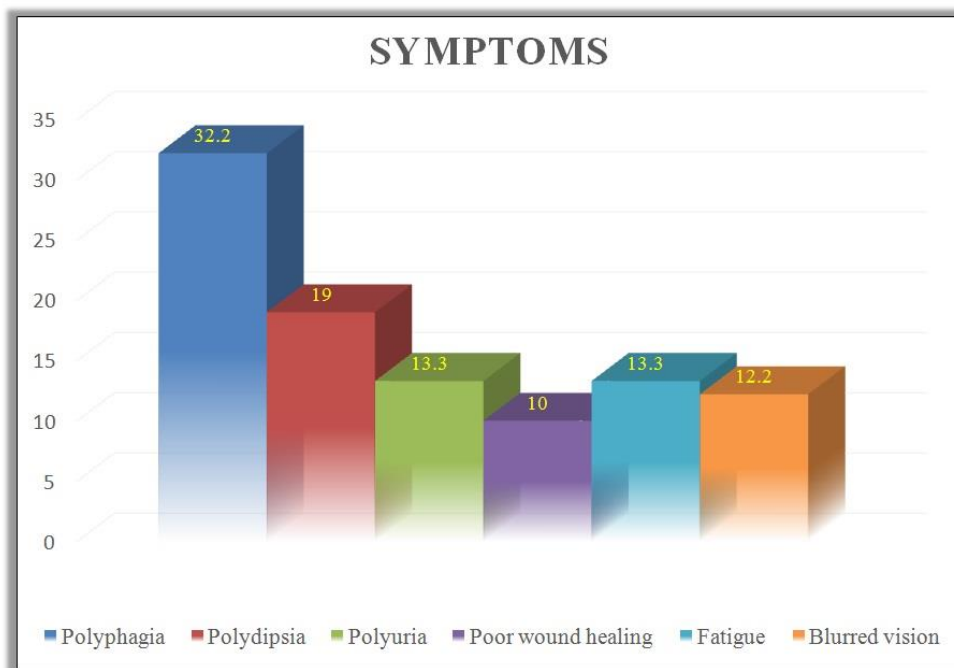


FIG-2: PERCENTAGE GRAPH OF SYMPTOMS

Based on Table-1, the above figures are drawn which showed the family history, symptoms and Past medical History of 270 patients in the study. Figure-1 showed that 156 patients had family history of Diabetes, Figure-2 showed that Polyphagia was the most common symptom in the study, Figure-1 showed Hypertension as the most found comorbidity

TABLE- 2: - THERAPY AND SIDE EFFECTS

CATEGORY	SUB-CATEGORY	NO.OF PATIENTS	STANDARD DEVIATION	P-VALUE
THERAPY	Monotherapy	90	2.190	0.0177
	Combination therapy	180		
COMBINATION THERAPY	Two drug therapy	147	-	-
	Three drug therapy	27		
	Four drug therapy	06		
MONOTHERAPY	Metformin	78	-	-
	Glimepiride	03		
	Glibenclamide	03		
	Voglibose	03		
	Sitagliptin	03		

CATEGORY	SUB-CATEGORY	NO.OF PATIENTS	STANDARD DEVIATION	P-VALUE
SIDE EFFECTS	Diarrhea	21	0.797	0.0013
	Weight gain & acidity	27		
	Hypoglycemia	12		
	None	210		

Table-2 and Figure-3 represents prescription pattern given in 270 patients in which monotherapy (33.3%) was less than combination therapy (66.7%). Figure-3 represents monotherapy was prescribed to 90 patients in which metformin is the highly prescribed to 86.8% patients. Figure-3 represents combination therapy was prescribed to 180 patients in which two drug therapy was given to 81.7% patients. Figure 4 represents side effects of therapy majorly weight gain and acidity (10%) and hypoglycemia (4.4).

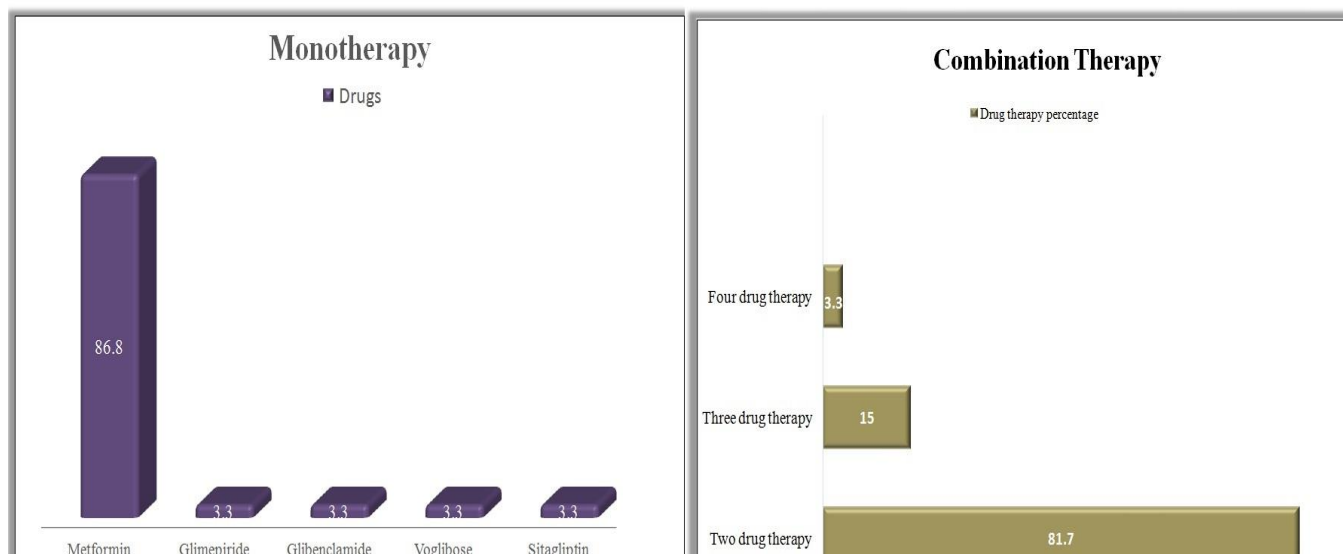


FIG-3: PERCENTAGE GRAPH OF THERAPY

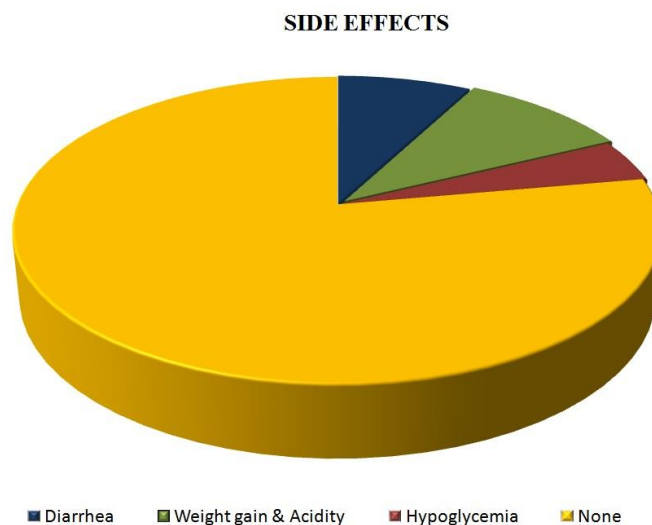


FIG-4: PERCENTAGE GRAPH OF SIDE-EFFECTS

TABLE- 3: DRUG UTILIZATION AND ITS COST EFFECTIVENESS

CATEGORY	SUB-CATEGORY	NO.OF PATIENTS
DRUG UTILIZATION	Metformin	162
	Glimepiride	75
	Voglibose	05
	Glibenclamide	18
	Sitagliptin	10

Drugs	Percentage of drugs	Cost
Metformin	78%	Rs.15
Glimepiride	3%	Rs.110
Glibenclamide	3%	Rs.8
Voglibose	3%	Rs.86
Sitagliptin	3%	Rs.315

Table-3 specify overall drug utilization for 270 patients in which metformin (60%) was the highly utilized Drug and the cost effectiveness of the prescribed drugs in which Glibenclamide was the most cost-effective drug and metformin was the most utilized drug.

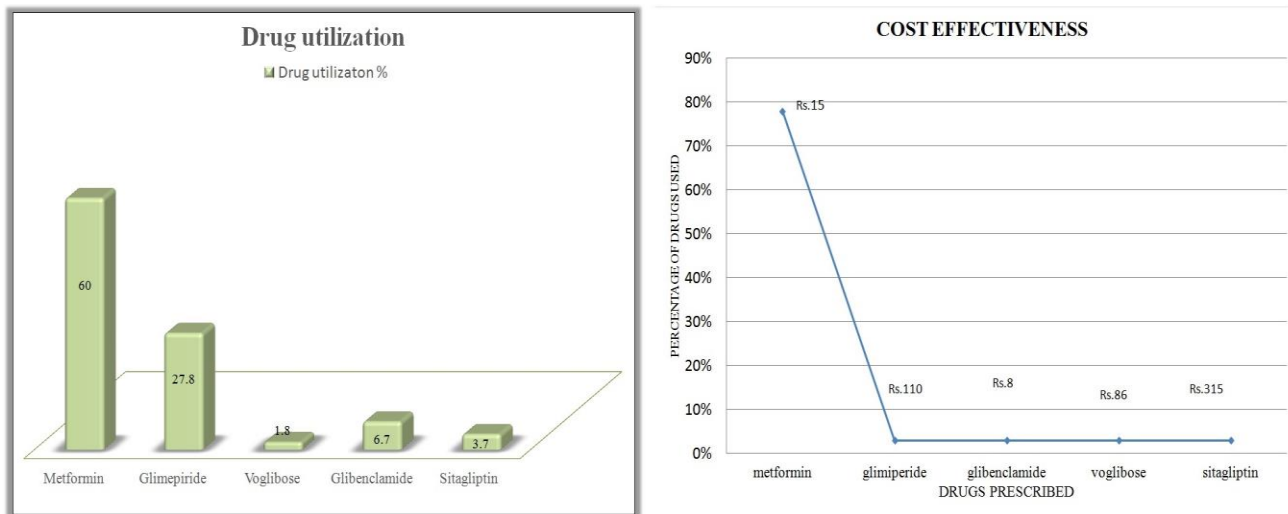


FIGURE-5: - PERCENTAGE GRAPH OF DRUG UTILIZATION AND COST-EFFECTIVENESS

Table-3 and Figure 5 shows the percentage of drugs that are utilized in the treatment of 270 patients and Figure-5 shows the analysis of cost of therapy for 270 patients in which most cost-effective drug was glibenclamide (Rs.8) but metformin (Rs.15) was highly prescribed i.e., 78% due to multiple mechanisms of actions and greater efficacy.

DISCUSSION

A prospective interventional study, "A STUDY ON DRUG UTILIZATION REVIEW OF ORAL HYPOGLYCAEMIC DRUGS IN A TERTIARY CARE HOSPITAL" was conducted in an out-patient and in-patient departments of a tertiary care hospital and 270 were the total number of patients collected and participated in the survey. Data was collected in a well-designed Data collection forms.

As per our study among 270 patients, 61.1% of cases were males and 38.9% of cases were females which is identical to the research that is done by Sayed Aliul Hasan Abdi, Shobha Churi, et al.²⁴ According to our patients between 51-60 years were higher with 32.2% and found to be highly affected with Type 2 Diabetes which is identical to the study carried out by Sudha Vengurlekar et al.²⁵ In our study 57.8% patients had a family history of Type 2 Diabetes and 42.2% haven't had any history which is similar to the study that is done by A K Papazafiropoulou et al.²⁶ According to our study out of 270 patients 141 patients were alcoholics and 97 patients were smokers. 21 patients were both alcoholics and smokers. In our study, patients with good adherence to medication were 35.6%, poor adherence -43.3% and very poor - 21.1% suggesting the importance patient education and counselling. Out of 270 patients, 46.7% cases were reported to rarely perform physical exercise and brisk walking for 30 mins which is similar to the research done by Hidetaka Hamasaki²⁷. Total 270 Patients were observed to have dietary restrictions like low salt and low-fat diet. Hypertension was found it to be highest i.e., 23.3% similar to the study of Upadhyay DK, Palaian S et al.²⁸ followed by CVD's -19% which is similar to study of SudhaVengurlekar.²⁵ Various symptoms were observed in the study population in which polyphagia 32.2% recorded highest. Patients prescribed with combination therapy-66.7%, monotherapy-33.3%. Monotherapy was prescribed for 90 patients. Metformin is most commonly prescribed drug as monotherapy which is similar to the study of

Sang Youl Rhee, Hyun Jin Kim, et al.²⁹ Combination therapy prescribed for 180 patients in which patients with two drug therapy-81.7%, three drug therapy-15%, four drug therapy-3.3% which is similar to the study of Grace SN Lau, Dylan CK Tse.³⁰ Overall utilization of drugs for 270 patients in which metformin-60% is highly utilized drug. Cost of the therapy is analysed for 270 patients. Metformin is prescribed more as its costs lesser ₹ 40, patient compliance is greatly observed and has multiple mechanism of actions than Glibenclamide which costs Rs. 8. Drugs produced some of the side effects such as weight gain and acidity, hypoglycaemia, diarrhoea. Weight gain & Acidity are the commonly seen side effect. No ADR's were reported in our study.

CONCLUSION

Patients with Type-2 Diabetes Mellitus were more usually encountered between the ages of 51 and 60, as well as in those who had a poor lifestyle and bad behavioural habits, as well as those who were genetically predisposed to the disease. Monotherapy and a few combination treatments were employed in this study. Patients had a variety of symptoms. The most common symptom noticed was polyphagia (increased appetite). Metformin was the most commonly prescribed medicine among the monotherapies provided to the patient. The most common side effects were weight gain and acidity. The majority of the patients in our study were treated with a combination therapy that included additional comorbidities. Hypertension was discovered to be the most prevalent comorbidity. Combination therapies included two drug therapy, three drug therapy, and four drug therapies. Dose changes were used to control minor adverse effects. The prescription in this trial was reasonable, and the medications were both safe and effective. This study found that the occurrence of diabetes has a significant impact on comorbidities, and that patients should be treated carefully based on the severity of their comorbidity, rather than prescribing haphazardly. This study provides excellent patient

education while also demonstrating that the prescription is cost effective. Our study was not able to prove a particular drug for a particular glucose level which might be proven later with advanced therapies.

REFERENCES

- Peng – Fei, Qian Li, Mogher Khamaisi et.al Type 2 Diabetes mellitus and Macrovascular complications, *International Journal of Endocrinology*, 2017, DOI: 10.1155/2017/4301461
- Pradeepa R. Mohan V, The changing scenario of diabetes epidemic: implications for India, *The Indian Journal of Medical Research*, 2002, 116:121-132
- Akram T Kharroubi, Hisham M Darwish, Diabetes mellitus: The epidemic of the century, *World Journal of Diabetes*, 2015, DOI: 10.4239/wjd.v6.i6.850
- Nathaniel G Clark, Kathleen M.Fox, Susan Grandy et.al, Symptoms of Diabetes and their association with the risk and presence of Diabetes, *Diabetes care*, 2007, DOI: 10.2337/dc07-0816
- Yanling Wu, Yanping Ding, Wen Zhang, et al, Risk Factors Contributing to Type 2 Diabetes and Recent Advances in the Treatment and Prevention, *International Journal of Medical Sciences*, 2014, DOI: 10.7150/inms.10001.
- Debrah Asimwe, Godfrey O. Mauti, and Ritah Kiconco, Prevalence and Risk Factors Associated with Type 2 Diabetes in Elderly Patients Aged 45-80 Years at Kanungu District, *Journal of Diabetes Research*, 2020, DOI: 10.1155/2020/5152146.
- Aidar R Gosmanov, Elvira O. Gosmanova, Abbas E. Kitabchi, Hyperglycemic Crisis: Diabetic Ketoacidosis (DKA), And Hyperglycemic Hyperosmolar State (HHS), 2021,
- Duriye Deniz Demirseren, Selma Emre, Gulsen Akoglu, et al, Relationship Between Skin Diseases and Extracutaneous Complications of Diabetes Mellitus, 2013, DOI: 10.1007/s40257-013-0048-2.
- Sharad P. Pendsey, Understanding diabetic foot, *International Journal of Diabetes in Developing Countries*, 2010, DOI: 10.4103/0973-3930.62596.
- Jessica L. Harding, Meda E. Pavkov, Dianna J. Magliano, et al, Global trends in diabetes complications: a review of current evidence, 2018, DOI: 10.1007/s00125-018-4711-2.
- Cristina Hernandez, Rafael Simo, Treatment of Diabetes Mellitus: General Goals, and Clinical Practice Management, *Spanish journal of Cardiology*, Volume 55, Issue 8, 2002, DOI: 10.1016/s0300-8932(02)76714-6.
- Mary E Packer, Winston Crasto, Type 2 diabetes: Pharmacological management strategies, *Pharmaceutical Journal*, 2015.
- Michael Dansinger, Type 2 Diabetes treatments, 2019.
- Jean L. Chan, Martin J. Abrahamson, Pharmacological management of type 2 diabetes mellitus: rationale for rational use of insulin, *Mayo Clinic Proceedings*, DOI: 10.4065/78.4.459.
- James Thrasher, Pharmacologic Management of Type 2 Diabetes Mellitus: Available Therapies, *The American Journal of Medicine*, 2017, DOI: 10.1016/j.amjmed.2017.04.004.
- Julie S. Eggleton, IshwarlalJlalal, Thiazolidinediones, *Stat Pearls*, 2021.
- Arkiath V Raveendran, Elias C Chacko, Joseph M Pappachan, Non-pharmacological Treatment Options in the Management of Diabetes Mellitus, *European Endocrinology*, 2018, DOI: 10.17925/EE.2018.14.2.31.
- Sheri R. Colberg, Ronald J. Sigal, Kristin Castorino, et al, Physical Activity/Exercise and Diabetes: A Position Statement of the American Diabetes Association, 2016, DOI: 10.2337/dc16-1728
- Samuel Klein, Nancy F Sheard, Xavier Pi-Sunyer, Anne Daly, et al, Weight management through lifestyle modification for the prevention and management of type 2 diabetes: rationale and strategies. A statement of the American Diabetes Association, the North American Association for the Study of Obesity, and the American Society for Clinical Nutrition, *American Journal of Clinical Nutrition*, 2004, DOI: 10.1093/ajcn/80.2.257
- Drug and Therapeutics Committee Training Course, Session 11. Drug Use Evaluation, World Health Organization, United States Agency International Development, Management Sciences for Health.
- Sekhar Mandal, Tamoghna Maiti, Asoke Kr. Das, et.al, Drug utilization study in patients with type 2 diabetes mellitus attending diabetes clinic of a tertiary care hospital in rural Bengal, *International Journal of Basic & Clinical Pharmacology*, 2016, DOI: 10.18203/2319-2003.ijbcp20162487.
- Dr Vikram N. Patil, Dr Padmakar T. Pandit, Dr Balasaheb B. Ghongane, A Study of Drug Use in Type 2 Diabetes Mellitus with or Without Co-Morbidities in Patients Visiting A Tertiary Care Hospital, *Journal of Medical Science and Clinical Research*, 2017, DOI: 10.18535/jmscr/v5i5.30.
- Shruti Vihang Brahmbhatt, Bhagya Manoj Sattigeri, Ashok Kumar Nil, et al, prospective study on drug utilization pattern & rationality in treatment of type II diabetes mellitus, *International Journal of Research in Medical Sciences*, 2014, DOI: 10.5455/2320-6012.IJRMS20140852.ss
- Sayed Aliul Abdi, Shobha Churi, et al, Study of drug utilization pattern of antihyperglycemic agents in a South Indian tertiary care hospital, *Indian Journal of Pharmacology*, 2012, DOI: 10.4103/0253-7613.93850
- Sudha Vengurlekar, Prerna Shukla, et al, Prescribing Pattern of Antidiabetic Drugs in Indore City Hospital, *Indian Journal of Pharmaceutical Sciences*, 2008, DOI: 10.4103/0250-474X.45404
- A K Papazafropoulou et al, Family History of Type 2 Diabetes: Does Having a Diabetic Parent Increase Risk? *National Library of Medicine*, 2017, DOI: 10.2174/1573399812666151022143502
- Hidetaka Hamasaki, Daily physical activity and type 2 diabetes, *World Journal of Diabetes*, 2016, DOI: 10.4239/wjd.v7.i12.243

28. Upadhyay DK, Palaian S, et al, Prescribing pattern in diabetic outpatients in a tertiary care teaching hospital in Nepal, 2007

29. Sang Youl Rhee, et al, Monotherapy in patients with type 2 diabetes mellitus, Diabetes and Metabolism Journal, 2017, DOI: 10.4093/dmj.2017.41.5.349

30. Grace SN Lau, et al, Use of antidiabetic and antihypertensive drugs in hospital and outpatient settings in Hong Kong, National Library of Medicine, 1996, DOI: 10.1177/106002809603000304

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