

AGE AND GENDER-BASED UTILISATION PATTERN OF ANTIDIABETIC DRUGS IN AJMAN, UNITED ARAB EMIRATES

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Diabetes is a chronic multi-system metabolic disease associated with significant morbidity, mortality and cost to the society. Socio-demographic factors like age and gender may affect prescribing pattern. The objective of the study was to evaluate the drug usage pattern of antidiabetic drugs in different age groups and gender. A cross sectional survey of all prescriptions of patients with diabetes attending the Outpatient Department (OPD) of Internal Medicine of Gulf Medical College Hospital and Research Centre, Ajman, United Arab Emirates was conducted for three months. The socio-demographic and drug information for each patient was obtained using a questionnaire. A total of 132 prescriptions were included in this survey whereby 54.8% of patients were males and 45.2% were females. The mean age of patients with diabetes was 54.09±10.24 years. Hundred twenty eight prescriptions were for patients with type 2 diabetes. Metformin alone and in combinations were the commonly prescribed antidiabetic drug. Insulin prescription was noted in 14 patients (type 1 and 2 diabetes), the commonest being human insulin. Metformin combinations were most commonly prescribed in both genders. For patients below 45 years and those between 45–60 years of age, metformin combinations were the commonest prescribed, while among patients above 60 years of age sulfonylureas were the most commonly prescribed. The utilisation pattern of antidiabetic drugs varied among different age groups and gender. Metformin alone and combinations with newer antidiabetic medications were commonly utilised.

Keywords: Utilisation pattern, Antidiabetic drugs, Diabetes, United Arab Emirates

INTRODUCTION

The prevalence of diabetes mellitus for all age groups across the world was estimated to be 2.8% in 2000 and 4.4% in 2030. The number of people affected with diabetes is projected to increase from 171 million in 2000 to 366 million in 2030. The most important demographic change to diabetes prevalence globally appears to be the increase in the proportion of people above 65 years of age (Wild *et al.* 2004).

The treatment of type 1 diabetes is mainly with insulin, whereas type 2 diabetes is treated with oral hypoglycemic agents. Uncontrolled blood sugar can lead to several

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complications like microvascular (retinopathy, nephropathy and neuropathy) and macrovascular complications (ischemic heart disease, peripheral vascular disease and cerebrovascular disease) (Rang *et al.* 2003; Knowler *et al.* 2002; Bakassas and Lunde 1986). Recent studies from the developed countries have addressed gender differences in the control of hypertension, diabetes and other cardiovascular risk factors in diabetic hypertensive patients (Ferrara *et al.* 2008; Gouni-Berthold *et al.* 2008; McFarlane *et al.* 2005; Nilsson *et al.* 2004).

Several antidiabetic drug utilisation reviews have been published from across the world (Sultana *et al.* 2010; Upadhyay *et al.* 2007; Yurgin, Secnik and Lage 2007; Chiang *et al.* 2006; Johnson, Pohar and Secnik 2006; Boccuzzi *et al.* 2004; Sutharson, Hariharan and Vamsadhara 2003; Al Khaja, Sequeira and Mathur 2001; Yuen *et al.* 1998). Drug utilisation review (DUR) of antidiabetic medicines in the healthcare setting can facilitate rational drug use in patients with diabetes. They provide useful insights into the current prescribing practices and also identify irrational prescribing. The consequences of irrational prescribing include non-adherence to medications, which can result in complications due to uncontrolled blood glucose levels and also escalate drug costs and health care costs. Findings from DUR studies can be used to improve current prescribing practices and to help policy makers and Drug and Therapeutic committees encourage rational use of drugs. Hence, the present study was carried out to assess the age and gender-wise utilisation pattern of antidiabetic drugs among patients with diabetes visiting a tertiary care centre in Ajman, United Arab Emirates.

METHODS

In this cross sectional survey, prescriptions of patients above 18 years of age with type 1 or type 2 diabetes visiting the Outpatient Department (OPD) of Internal Medicine of Gulf Medical College Hospital and Research Centre, Ajman were included. This study was conducted over a period of three months from January to March 2011. An interviewer-administered questionnaire was developed to collect relevant information pertaining to the study objectives. The questionnaire consisted of both open-ended and close-ended questions, which dealt with socio-demographic characteristics, clinical data and pattern of antidiabetic prescription. The subject experts validated the questionnaire for its content, and a pilot study was carried out among randomly selected patients attending the OPD of Internal Medicine. The questionnaire was administered at end of the patients visit in the OPD. The prescriptions of this study sample were utilised for assessing the drug utilisation pattern. One prescription per patient was used for the analysis. The information collected from the prescriptions was transferred to the questionnaire. Anonymity of the study subjects was maintained.

Approval of the study was obtained from the Gulf Medical University Ethics Committee. A written informed consent form was used in the study to obtain consent from the subjects willing to participate in the study. Data were fed into Microsoft Excel spreadsheet and transferred to predictive analytical software (PASW) version 18 (IBM Chicago, Illinois) for analysis. Chi-square test was used to determine any association between the drugs prescribed in both gender and also among the different age groups ($p < 0.05$).

RESULTS

A total of 132 patients were surveyed. The sample consisted of 52.3% female patients and 47.7% male patients. The ages of the subjects were categorised into 3 groups, viz. below 45 years, between 45 and 60 years and above 60 years. Majority of the patients were in the age group of 45 to 60 years (50.8%) (Table 1). The mean age of the subjects was 54.09 ± 10.24 years with a minimum and maximum age of 28 and 88 years, respectively. A female preponderance was observed in all age groups except in the age group 45 to 60 years (Table 1).

Table 1: Age and gender distribution of participants.

Age group	Gender				Total	
	Male		Female		No.	%
	No.	%	No.	%		
Less than 45 years	10	15.9	15	21.7	25	18.9
Between 45 and 60 years	37	58.7	30	43.5	67	50.8
Greater than 60 years	16	25.4	24	34.8	40	30.3
Total	63	100.0	69	100.0	132	100.0

Ninety seven percent had type 2 diabetes mellitus and 3.0% had type 1 diabetes mellitus. The mean age of subjects with type 2 diabetes was 54.7 ± 9.8 and that of type 1 diabetes patients was 35.3 ± 5.0 . The mean duration of diabetes mellitus was 4.3 ± 4.2 years. The mean age at onset of type 1 diabetes mellitus was 14.8 ± 1.9 years whereas the mean age at onset of type 2 diabetes mellitus was 50.9 ± 8.4 years. All subjects with type 1 diabetes reported family history of diabetes and 75.0% were first degree relatives of the patients. Around 48.4% of the type 2 diabetes reported family history of diabetes and majority were first degree relatives.

Among the patients, 84.1% had at least one coexisting condition. The coexisting condition hypertension was predominant in both, 75.0% in type 1 diabetes and 57.8% in type 2 diabetes.

The average number of drugs per prescription was 3.2 ± 1.3 . All patients with type 1 diabetes ($n=4$) received human insulin. Prescriptions with 5 and more than 5 drugs were found among patients above 45 years of age. There were no gender differences in the mean number of drugs prescribed; descriptive statistics was determined. The most commonly co-prescribed medications along with antidiabetic drugs were antihypertensives followed by hypolipidemic agents.

Among the antidiabetic medications prescribed for type 2 diabetics, metformin combination was the common class of drugs, accounting for 32.8% of total antidiabetics, followed by metformin (23.4%), sulfonylureas (28.9%), insulin (7.8%), gliptin (4.7%) and acarbose (2.3%). The most common metformin combination was metform + sitagliptin (14.3%), followed by metformin + vildagliptin (9%). The most common sulfonylurea prescribed was glicazide (11.4%), glimepiride (9%) and glibenclamide (9%). Both metformin combinations and insulin were prescribed to both genders equally whereas metformin was prescribed to 53.3% female patients. Acarbose was given to more males than to females whereas gliptin was prescribed more to females when compared to males. The gender-based pattern of drug utilisation is detailed in Table 2. No statistical

significance noted in the gender based drug utilisation pattern. Chi-square test was used to compare utilisation pattern among males and females and no statistical significance was found ($p>0.05$).

Table 2: Gender distribution of drugs among patients with type 2 diabetes.

Drugs	Gender				Total	
	Male		Female		No.	%
	No.	%	No.	%		
Metformin	14	22.6	16	24.2	30	23.4
Metformin combination	21	33.9	21	31.8	42	32.8
Insulin	5	8.1	5	7.6	10	7.8
Sulfonylurea	18	29.0	19	28.8	37	28.9
Gliptin	2	3.2	4	6.1	6	4.7
Acarbose	2	3.2	1	1.5	3	2.3

The drug utilisation pattern in the three age groups is presented in Table 3. It was observed that among the patients above 60 years of age, sulfonylureas were the most frequently prescribed antidiabetic drug, while metformin combinations were commonest in the other two groups. No statistical significance noted in the drug utilisation pattern in the three age groups. Chi-square test was used to compare utilisation pattern different age groups and no statistical significance was found ($p>0.05$).

Of the 132 patients, insulin was utilised by 14 patients (both type 1 and type 2 diabetes). Among the various insulin preparations, human insulin was prescribed in five subjects followed by insulin detemir in five subjects and regular insulin was prescribed in four patients. The most preferred site of insulin administration was the abdomen followed by the forearm. The most frequently used device for administration of insulin was insulin pen.

Table 3: Age group distribution of drugs among patient with type 2 diabetes.

Drugs	Age group						Total	
	Less than 45 years		45-60 years		Greater than 60 years		No.	%
	No.	%	No.	%	No.	%		
Metformin	5	23.8	20	29.9	5	12.5	30	23.4
Metformin combination	9	42.9	21	31.3	12	30.0	42	32.8
Insulin	1	4.8	4	6.0	5	12.5	10	7.8
Sulfonylurea	5	23.8	15	22.4	17	42.5	37	28.9
Gliptin	1	4.8	4	6.0	1	2.5	6	4.7
Acarbose	-	-	3	4.5	-	-	3	2.3

DISCUSSION

In the management of diabetes, drugs play a vital role and become unavoidable in the vast majority of patients. The present study assessed the age and gender-based utilisation pattern of antidiabetic drugs. Metformin combination was the most commonly prescribed antidiabetic. The route of administration for the majority of the drugs prescribed was the oral route.

In our study, we found that the average number of drugs per prescription was 3.2 ± 1.3 drugs. A previous study from India reported an average of 1.95 (Sutharson *et al.* 2003). Prescriptions with five or more drugs were found to be common among patients above 45 years of age. With the advancing age, the co-morbidities also increase and consequently increase the number of prescribed medications. This could explain the reason for increased number of medication in patients above 45 years of age.

The present study showed a high number of cases in the age group 45 to 60 years, with a mean age of 54.09 ± 10.24 years. This is in accordance with the observation made by Upadhyay *et al.* (2007) and Boccuzzi *et al.* (2004). Other studies (Yurgin, Secnik and Lage 2007; De Pablos-Velasco *et al.* 2005; Van den Brink *et al.* 1993) have reported an average age higher than what was seen in the present study. An early onset of developing diabetes is seen in this study though in general, the elderly are at greater risk compared to the younger generation (Upadhyay *et al.* 2007).

In the present study, a slight preponderance of females was noticed similar to that reported by Sutharson, Hariharan and Vamsadhara (2003). In contrast, Vengurlekar *et al.* (2008), Yurgin, Secnik and Lage (2007), Johnson, Pohar and Secnik (2006) and Boccuzzi *et al.* (2004) indicated male predominance in their reports.

The mean duration of diabetes mellitus observed was 4.3 ± 4.2 years. This observation was similar to the observation made by Upadhyay *et al.* (2007), whereas a study from Spain showed the mean duration of diabetes as 11.8 ± 8.0 years (De Pablos-Velasco *et al.* 2005). In this study, hypertension was the commonest co-morbidity observed. Yurgin, Secnik and Lage (2007) also reported similar observation with regard to the co-morbidity in patients with diabetes.

Metformin alone and metformin combination were the commonly prescribed antidiabetic drugs observed in the present study, in line with findings of Sultana *et al.* (2010), Upadhyay *et al.* (2007), Yurgin, Secnik and Lage (2007) and Johnson, Pohar and Secnik (2006). This finding is in contrast to other investigators (Chiang *et al.* 2006; Al Khaja, Sequeira and Mathur 2001) where sulfonylureas was the most commonly prescribed antidiabetic drug. Yuen *et al.* (1998) observed similar findings. Vengurlekar *et al.* (2008) reported that in their study metformin was the most prescribed drug. Metformin + sitagliptin combination was the most common combination observed in our study, while in the study by Al Khaja, Sequeira and Mathur (2001) metformin + sulfonylurea was the most common combination. Metformin is considered to be a safer and cost effective drug over others in terms of hypoglycemia and could be the probable reason for this finding.

It was observed that among the patients above 60 years of age, sulfonylureas was the most frequently prescribed antidiabetic drug. Yurgin, Secnik and Lage (2007) also observed that metformin prescriptions were fewer in patients 75 years and above. Al Khaja, Sequeira and Mathur (2001) also reported the use of long acting sulfonylureas in patients above 65 years. It is generally indicated that age above 65-70 years represents a specific contraindication for the administration of the biguanides since the risk of the

drug-associated lactic acidosis increases with age (Orban *et al.* 2006). No gender-based differences were noted in drug prescribing pattern in the study, similar to Al Khaja, Sequeira and Mathur (2001). Limitations of the study include the small sample size, which restricts the generalisation of the findings.

CONCLUSION

In conclusion, a wide spectrum of antidiabetic drugs was prescribed among the subjects, with metformin combination being the most commonly prescribed antidiabetic medication. Sulfonylureas was frequently prescribed in patients above 60 years of age. The number of co-medications was higher in patients above 45 years. Utilisation pattern of antidiabetic medications was similar in both genders. It is desirable that longitudinal studies on utilisation pattern and pharmacoeconomic studies of antidiabetic medications are performed.

REFERENCES

- AL KHAJA, K. A., SEQUEIRA, R. P. & MATHUR, V. S. (2001) Prescribing patterns and therapeutic implications for diabetic hypertension in Bahrain, *Annals of Pharmacotherapy*, 35: 1350–1359.
- BAKASSAS, I. A. & LUNDE, P. K. (1986) National drug policies: The need for drug utilization studies, *Trends Pharmacological Sciences*, 7: 331–334.
- BOCCUZZI, S. J., WOGEN, J., FOX, J., SUNG, J. C., SHAH, A. B. & KIM, J. (2004) Utilization of oral hypoglycemic agents in a drug-insured US population, *Diabetes Care*, 24(8): 1411–1415.
- CHIANG, C. W., CHIU, H. F., CHENS, C. Y., WU, H. L. & YANG, C. Y. (2006) Trends in the use of oral antidiabetic drugs by outpatients in Taiwan: 1997–2003, *Journal of Clinical Pharmacy and Therapeutics*, 31: 73–82.
- DE PABLOS-VELASCO, P. L., MARTINEZ-MARTIN, F. J., MOLERO, R., RODRÍGUEZ-PEREZ, F., GARCÍA-PUENTE, I. & CABALLERO, A. (2005) Pattern of prescription of hypoglycemic drugs in Gran Canaria (Canary Islands, Spain) and estimation of the prevalence of diabetes mellitus, *Diabetes and Metabolism*, 31: 457–462.
- FERRARA, A., MANGIONE, C. M., KIM, C., MARRERO, D. G., CURB, D. , STEVENS, M. et al. (2008) Sex disparities in control and treatment of modifiable cardiovascular disease risk factors among patients with diabetes: Translating research into action for diabetes (TRIAD) study, *Diabetes Care*, 31: 69–74.
- GOUNI-BERTHOLD, I., BERTHOLD, H. K., MANTZAROS, C. S., BOHM, M. & KRONE, W. (2008) Sex disparities in the treatment and control of cardiovascular risk factors in type 2 diabetes, *Diabetes Care*, 31: 1389–1391.
- JOHNSON, J. A., POHAR, S. L. & SECNIK, K. (2006) Utilization of diabetes medication and cost of testing supplies in Saskatchewan, 2001, *BMC Health Services Research*, 6: 159.
- KNOWLER, W. C., BARRETT-CONNOR, E., FOWLER, S. E., HAMMAN, R. F., LACHIN, J. M., WALKER, E. A. *et al.* (2002) Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin, *The New England Journal of Medicine*, 346: 393–403.

- MCFARLANE, S. I., CASTRO, J. KAUR, J., SHIN, J. J., KELLING, D. Jr., FARAO, A. *et al.* (2005) Control of blood pressure and other cardiovascular risk factors at different practice settings: Outcomes of care provided to diabetic women compared to men, *Journal of Clinical Hypertension (Greenwich)*, 7: 73–80.
- NILSSON, P. M., THEOBALD, H. JOURNATH, G. & FRITZ, T. (2004) Gender difference in risk factor control and treatment profile in diabetes: A study in 229 Swedish primary health care centres, *Scandinavian Journal of Primary Health Care*, 22: 27–31.
- ORBAN, J. C., GHADDAB, A., CHATTI, O. & ICHAI, C. (2006) Metformin-associated lactic acidosis, *Annales Francaises d'Anesthesie et de Reanimation*, 25: 1046–1052.
- RANG, H. P., DALE, M. M., RITTER, J. M. & MOORE, P. K. (2003) *Pharmacology*, 5th edition, pp. 315–322 (Sydney: Churchill Livingstone).
- SULTANA, G., KAPUR, P., AQIL, M., ALAM, M. S. & PILLAI, K. K. (2010) Drug utilization of oral hypoglycemic agents in a university teaching hospital in India, *Journal of Clinical Pharmacology and Therapeutics*, 35: 267–277.
- SUTHARSON, L., HARIHARAN, R. S. & VAMSADHARA, C. (2003) Drug utilization study in diabetology outpatient setting of a tertiary hospital, *Indian Journal of Pharmacology*, 35: 237–240.
- UPADHYAY, D. K., PALAIAN, S., RAVI SHANKAR, P., MISHRA, P. & SAH, A. K. (2007) Prescribing pattern in diabetic outpatients in a tertiary care teaching hospital in Nepal, *Journal of Clinical and Diagnostic Research*, 3: 248–255.
- VAN DEN BRINK, G., SCHWARTZENBERG, R. R., HOEVE, L. J, PORSIUS, A. J. & HOEVE, L. L. (1993) The use of hypoglycemic and cardiovascular drugs in 582 patients with diabetes mellitus. Description and quality assessment, *Pharmacy World and Science*, 15: 128–131.
- VENGURLEKAR, S., SHUKLA, P., PATIDAR, P., BAFNA, R. & JAIN, S. (2008) Prescribing pattern of antidiabetic drugs in Indore City Hospital Indian, *Journal of Pharmaceutical Sciences*, 70: 637–640.
- WILD, S., ROGLIC, G., GREEN, A. SICREE, R. & KING, J. (2004) Global prevalence of diabetes- Estimates for the year 2000 and projections for 2030, *Diabetes Care*, 27: 1047–1053.
- YUEN, Y. H., CHANG, S., CHONG, C. K. L., LEE, S. C., CRITCHLEY, J. A. & CHAN, J. C. (1998) Drug utilization in a hospital general medical outpatient clinic with particular reference to antihypertensive and antidiabetic drugs, *Journal of Clinical Pharmacy and Therapeutics*, 23: 287–294.
- YURGIN, N., SECNIK, K. & LAGE, M. J. (2007) Antidiabetic prescriptions and glycemc control in German patients with type 2 diabetes mellitus: a retrospective database study, *Clinical Therapeutics*, 29: 316–325.