# COMPARISON OF USE OF ANTIDIABETIC AGENTS AMONG GERIATRIC AND NON-GERIATRIC POPULATION

**Rajeshwari . S*, Prabha Adhikari MR**, Shashidhar Kotian*****

*Department of Pharmacology, ** Department of Medicine, Department of Community Medicine, Kasturba Medical College, Manipal University, LHH Road, Mangalore - 575001

## Summary

In India, 20% of the elderly population has T2DM. The goals of treatment are the same for elderly and younger patients; however, treatment decisions are influenced by age, life expectancy, comorbid conditions, and severity of the vascular complications. Hence this study was conducted to compare and evaluate antidiabetic prescription pattern among geriatric and non-geriatric population. This cross-sectional study was conducted in a tertiary care teaching hospital. Patients of ≥60 years (geriatric), ≤ 60 years (non-geriatrics) with type 2 diabetes mellitus (DM) were identified and included in the study after obtaining written informed consent. Patient's demographic data, age, sex, BMI and duration of diabetes were collected in a patient proforma. Details of antidiabetic agents prescribed were collected from the patients' records. Data collected were analysed using $x^2$ and students unpaired t test. A total of 477 diabetic patients were included for the study, 320 geriatric and 157 nongeriatrics. Mean age was 68.31±6.06 and 49.91±6.91 years respectively. Duration of DM was 11.38±8.90 and 6.52±5.71 years (z=0.001). Most commonly used oral antidiabetic agent was metformin (74.42%) either as monotherapy or in combination with other OAD agents, followed by sulfonylureas (69.18%). Among sulfonylureas glibenclamide (25.93% vs 23.56%) and glimepiride (23.75% vs 28.02%) were most commonly used by both the groups. Metformin was utilized more among nongeriatrics (p=0.03). There was no significant difference in the use of other antidiabetic drugs between the two groups. There was no significant difference in the distribution of patients on mono/combination antidiabetic therapy between the two groups.
Geriatric diabetic patients utilized more of sulfonylureas and less of metformin compared to nongeriatric population.

**Keywords:** Geriatric, nongeriatric, antidiabetic agents, sulfonylureas, metformin

## Introduction

The elderly population is rapidly increasing in the world. In India there were over 77 million elderly in 2004, constituting 7.7% of the total population and this is expected to rise to 100 million by 2013.[1] Diabetes mellitus is one of the main threats to human health in the 21st century.[2] Although diabetes has been a known medical problem for >2 millennia, it still presents a challenge and most certainly continues to be a focus of medical care for many decades to come as our population continues to age and live longer.

Drug utilization studies (DUS) are powerful exploratory tools to ascertain the role of drugs in society. DUS are aimed to analyze the present and the developmental trends of drug usage at various levels of the health care system, whether national, local or institutional. Drug utilization studies evaluate drug use at a population level, according to age, sex, morbidity, among other characteristics.[3] Drug utilization becomes essential for elderly care since incorrect use of medication is one of the greatest problems experienced by this population.[4,5] The elderly often use more than one drug, which may lead to drug interactions, adverse effects, concomitant use of other therapies and drug redundancy, and the use of drugs without therapeutic value.[6]

In India, 20% of the elderly population has T2DM. The goals of treatment are the same for elderly and younger patients; however, treatment decisions are influenced by age, life expectancy, comorbid conditions, and severity of the vascular complications.[7] Management of DM in elderly population is linked to the increased prevalence of comorbidities, relative inability to tolerate adverse effects of medication and hypoglycaemia. A wide variety of oral diabetes medications are currently available for the treatment of type 2 diabetes mellitus.[8] Over the past decade, in addition to insulin eight classes of drugs used to treat diabetes include sulfonylureas, biguanides, alpha-glucosidase inhibitors, meglitinides, thiazolidinediones, exenatide, dipeptidyl peptidase IV inhibitors and pramlintide.[9] The aim of the present study is to compare and evaluate antidiabetic prescription pattern among geriatric and non-geriatric population.

## Methods

Cross-sectional study conducted in a tertiary care teaching hospital. Patients of age ≥60 years (geriatric) and ≤ 60 years (non-geriatrics) with type 2 diabetes mellitus (DM) were identified and included in the study after obtaining written informed consent. The study was approved by the Institutional Ethics committee (IEC). Patient's demographic data, age, sex, height, weight and duration of diabetes were collected in a patient proforma. Body mass index (BMI) was calculated using patients' height and weight. Details of antidiabetic agents prescribed were collected from the patients' records. Data collected were analysed using students unpaired t test for variables with normal distribution and mann whitney U test for variables with non-normal distribution. Chi square test was done to analyse distribution of patients with regard to gender and drug usage.

## Results

A total of 477 diabetic patients were included for the study, 320 geriatric and 157 nongeriatric. Demographic data of both groups are given in table 1.

There was no significant difference in the antidiabetic drug utilization between the two groups except metformin which was utilized more among the nongeriatrics (p=0.03). Of the sulfonylureas glibenclamide (25.93% vs 23.56%) and glimepiride (23.75% vs 28.02%) were most commonly used by both the groups as shown in table 2.

**Table 1: Demographic data**

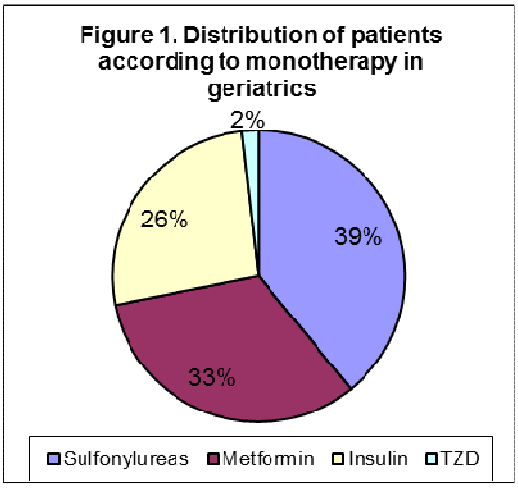
| Characteristics | Geriatrics n= 320 (%) | Nongeriatrics n=157 (%) | p value |
|---|---|---|---|
| Male | 162 (50.6%) | 89 (56.7%) | 0.25 |
| Female | 158 (49.4%) | 68 (43.3%) | |
| Age (years) | 68.31 ± 6.06 | 49.91 ± 6.93 | 0.001 *** |
| Height (cm) | 158.97 ± 9.44 | 161.41 ± 10.98 | 0.015 * |
| Weight (kg) | 62.56 ± 10.59 | 68.34 ± 13.46 | 0.001 *** |
| Body Mass Index | 24.78 ± 3.81 | 25.89 ± 4.11 | 0.003 ** |
| Age (years) | 68.31 ± 6.06 | 49.91 ± 6.93 | 0.001 *** |
| Duration of DM | 11.38 ± 8.90 | 6.52 ± 5.71 | 0.001** |

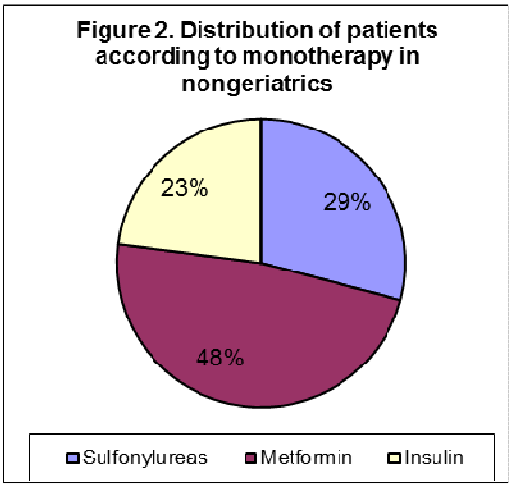
Values are expressed as mean ± SD; * significant ** highly significant *** very highly significant

**Table 2: Utilization of antidiabetic agents - individual and drug combinations**

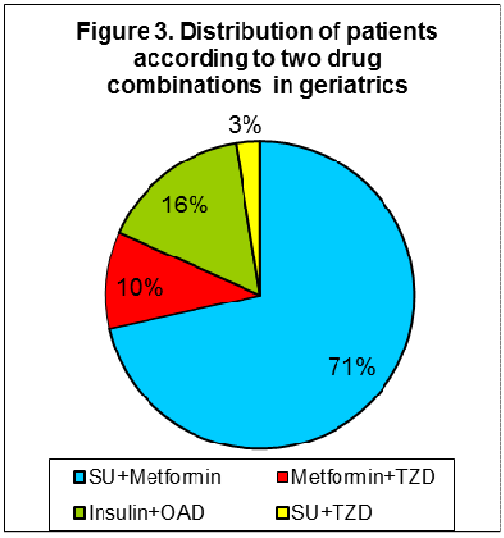
| Drugs / Therapy | Total population n=477 (%) | Geriatrics n=320 (%) | Nongeriatrics n=157 (%) | $X^2$ value | p value |
|---|---|---|---|---|---|
| Glibenclamide | 120 (25.16) | 83 (25.93) | 37 (23.56) | 0.20 | 0.65 |
| Glimepiride | 120 (25.16) | 76 (23.75) | 44 (28.02) | 0.80 | 0.36 |
| Glipizide | 63 (13.21) | 44 (13.75) | 19 (12.10) | 0.12 | 0.72 |
| Gliclazide | 27 (5.66) | 23 (7.18) | 4 (2.54) | 3.42 | 0.06 |
| **SU** | **330 (69.18)** | **226 (70.63)** | **104 (66.24)** | **0.76** | **0.39** |
| Metformin | 355 (74.42) | 228 (71.25) | 127 (80.89) | 4.65 | 0.03 |
| Pioglitazone | 87 (18.24) | 56 (17.5) | 31 (19.74) | 0.22 | 0.63 |
| Rosiglitazone | 10 (2.1) | 8 (2.5) | 2 (1.27) | 0.29 | 0.59 |
| **TZD** | **97 (20.33)** | **64 (20)** | **33 (21.02)** | **0.01** | **0.89** |
| Insulin | 94 (19.71) | 70 (21.87) | 24 (15.28) | 2.49 | 0.11 |
| **Total OAD** | **383 (80.29)** | **250 (78.12)** | **133 (84.71)** | **2.48** | **0.11** |
| Monotherapy | 158 (33.12) | 110 (34.37) | 48 (30.57) | 0.52 | 0.46 |
| Dual therapy | 246 (51.57) | 158 (49.37) | 88 (56.05) | 1.62 | 0.20 |
| Triple therapy | 73 (15.30) | 52 (16.25) | 21 (13.37) | 0.46 | 0.49 |

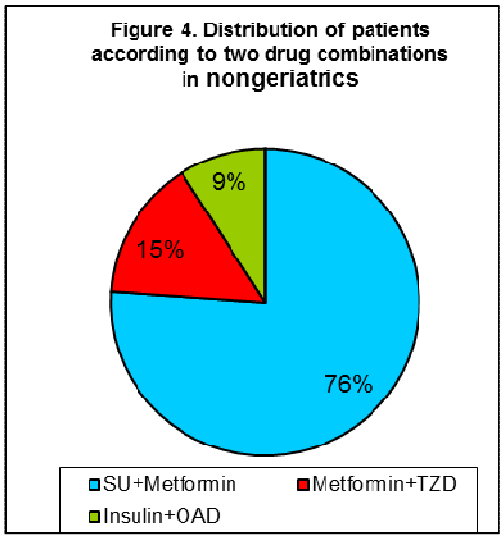
Patients receiving sulfonylurea, metformin, insulin or TZD alone as monotherapy in geriatric population and nongeriatric population are described in figures 1 and 2 respectively.




Distribution of two drug combinations in geriatric and nongeriatric population is described in figure 3 and 4.




## Discussion

In our study of comparison of 320 elderly diabetic patients with 157 nongeriatric diabetics, we found significant differences in duration of diabetes and BMI. Elderly diabetics had a significantly lower BMI compared to nongeriatric diabetics which could be due to poor nutrition, age related changes in taste and appetite, unintentional weight loss due to aging process or due to illness.[10,11,12] Duration of diabetes was significantly longer in geriatrics and this is not surprising. Utilization of different classes of sulfonylureas did not appear different in both groups except for gliclazide which was used more often in older people. Brodows RG concluded that glibenclamide is associated with an increased likelihood of hypoglycemia (1.9 adjusted relative risk over glipizide), most likely because of the accumulation of active metabolites.

Therefore, it should be avoided in elderly patients and in patients with a creatinine clearance of <50ml/min.[13] The cumulative frequency of hypoglycemia with glibenclamide is substantially greater than with glimepiride and gliclazide among elderly.[14,15] Moreover, long acting gliclazide is associated with a lower frequency of hypoglycemia than glimepiride among older adults. Although glibenclamide should not be preferred in elderly diabetics, it was prescribed for 36.7% of geriatric patients indicating that clinicians are prescribing different classes of drugs according to cost and required glycemic control. The use of sulfonylureas was more in geriatrics (geriatrics 70.62% and nongeriatrics 66.24%) which could be due to more number of lean/lower BMI patients reflecting more insulin deficiency in the geriatric group compared to the nongeriatric group.

Our study showed that metformin use as monotherapy was almost 50% in nongeriatrics and only 30% in the geriatric population. Metformin use was more in nongeriatrics (geriatrics 71.25% and nongeriatrics 80.9% ) indicating that the group had more number of obese / overweight patients reflecting insulin resistance. This difference was not surprising in view of the longer duration of diabetes in the elderly. The lower prescription of metformin in the elderly is acceptable since elderly tolerate metformin poorly due to associated anorexia and weight loss, both of which ultimately lead to increased frailty. Metformin use is not recommended in patients with creatinine clearance less than 60 to 70 ml/min and it is worth noting because renal failure may be masked in elderly by sarcopenia[16] as seen in our patients. Lactic acidosis also places a limitation for the use of metformin in people aged over 70 years. Lower BMI and impaired creatinine clearance could also be the reasons for lower prescription of metformin in the elderly. No difference was seen in TZD use. No gross difference was seen in insulin monotherapy in both the groups.

In our study the most commonly used OAD agent was metformin (74.42%) either as monotherapy or in combination with other OAD agents, followed by sulfonylureas (69.18%). Similar reports of metformin and sulfonylureas being the most commonly used OAD agents, have been seen in earlier literature[17,18] where metformin was used in 50.4% and sulfonylurea was used in 43.2% of patients. Among the sulfonylureas, glibenclamide (37.5%) and glimepiride (37.5%) were the most frequently used agents. These findings too are similar to earlier reports.[19,20]

A study done by Panneerselvam A[21] showed that 46% of the patients were on monotherapy, 39.5% used a double drug regimen and 8.8% were on triple drugs. In our study 33.12% received monotherapy, 51.58% received a two drug combination and 15.30% were on triple drug therapy. There was no significant difference in the age-wise distribution of patients on mono/combination antidiabetic therapy. The percentage of patients who received two drugs & three drug combinations were more in our study, as the study population mainly included geriatric patients with long standing diabetes. Of the combinations, sulfonylurea and metformin was the most popular which was similar to the earlier report by KA AI Kahaja et al.[22]
To conclude geriatric diabetics had a significantly lower BMI compared to nongeriatric diabetics. Geriatric diabetic patients used more of sulfonylureas than metformin. Nongeriatric population used more of metformin than sulfonylureas.

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