

# Prescription Pattern of Type-2 Diabetes Management in the Geriatric Patients

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## ABSTRACT

**Background:** As a public health issue, diabetes is becoming more prevalent among the elderly, making it a major problem in India. Researchers hope to learn more about prescription patterns, diabetes awareness, and risk factors in the elderly as a result of their work in this area. **Materials and Methods :** An observational study was conducted among elderly patients (aged 60 and older) in a teaching hospital. The KAP questionnaire was used to gauge diabetic patients' general knowledge of their condition, including their age, gender, race/ethnicity, diabetes diagnosis, and previous treatment. **Results:** The study included 110 patients, of which 59 (53.6 percent) were men and 51 (46.4 percent) were women, all of whom had been diagnosed with type 2 diabetes mellitus. Males between the ages of 60 and 69 make up the majority of patients. The majority of diabetics ( $n=85$ ) are between the ages of 60 and 69, while 33.7 percent ( $n=25$ ) are between the ages of 70 and 79. According to the findings, insulin and metformin

are the most commonly prescribed antidiabetic medications. This study used both descriptive and inferential statistical analysis. **Conclusion:** As a result of this study, diabetes and the risk factors associated with it are now recognized as a major public health issue that necessitates immediate action.

**Keywords:** Diabetes, Geriatric, Knowledge, Complications, Obesity.

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DOI: 10.5530/jyp.2022.14.84

## INTRODUCTION

Diabetes is considered as an emerging global epidemic, accounting for one of the leading causes of morbidity and mortality worldwide, as well as the various causative factors, particularly macrovascular and microvascular complications. Diabetes mellitus is linked to premature morbidity and mortality, putting a significant strain on individuals and healthcare systems.<sup>1</sup> The risk of macrovascular complications (ischemic cardiovascular disease, stroke, and peripheral vascular disease) is reduced, but the quality of life suffers as a result of specific diabetic microvascular complications.<sup>2,3</sup> In India, the proportion of the elderly has rapidly increased over the last few decades. According to the 2011 census, 5.3 percent of the Indian population was over the age of 65. Diabetes prevalence among the elderly has been steadily increasing, making it a major public health burden even in India.<sup>4</sup>

Diabetes prevalence is expected to rise as the population ages and lifestyles change, particularly among people aged 75 and up. Aging is associated with geriatric syndromes such as cognitive impairment, depression, urinary incontinence, falling, polypharmacy, and sarcopenia, in addition to macrovascular and microvascular complications in elderly diabetes mellitus (DM) patients.<sup>5</sup>

Various studies have shown that the duration and progression of type 2 diabetes mellitus, as well as age, increase comorbidities and mortality rate, which has an impact on health-related quality of life (HRQoL) and deteriorates patients' quality of life (QoL).<sup>6</sup>

Diabetes and geriatric syndromes, on the other hand, have been linked to an increased risk of incident disabilities, mortality, and a higher likelihood of hospitalization in older adults, causing profound

psychological and physical distress in both patients and caregivers as well as a significant burden on health-care systems.<sup>7,8</sup> The burden of diabetes has steadily increased over the past quarter century in India and across the globe, with India contributing a major part of the global burden.<sup>9</sup> By 2050, the world's population will be equal parts old and young, with 2 billion people aged 60 and up and another 2 billion under the age of 15, accounting for 21 percent of the total.<sup>10</sup>

In India, the prevalence of diabetes has increased from 7.1 percent in 2009 to 8.9 percent in 2019. With 77 million diabetics, India ranks second only to China in the global diabetes epidemic.<sup>11</sup> The number of people with diabetes over the age of 65 is 12.1 million, ranking third in 2019. According to the International Diabetes Federation's projection data, the number of people with diabetes over the age of 65 will be 18.0 million in 2030, but 27.5 million in 2045, putting them in second place (IDF).<sup>12,13</sup>

Diabetes management and care for older people are difficult due to the complexity of the condition in old age and the heterogeneity of this age group. Diabetics must receive lifelong education in both new and old cases of diabetes.<sup>14</sup>

The current study was carried out to assess the prescription pattern, overall diabetes knowledge, and specific domains in which our diabetics are deficient, as well as to identify risk factors and associations of insufficient knowledge among elderly diabetics. This research will allow health care providers to include socially and culturally acceptable diabetes education programmes for elderly type 2 diabetics.

## MATERIALS AND METHODS

### Study Design

A prospective observational study was conducted on 110 patients for 6 months from December 2021 to June 2022 at the Maharishi Markandeshwar Institute of Medical Sciences and Research (MMIMSR), Mullana, Ambala, Haryana, in various departments (General Medicine and Surgery). The sample size was calculated using the formula  $N=4PQ/d^2$ , where P, Q, and d represent prevalence, 100-P, and 20% of P, respectively. The prevalence rate was derived from a study conducted by Pradhan N. et al. and Vashitha A. et al.<sup>15,16</sup> Prescription Patterns in the Management of Type 2 Diabetes Mellitus among Geriatric Patients are studied. The protocol of the study was approved by IEC at Maharishi Markandeshwar Institute of Medical Sciences and Research (MMIMSR), Mullana with ethical clearance number: 2118

A data entry format was created specifically for entering patient demographic data (name, age, gender, address, and education), lab records (RBS, HbA<sub>1c</sub>, BMI, and BP), patient social history, medication history, past medical history, and type of type 2 diabetes mellitus diagnosis. A standardized digital glucometer was used to measure capillary blood glucose (CBG) (Accu-Chek, Roche diagnostics, Indianapolis, IN, USA).<sup>17</sup> The monitor recorded the blood glucose level in milligrams per deciliter. BMI was calculated for participants using the formula: weight (kg)/height (m<sup>2</sup>). Using a properly calibrated and validated standard mercury sphygmomanometer, blood pressure was measured on the right arm while the subject was sitting and after a minimum of 5 min rest. According to the American Diabetes Association, subjects with a blood glucose level  $\geq 126$  were classified as diabetic.<sup>18,19</sup> In accordance with JNC7, subjects with Systolic B.P  $\geq 140$  and/or Diastolic B.P  $\geq 90$  were classified as Hypertensive.<sup>20</sup> A standardized KAP questionnaire was devised by researchers and validated by clinicians from the department of medicine and surgery to measure the knowledge of elderly patients.<sup>21</sup>

The study was carried out by considering the following inclusion and exclusion criteria. Patients of varied ages who got any sort of type 2 diabetes mellitus therapy in any of the hospital's departments were included in the study. The study includes inpatients and outpatients over the age of 60 who are taking antidiabetic therapy and who are willing to participate. Patients under the age of 60, Pregnant and lactating women, Psychiatric and Diabetes Mellitus-1 patients and Patients in critical condition requiring a critical care stay were excluded. Finally, the results were analyzed using descriptive statistical methods and were reported to the concerned departments. Data were mentioned in mean  $\pm$  SD values and categorical variables were presented in percentage. Microsoft word and excel were used to generate graphs and tables.

## RESULTS

The study population included all subjects who met the inclusion and exclusion criteria. The study included 110 patients with type 2 diabetes, of which 59 (53.6%) were male and 51 (46.4%) were female. As shown in Table 1, the male age group of 60-69 years has the highest number of patients (40.9 percent). 77.3% patients belong to male category between the age group of 60-69 years followed by (22.7%) in the age group 70-79 years in the age group. Approximately, 30% patients were aware about the causes, symptoms and complications of the disease. But after counseling it was found that 70% Patients benefited from this study. 63.6% ( $n=70$ ) were from the rural areas, while 36.7% ( $n=40$ ) were from the town, and married participants had a significantly higher prevalence of diabetes than single participants as shown in Table 1.

According to RBS and HbA<sub>1c</sub> data in Table 2, the age trend shows that diabetes affects 77.3% ( $n=85$ ) of patients aged 60-69 years and 33.7% ( $n=25$ ) of patients aged 70-79 years. Obesity was present in 21.9% of the

**Table 1: Demographic details of study population (n=110).**

Variables		Male (n=59)	Female (n=51)	(%age)	
Age(Years)	60-69	45	40	77.3%	
	70-79	14	11	22.7%	
	Mean $\pm$ SD	29.5 $\pm$ 21.9	25.5 $\pm$ 20.05		
Area/ Age(Years)	Rural	60-69	30	24	49.1%
		70-79	8	8	14.5%
	Urban	60-69	16	13	26.4%
		70-79	5	6	10%
Marital status	Married	60-69	37	33	63.6%
		70-79	8	9	15.4%
	Single	60-69	6	4	9.1%
		70-79	7	5	10.9%
Educational level	Illiterate	33	40	70%	
	Literate	18	19	30%	
BMI	Underweight (<18.5%)	6	0	5.4%	
	Normal (18.5-24.9%)	26	22	43.6%	
	Overweight (25-29.9%)	19	13	29.1%	
	Obesity (>30%)	11	13	21.9%	

SD, Standard deviation; BMI is measured in (kg/m<sup>2</sup>)

participants overall. Diabetes became more prevalent as participants' BMI increased. The patients' mean BMI was found to be 24.31 $\pm$ 3.49 kg/m<sup>2</sup>.

During the study other Complications are found with type-2 diabetic mellitus, viz: Hypertension 64.5% ( $n=71$ ), COPD 9.1% ( $n=10$ ), CKD 13.6% ( $n=15$ ), CLD 10.9% ( $n=12$ ), CAD 29.1% ( $n=32$ ), Diabetic foot ulcer 8.1% ( $n=9$ ), Nephropathy 24.5% ( $n=27$ ), Neuropathy 32.7% ( $n=36$ ), Retinopathy 42.8% ( $n=47$ ) and other comorbidities. Highest number of patients belongs to hypertensive 64.3% ( $n=71$ ) as discussed in Table 2.

The study reveals that most commonly 30(27.3%) prescribed antidiabetic medication is insulin followed by 48(43.3%) is Oral hypoglycemic agent. The major concomitant drugs category was 80% Proton pump inhibitor and 64.5% antihypertensive drugs as discussed in Table 2.

## DISCUSSION

The data were analyzed using a descriptive statistical method and reported to the appropriate departments. The study included 110 subjects who were diagnosed with type 2 diabetes and admitted to the General Medicine and Surgery ward at the Maharishi Markandeshwar Institute of Medical Science and Research (MMIMSR), Mullana, Ambala, Haryana.

According to a study by Borba et al., managing diabetes mellitus has become more dependent on knowledge, which was more in line with the results of this study. The older patients in the current study had little knowledge of diabetes, its symptoms, and complications, particularly in rural areas.<sup>22-25</sup>

The study population included more male patients than female patients, with the majority of the study population falling between the ages of 60 and 69, according to the results of the age distribution. The age distribution findings from this study were contrasted with those from other closely related studies conducted by Asharani N et al. According to the geographic distribution of this study's patients, there were more rural than urban patients. The majority of diabetics ( $n=85$ ) were between the ages of 60 and 69. This is similar to the findings of a study reported by Ugwu et al.<sup>26</sup>

**Table 2: The prevalence, complication and treatment of T2D among studied population.**

Age (Years)	Range	Number of Patients (%age)
60-69	Random blood glucose(RBS) (80-130mg/dl)	85(77.3%)
70-79	Random blood glucose(RBS) (80-130mg/dl)	25 (36.7%)
<b>Normal HbA<sub>1c</sub> &lt;5.7%</b>		
60-69	Pre-diabetic (5.7-6.4%)	20 (18.1%)
	Diabetic (>6.5%)	65 (59.1%)
70-79	Pre-diabetic (5.7-6.4%)	8 (7.3%)
	Diabetic (>6.5%)	17 (15.5%)
<b>Normal Blood Pressure(BP) : Systolic:139 Diastolic:89</b>		
60-69	High systolic BP, mmHg (>140)	53(48.2%)
	High Diastolic BP, mmHg(>90)	34(30.9%)
70-79	High systolic BP, mmHg (140)	7(8.1%)
	High diastolic BP, mmHg (90)	3(4.5%)
<b>Complication</b>		
	Hypertension, n (%)	71 (64.5%)
	Chronic obstructive pulmonary disease (COPD) n (%)	10 (9.1%)
	Chronic kidney disease (CKD), n (%)	15 (13.6%)
	Chronic liver disease (CLD), n (%)	12 (10.9%)
	Coronary artery disease (CAD), n (%)	32 (29.1%)
	Diabetic foot ulcer/ Diabetic foot, n (%)	9 (8.1%)
	Nephropathy, n (%)	27 (24.6%)
	Neuropathy, n (%)	36 (32.7%)
	Retinopathy, n (%)	47 (42.7%)
<b>Treatment method and other Medications</b>		
	Insulin, n (%)	30 (27.3%)
	Oral hypoglycemic agents, n (%)	48 (43.3%)
	Insulin + Metformin, n (%)	6 (5.5%)
	Insulin + Tenepride, n (%)	4 (3.6%)
	Insulin + Glimepiride, n (%)	3 (2.7%)
	Insulin + Vildagliptin, n (%)	3 (2.7%)
	Insulin + Metformin + Tenepride, n (%)	5 (4.5%)
	Insulin + Metformin + Glimepiride, n (%)	3 (2.7%)
	Antihypertensive, n (%)	71 (64.5%)
	Proton pump inhibitor, n (%)	88 (80%)
	Multivitamin, n (%)	102 (92.7%)
	Antibiotic, n (%)	40 (36.4%)

HbA<sub>1c</sub> = Glycated hemoglobin, BP = Blood pressure

There were 21.9 percent obese participants in total. Participants' diabetes risk increased as their BMI increased. Patients are experiencing an increase in the number of complications and comorbidities despite their decreased weight.<sup>27</sup> There were no significant differences in laboratory findings between male and female patients. During the study other Complications are found with type-2 diabetic mellitus mostly in the 60-69 years age group. The most commonly prescribed antidiabetic medication is oral hypoglycemic agents followed by insulin in the studied

population.<sup>28</sup> In the current study, metformin was prescribed most frequently, whether alone or in combination with other oral hypoglycemic medications or insulin. This illustrates the fact that metformin is still the medication of choice for most doctors treating Type 2 diabetes in elderly patients. Hadia *et al.* conducted a similar prospective observational study. Diabetes management necessitates more than just proper KAP and medication adherence. Older patients may require more frequent follow-ups and closer monitoring, as well as motivation and counselling emphasising of lifestyle changes. So, collaboration between patients and health care professionals, as well as strong social support, are critical for patient empowerment, which enables them to better understand and manage their illness.

## CONCLUSION

Diabetes mellitus was diagnosed in 110 elderly patients admitted to (MMIMSR), Mullana, Haryana, in the current study. Diabetes mellitus affects a higher percentage of elderly people in rural areas than in urban areas, indicating an alarming rise in the number of elderly people with the disease. Obesity is also a significant risk factor for diabetes mellitus. The mortality and morbidity associated with diabetes are expected to rise as the disease becomes more common among the elderly population. There is a pressing need to improve the diabetes knowledge of the geriatric diabetic population. Health care facilities for the elderly may reduce diabetes-related morbidity and mortality, especially for those with the disease.

## ACKNOWLEDGEMENT

The authors wish to express their sincere gratitude to all the people who participated and cooperated in the study.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

## ABBREVIATIONS

**T2DM:** Type-2 Diabetes Mellitus; **RBS:** Random Blood Sugar; **BMI:** Body mass Index; **HbA<sub>1c</sub>:** Glycated Hemoglobin; **BP:** Blood Pressure, **SD:** Standard Deviation; **IEC:** Institutional Ethics Committee; **KAP:** Knowledge Attitude Practice.

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**Article History:** Received: 22-06-2022; Revised: 04-07-2022; Accepted: 01-09-2022.

**Cite this article:** Sah KK, Gupta KK, Mehta DK, Joshi S, Das R. Prescription Pattern of type 2 Diabetes Management in the Geriatric Patients. *J Young Pharm.* 2022;14(4):416-9.