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Evaluation of prescribing pattern of anti-diabetic drugs using WHO prescribing indicators in a tertiary care hospital in Puducherry: A cross-sectional study

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Abstract
Background
Diabetes is emerging as a major health care problem especially in developing countries. Adhering to the WHO indicators and judicious use of anti-diabetic drugs will be a promising step in health care system.
Objective
To analyse the prescribing pattern of anti-diabetic drugs in a tertiary care hospital.
Materials and Methods
A retrospective, cross-sectional study was done for six months in the Medical Records Department, Pondicherry Institute of Medical Sciences. The data was analysed using WHO core indicators and expressed as descriptive statistics.
Results
The total number of encounters surveyed was 600**.** Present study found that the average number of drugs prescribed per encounter was 5.15. Percentages of drugs prescribed by generic name was found to be 25.37%, antibiotic drugs 22.66% and injections 20.5%. Drugs prescribed from an Essential Drug List (EDL) was 74.30%.

Keywords: Diabetes, Prescribing pattern, Anti-diabetic drugs, WHO core indicators.

Introduction
Irrational use of drugs is a major health concern of present day medical practice. Indicators provide a measure of performance of health care providers in the area of prescribing practices. Based on the practice observed samples of clinical encounters taking place at health care facilities for the treatment of acute and chronic illnesses indicators are formulated. World Health Organization developed a core prescribing indicators to measure the degree of polypharmacy, the tendency to prescribe drugs by generic name and overall level of use of antibiotics and injections.

The degree to which the prescribing practice is adhered to the essential drug list (EDL), formulary or standard treatment guidelines is also measured. This is done by searching for number of drugs prescribed from the essential drug list [1]. Access to essential drug list and essential drugs available on regular basis help the prescribers to treat the patients in a rational way [2]. Ineffective treatment, unnecessary prescription of drugs particularly antimicrobials and injections, development of resistance to antibiotics, adverse effects and economic burden both on patients and society are inevitable consequences. It has been estimated that 50% or more medicine expenditure is being wasted through irrational prescribing, dispensing and patient use of medicine [3]. In the health care settings of developing countries irrational prescriptions and long term use of drugs is characterized by poly pharmacy, excessive use of antibiotics and injections and use of drugs of doubtful efficacy is quite common [4]. Diabetes mellitus (DM), a group of metabolic disorders has been known to mankind since time immemorial. It results from absolute or relative deficiency of insulin or its function. By the year 2025 about 300 million persons with diabetes has been estimated globally [5].

According to sixth edition of International Diabetes Federation there were 382 million diabetes patients by the year 2013. Yet 175 million of cases were undiagnosed. Each year more than 231,000 people in the United States and more than 396 million people worldwide die from diabetes and its complications [6]. Estimated global healthcare expenditures to treat and prevent diabetes and its complications is at least 376 billion US Dollar (USD) in 2010. By 2030, this number is projected to exceed some 490 billion USD [7].

Number of drugs are available for treatment of type 1 and type 2 diabetes with or without complications. Prescription of such drugs varies from physician to physician depending upon

the glycemic status and complications due to diabetes. It is essential to understand the trend of prescription given to the patients in tertiary health care centers. Guidelines and prescribing indicators help in judicious and rational use of drugs. Whether the physicians in tertiary health care center adhere to WHO core prescribing indicator is still unclear. Hence, this study was designed with the following aim and objectives.

Aim of the study

To study the prescribing pattern of anti-diabetic drugs in a tertiary care hospital.

Objectives

To analyse the prescribing pattern of anti-diabetic drugs in a tertiary care hospital using WHO core drug prescribing indicators.

Materials and Methods

Study design: Retrospective, cross-sectional study

Study site: Medical Records Department (MRD), Pondicherry Institute of Medical Sciences (PIMS), Pondicherry.

Inclusion criteria: Prescriptions from all diabetic patients of either gender are included.

Exclusion criteria: Prescriptions from pregnant women and with insufficient data are excluded

Study Period: 6 months (March 1, 2014 – Aug 30, 2014)

Methodology

After obtaining approval from the Institutional Ethics Committee and permission from Medical Records Department, data from the period of 6 months from March 1, 2014- August 30, 2014 was collected and recorded on a customized data collection sheet in an approved manner.

1. Diagnosed case files of diabetes mellitus was collected from MRD of a tertiary care hospital, Pondicherry Institute of Medical Sciences (PIMS), Puducherry.
2. Prescriptions containing anti diabetic drugs were entered into data collection sheet with details such as name of drug, dosage form and route of administration of prescribed drug.
3. Demographic details such as name, age, gender and PIMS No. of the patients receiving anti diabetic drugs were collected from the same patient's record file.
4. All data collected as per proforma were analysed manually using WHO prescribing indicators and then using Microsoft excel 2013.

Formula adopted from the WHO's manual for prescribing indicators assessment [8]

1. Average number of drugs per encounter= Total number of drugs prescribed/Total number of encounters sampled.
2. Percentage of drugs prescribed by generic name= (Number of drugs prescribed by generic name/Total number of drugs prescribed) x100
3. Percentage of encounters with an antibiotic prescribed= (Number of patient encounters with an antibiotic/ Total number of encounters sampled) x100
4. Percentage of encounters with an injection prescribed= (Number of patient encounters with an injection prescribed/Total number of encounters sampled) x100
5. Percentage of drugs prescribed from essential drugs list= (Number of drugs prescribed from essential drugs list/ Total number of prescribed drugs) x100.

Results

A total number of 600 encounters was surveyed. Total number of drugs prescribed in 600 prescriptions was 3090.Out of 600 encounters, 376 (62.66%) males and 224 (37.34%) females were observed. Most patients belonged to the age group of 51-70 years (54.16%) followed by 30-50 years (32.66%). Present study found that the average number of drugs prescribed per encounter was 5.15. Percentages of drugs prescribed by generic name was found to be 25.37%, antibiotic drugs 22.66% and injections 20.5%. Drugs prescribed from an Essential Drug List (EDL) was 74.30%. The commonly used anti-diabetic drugs were Metformin (56.03%) and Glimepiride (15.8%). Observed encounters showed antibiotics like Ciprofloxacin (38.23%) followed by Doxycycline and Cefixime (10.29%). Other non-diabetic drugs prescribed were Anti-hypertensive, Antimalarial, analgesics/Antipyretics and Multi-vitamins depending upon the diagnosis of the patient.

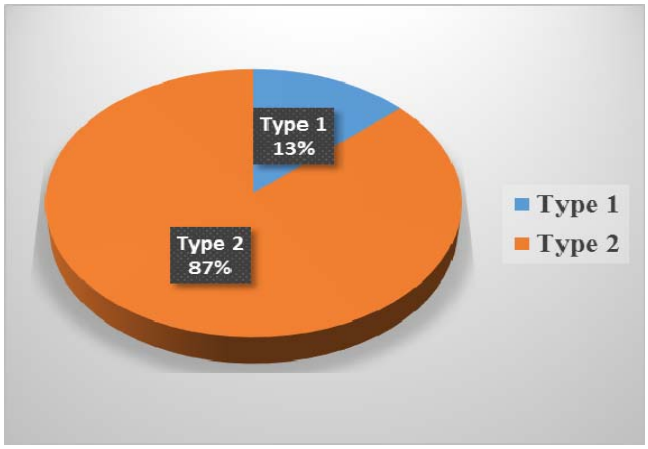

Fig 1: Distribution of Type 1 and Type 2 Diabetes mellitus in observed encounters

Table: Summary of results obtained at PIMS from March 2014 to August 2014 (n = 600 encounters)

S.no	Prescribing indicators	Total drugs/ encounters	Average/ percent	Standard derived or ideal
1	Average number of drugs per encounter	3090	5.15	(1.6-1.8)
2	Percentage of drugs prescribed by generic name	784	25.37%	100%
3	Percentage of drug encounter with antibiotics	746	22.66%	(20.0-26.8%)
4	Percentage of drug encounter with injections	123	20.5%	(13.4%-24.1%)
5	Percentage of drugs prescribed from EDL	2296	74.30%	100%

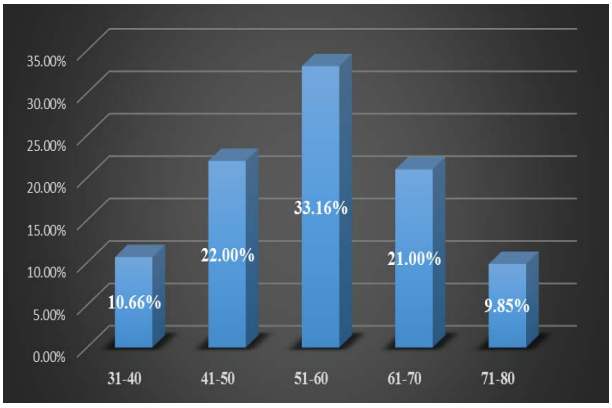

Fig 2: Age wise distribution of patients in observed encounters

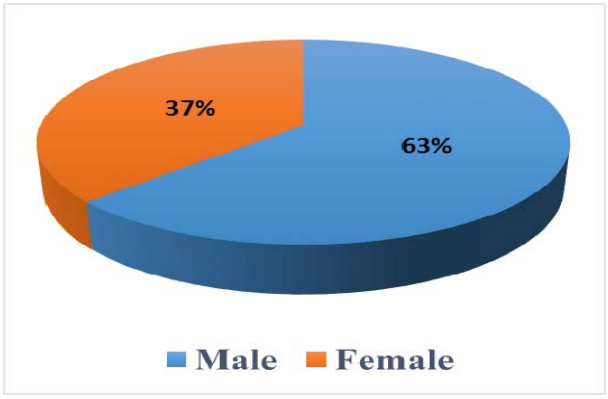

Fig 3: Gender wise distribution of observed encounters

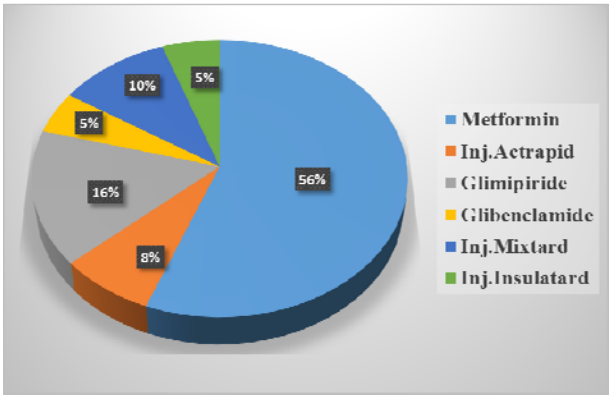

Fig 4: Distribution of prescribed anti-diabetic drugs in the encounters

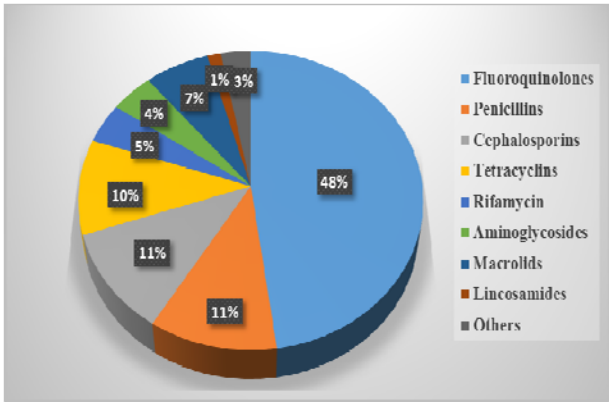

Fig 5: Distribution of Antibiotics prescribed in encounters

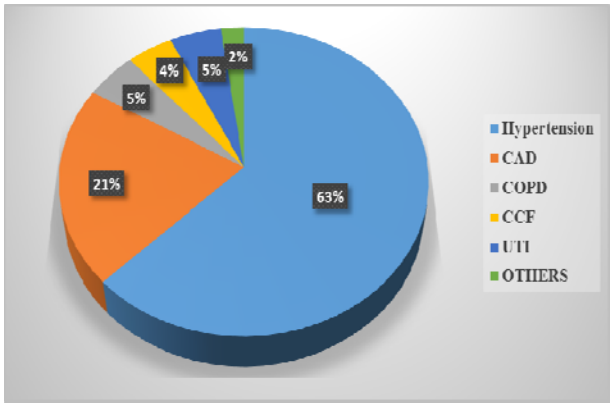

Fig 6: Distribution of comorbidity in observed encounters

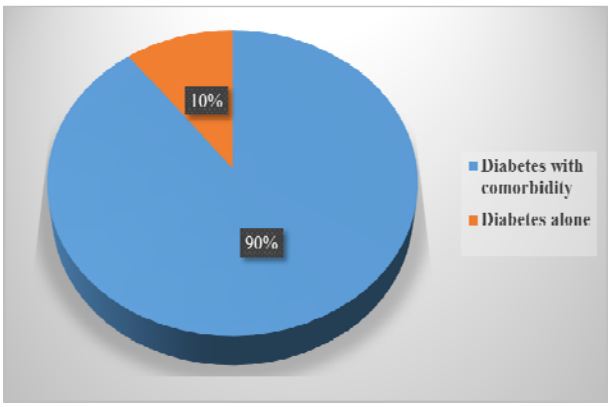

Fig 7: Percentage of encounters with diabetes alone and diabetes with comorbidity

Discussion

Diabetes mellitus (DM), comprises a group of common metabolic abnormalities that share the phenotype of hyperglycemia [9]. In this study, we found a higher incidence of diabetes in elderly patients with a high incidence in age group of 51-60 years. This finding is in accordance with similar study conducted by Upadhyay *et al.* [10]. In general, patients developing diabetes mellitus are in the age group of more than 50 years. In our study 376 (62.66%) males and 224 (37.34%) females had diabetes mellitus. The reason for having diabetes more in males than in females could be because of lifestyle. In this present study prevalence of type 2 DM is more when compared to type1 DM (87% vs 13%).

Average number of drugs per prescription was 5.15 in our study which is above the standard (1.6-1.8) derived to serve as ideal [11]. Possible reason for polypharmacy could be because of comorbid conditions in diabetic patients. Doctors should refrain from prescribing unnecessary medicines like multivitamins, minerals and enzymes unless absolutely required by the patient. Our study is almost in concordance with study done in Bareilly, UP whose number of drugs per prescription was 5.97 [12]. Polypharmacy could be due to comorbid conditions as it was seen in our study hypertension followed by CAD, COPD & UTI and CCF were common findings. The study of prescribing pattern and evaluation of the prescribing practice may recommend necessary modifications to achieve rational and cost-effective medical care by practitioners for making medical care rational. Patients with diabetes mellitus are generally treated with many pharmacological agents which may leads to polypharmacy and drug related problems in the prescriptions [13]. Polypharmacy

has been reported as one of the causes of adverse drug reactions [14].

The percentage of drugs prescribed by generic name in the present study showed 25.37%. Considering the standard derived to serve as ideal (100%) [11]. The prescribers of our hospital need to improve in prescribing pattern by using more of generic name. In another study of 12 developing countries the percentage of generic drugs prescribed was 58% in Nigeria which is also below the standard. Our study also showed much lower percentage of prescriptions with generic name. The reason for which could be many; namely lucrative advertisements by the pharmaceutical companies, limited awareness about the prescribing guidelines of WHO by the prescribers, insufficient availability of generic drugs in our pharmacy (as per records). Prescribing generic drugs could be a viable alternative as it decreases the economic burden on the patients. Further, educational intervention methods and strict compliance to WHO drug policies could play a role in generic prescribing [15].

Percentage of encounters in which antibiotics were prescribed in our tertiary care center was 22.66%. This result is within the standard (20.0%-26.8%) derived to be ideal [11].

The optimum percentage of prescriptions with antibiotics shows that the doctors in our hospital are judiciously using antibiotics.

The percentage of encounters in which injections were prescribed was 20.5%. This result falls within the standard (13.4%-24.1%) derived to serve as ideal [11]. Injections are always expensive compared to other dosage forms moreover it requires trained personal for administration. Besides this, unhygienic use of injections can increase the risk of transmission of potentially serious pathogens such as hepatitis, HIV/AIDS, and blood-borne diseases.

In our study the percentage of drugs prescribed from EDL (India) was 73.30% which is less than standard (100%) to serve as ideal [11]. Low percentage of result could be because of decrease awareness among the doctors about EDL.

A number of studies carried out on prescribing pattern of antidiabetic drugs in various parts of India and at global level concluded metformin to be the most common antidiabetic drug utilized for Type 2 DM. In uncontrolled cases, sulfonylureas or Insulin was added as the combination therapy as per ADA guidelines and WHO and metformin seems to be the first line drug

Followed [10, 16-18]. Our study also proved metformin was the commonest drug used (56%) followed by glimipiride (15.8%) and glibenclamide (4.9%). Among the antibiotics fluoroquinolones ranked high in our study of which ciprofloxacin was found to be (38.23%). This was followed by beta-lactam group of drugs (penicillins & cephalosporins) (11.02%) and tetracyclin (doxycycline) (10.29%). The use of antibiotics in this study could have been because of comorbid conditions like UTI.

Conclusion

Diabetes mellitus is reaching potentially epidemic proportions in India. The level of morbidity and mortality due to diabetes and its potential complications are enormous, and pose significant healthcare burdens on both families and society. Worryingly, diabetes is now being shown to be associated with a spectrum of complications. In India, the steady migration of people from rural to urban areas, the economic boom, and corresponding change in life-style are all affecting the level of diabetes. The prescribing pattern of antidiabetic drugs showed among the middle aged group diabetes was prevalent. Polypharmacy in our study indicates occurrence of diabetes with comorbid conditions. Accounting for high cost drug interactions and non-compliance. Lack of knowledge of the use of generic name and drugs listed under EDL has increased our findings from the standard. This requires awareness among the prescribers. Appropriate use of antibiotics and injections per encounter suggests sensible use of the same. Implementation of WHO core prescribing indicators by the prescribers would help to reduce the cost, to recognize and prevent potentially dangerous drug- drug interaction and antibiotic resistance.

This study depicts the use of various commonly prescribed antidiabetic drugs. Among the sulfonylurea group Glimepiride use was found to be maximum and Metformin among the Biguanide group. Prescribing patterns need to be improved in accordance with WHO core indicators.

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Conflict of interest: None declared

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