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# PROFILE OF ELDERLY PATIENTS WITH DIABETES MELLITUS

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**ABSTRACT**
Diabetes Mellitus (DM) represents a chronic metabolic disorder defined by elevated blood glucose levels and high glycated hemoglobin, which may or may not be accompanied by glucose in the urine. This condition stems from insufficient insulin production by the pancreas, impaired responsiveness of target tissues to insulin (insulin resistance), or a combination of both factors. Prolonged hyperglycemia is associated with the dysfunction and eventual failure of multiple organs, particularly the kidneys, heart, nerves, eyes, and blood vessels.
**Material and Methods**: Hospital based observational study of one year duration. All elderly patients age above 65 years presenting in medical OPD of Dr. RPGMC Tanda with the diagnosis of diabetes mellitus were included in the study. Age less than 65 yrs and failure to give consent were excluded. Results:- The patient cohort had a mean age of 70 years, with a higher prevalence in females (56.7%). On average, patients had an 8.9-year history of the disease, and a significant majority (80%) exhibited poor glycemic control. The most frequent clinical presentations included osmotic symptoms (62.2%), paresthesia (52.2%), and nocturia (38.9%). Hypertension was the dominant comorbidity (60%), followed by chronic kidney disease (11.1%) and coronary artery disease (6.7%). Microvascular Complications: Clinical investigations revealed alarmingly high rates of disease-related complications, notably albuminuria (95%), retinopathy (90%), anemia (80%), and neuropathy (54.4%). Conclusions and Recommendations: Consistent with broader population studies, the high incidence of poorly controlled diabetes and severe microvascular complications (like retinopathy and nephropathy) highlights an urgent need for regular screening. The study strongly advocates for early intervention and individualized management strategies to mitigate disease progression.

**KEYWORDS**: Insulin resistance, micro-nutriments, treatment individualization, cognitive impairment, complications, diabetes mellitus, elderly.

**INTRODUCTION**:
Diabetes mellitus (DM) is a chronic metabolic disease characterized by hyperglycemia and high glycated hemoglobin[1,2,] with or without glycosuria. Glucose metabolism disorder (GMD) results from a defect in insulin secretion by the pancreas, insulin action on the target tissues (or insulin resistance), or both.[3] Chronic hyperglycemia leads to damage and failure of various organs, especially the heart, blood vessels, eyes, kidneys, and nerves.[4] Those macro and micro angiopathies, which can be observed even in newly diagnosed patients[5] are due to GMD long-term duration.DM prevalence, in general, is growing worldwide,[6,7] and is becoming an epidemic and endemic problem with the social and economic burden.[8,9] However, its prevalence and its co-morbidities and mortality are higher in elderly than in young people.[10] According to Caspersen *et al*. diagnosed and/or undiagnosed DM affects 10.9 million US adults aged 65 years and older, and this number is projected to reach 26.7 million by 2050, which means 55% of all diabetes cases.[11] For the same authors, almost 8 from 10 old people have some form of dysglycemia according to different tests. This allows epidemiologists to classify DM with its complications as the most alarming health problem of the current century in middle age people and elderly. The elderly is a heterogeneous group with different physiological profiles and varying functional capabilities and life expectancy.[12] DM definition in old people is similar to the one of other people, which means fasting glycaemia ≥1.26 g/l (7.0 mmol/L) or glycemia after glucose loading (75 g) ≥2 g/l (11.11 mmol/L). People with postprandial or postloading glycemia between 1.40 and 1.99 g/l (7.78–11.06 mmol/L) suffer from a reduction in glucose tolerance.[13] The definition of elderly is a subject of controversies. In general, a person is considered as old if her civil age is ≥ 60 or 65 years old. However, on the scientific point a person is supposed to be old if her age is superior or equal to 75.[14] Nevertheless, everyone agrees that it is more important to consider the physiological or vascular age. That one varies according to genetic background, environmental factors and presence or lack of morbidities such as DM, high blood pressure, arthritis or other rheumatologic diseases, obesity, cognitive dysfunction, renal insufficiency, and heart failure. For this, the international diabetes federation (IDF) divides old patients into three functional groups.[15]
The International Diabetes Federation (IDF) categorizes older patients into three distinct functional classifications:

• The first group consists of functionally independent individuals who are self-sufficient. In these cases, DM may be their sole health concern or may coexist with non-life-threatening conditions.
• The second group includes non-autonomous patients who rely on others for support. This category is further split into:
• Frail patients, who often experience fatigue, weight loss, and significant limitations in strength or mobility, raising the likelihood of falls or the need for long-term care.
- Patients with dementia, who suffer from cognitive decline and cannot manage their own care. These individuals face a heightened risk of both hypo- and hyperglycemia.
• The third group comprises patients receiving end-of-life care. These individuals typically have severe medical conditions or malignancies and a limited life expectancy.
Older adults living with DM face a substantially higher absolute risk of cardiovascular issues, along with increased rates of morbidity and mortality compared to their non-diabetic peers. Cardiovascular diseases represent a major concern for this population. The most frequent complications stem from accelerated atherosclerosis. Compared to nondiabetic peers, elderly individuals with diabetes experience higher rates of urinary and fecal incontinence. Furthermore, vision loss is significantly more prevalent in the older diabetic population, driven by conditions such as cataracts, glaucoma, hypertensive retinopathy, and degenerative maculopathy. Among all age categories, senior citizens with diabetes face the highest incidence of end-stage renal disease, myocardial infarction (MI), visual impairment, and major lower-limb amputations. There appears to be a link between Alzheimer's disease and diabetes, likely sharing risk factors such as eating disorders and insulin resistance caused by a sedentary lifestyle. Research indicates that multi-infarct dementia and Alzheimer's-type dementia are roughly twice as common in diabetic patients as in age-matched controls without the disease. Cognitive impairment in these individuals ranges from minor executive dysfunction to severe memory loss and full-blown dementia. Diabetic Retinopathy is a diabetes-related disorder impacting the retina, characterized by damaged blood vessels that either leak or become obstructed. The growth of abnormal vessels from the retina can lead to scarring or hemorrhaging, resulting in permanent blindness or sight loss. A primary cause of vision impairment is the thickening of the retina's central region (diabetic macular oedema), which can cause permanent damage. The aim of our study was to review relevant and recent full articles about DM in old people in order to focus on epidemiology, physiopathology of type 2 DM in old people, clinical manifestations, complications, and therapeutic aspects.

**MATERIAL AND METHODS:**
Hospital based observational study of one year duration. All elderly patients age above 65 years presenting in medical OPD of Dr. RPGMC Tanda with the diagnosis of diabetes mellitus were included in the study. Age less than 65 yrs and failure to give consent were excluded.
Methodology: All patients were studied for basic data, history and examination with anthropometric measurements . Laboratory evaluation was done with CHG, RFT, electrolytes, LFT, Serum Proteins, HBA1C, Urine ACR and Lipid profile. Retinopathy was be tested with fundus examination. Cognitive impairment was tested with MMSE. Neuropathy with monofilament test. Machines used for testing:

- CHG- Sysmex kx-21
- RFT/electrolytes, LFT, Lipid profile – XL-640 (Transasia biomed pvt. Ltd.)
- HBA1C – Nyco card reader (Abott)
- Urine analysis – Urisys 1100 (Roche)

**STATISTICAL ANALYSIS**
The data was entered and cleaned in Microsoft excel spreadsheet. The data was then imported into and analysed using SPSS version 26. After testing for the normality of the data using Kolmogorov Smirnov test, the quantitative data was expressed as mean (median) and standard deviation (Interquartile range) wherever applicable. The qualitative data was expressed in frequencies and proportions. The analysis was done using Pearson‟s Chi-square test to determine the association between categorical exposure and outcome variables. A p value of less than 0.05 was considered to be statistically significant.

**OBSERVATIONS AND RESULTS**
This study was conducted in department of Medicine in Dr. Rajendra Prasad Government Medical College, Kangra at Tanda. A total of 90 patients were enrolled in the study over a period of one year after obtaining informed consent and ethical approval from institutional ethical committee. No. HFW- H DRPGMCI Ethics /2023101, Dated: 06.04.2023

**I. Demographic Profile**
A total of 90 elderly patients were enrolled in the study. The mean age of the participants was 70.00 ± 5.05 years, with an age range of 65 to 86 years. Of the study population, 51 (56.7%) were female and 39 (43.3%) were male, indicating a slight female predominance (Table 1).

**Table 1. Demographic characteristics of the study participants (N = 90)**

| Characteristic | Value |
|---|---|
| Age (years) | |

| | |
|---|---|
| Mean ± SD | 70.00 ± 5.046 |
| Range (Minimum–Maximum) | 65–86 |
| Sex, n (%) | |
| Female | 51 (56.7) |
| Male | 39 (43.3) |
| Total | 90 (100.0) |

**II. Presenting Symptoms**

Osmotic symptoms (polyuria and polydipsia) were present in 56 patients (62.2%), while 34 patients (37.8%) did not report these symptoms. Paraesthesia was reported by 47 patients (52.2%), whereas 43 patients (47.8%) did not experience paraesthesia (Table 2).

**Table 2: Distribution of Presenting Symptoms among the Patients (N = 90)**

| Presenting Symptom | Response | Frequency | Percentage (%) |
|---|---|---|---|
| Osmotic symptoms (Polyuria/Polydipsia) | Yes | 56 | 62.2 |
| | | | |
| | No | 34 | 37.8 |
| Paraesthesia | Yes | 47 | 52.2 |
| | No | 43 | 47.8 |

The distribution of other presenting symptoms is shown in Table 4. Fatigue was reported by 24 patients (26.7%), while 66 (73.3%) did not experience fatigue. Blurring of vision was present in only 4 patients (4.4%), whereas 86 (95.6%) had no such complaint. Nocturia was reported by 35 patients (38.9%), while 55 (61.1%) did not experience nocturia. Weight loss was observed in 12 patients (13.3%), whereas 78 (86.7%) did not report weight loss. Fever was present in 10 patients (11.1%), while 80 (88.9%) did not have fever. Abdominal symptoms (constipation/diarrhoea) were reported by 9 patients (10.0%), whereas 81 (90.0%) had no abdominal symptoms. Breathlessness was experienced by 19 patients (21.1%), while 71 (78.9%) did not report breathlessness.

**Table 3: Distribution of Other Presenting Symptoms among the Patients (N = 90)**

| Presenting Symptom | Response | Frequency | Percentage (%) |
|---|---|---|---|
| Fatigue | Yes | 24 | 26.7 |
| | No | 66 | 73.3 |
| Blurring of Vision | Yes | 4 | 4.4 |
| | No | 86 | 95.6 |
| Nocturia | Yes | 35 | 38.9 |
| | No | 55 | 61.1 |
| Weight Loss | Yes | 12 | 13.3 |
| | No | 78 | 86.7 |
| Fever | Yes | 10 | 11.1 |
| | No | 80 | 88.9 |
| Abdominal Symptoms (Constipation/Diarrhoea) | Yes | 9 | 10.0 |
| | No | 81 | 90.0 |
| Breathlessness | Yes | 19 | 21.1 |
| | No | 71 | 78.9 |

**III. Past History**

Among the 90 study participants, 80 (88.9%) had a previous history of diabetes mellitus, whereas 10 (11.1%) had no prior history of the disease (Table 5). The mean duration of diabetes was 8.89 ± 7.68 years, with a duration ranging from 0 to 30 years (Table 6). With respect to treatment, the majority of patients (65, 72.2%) were receiving oral hypoglycaemic agents (OHA). Thirteen patients (14.4%) were treated with a combination of insulin and OHA, while 4 (4.4%) were on insulin alone. One patient (1.1%) was receiving another form of treatment, and treatment details were unavailable for 7 patients (7.8%) (Table 7).

**Table 4. Past History of Diabetes Mellitus among the Study Participants (N = 90)**

| Past History of Diabetes Mellitus | Frequency | Percentage (%) |
|---|---|---|
| Yes | 80 | 88.9 |
| No | 10 | 11.1 |
| Total | 90 | 100.0 |

**Table 5. Duration of Diabetes Mellitus**

| Parameter | Value |
|---|---|
| Mean ± SD (years) | 8.89 ± 7.68 |
| Minimum (years) | 0 |
| Maximum (years) | 30 |

**Table 6. Antidiabetic Treatment Received by the Study Participants (N = 90)**

| Treatment | Frequency | Percentage (%) |
|---|---|---|
| Oral hypoglycaemic agents (OHA) | 65 | 72.2 |
| Insulin + OHA | 13 | 14.4 |
| Insulin | 4 | 4.4 |
| Other | 1 | 1.1 |
| Treatment details unavailable | 7 | 7.8 |
| Total | 90 | 100.0 |

**IV. Family History**

A family history of diabetes mellitus alone was reported by 9 patients (10.0%), while 4 patients (4.4%) had a family history of both diabetes mellitus and hypertension. A family history of hypertension alone was present in 9 patients (10.0%). The remaining 68 patients (75.6%) had no family history of either diabetes mellitus or hypertension (Table 8).

**Table 7. Family History of the Study Participants (N = 90)**

| Family History | Frequency | Percentage (%) |
|---|---|---|
| Diabetes mellitus | 9 | 10.0 |
| Diabetes mellitus and hypertension | 4 | 4.4 |
| Hypertension | 9 | 10.0 |
| No family history | 68 | 75.6 |
| Total | 90 | 100.0 |

Table 8. presents the family history as diabetes mellitus (DM) history was observed in 6 females (11.70%), 5 males (12.80%). Hypertension (HTN) history was observed in 4 females (7.80%), 7 males (18.00%). No family history was observed in 41 females (80.40%), 27 males (69.20%). The observed p-value was 0.487.

**Table 8: Association of family history with the sex of the patients**

| | | Sex | | | | |
|---|---|---|---|---|---|---|
| | | Female | | Male | | P value |
| | | N | % | N | % | 0.487 |
| Family History | DM | 6 | 11.70% | 5 | 12.80% | |
| | HTN | 4 | 7.80% | 7 | 18.00% | |
| | None | 41 | 80.40% | 27 | 69.20% | |
| | Total | 51 | 100% | 39 | 100% | |

**V. Personal History**

The personal history of the study participants is presented in Table 9. Alcohol consumption was reported by 24 patients (26.7%), while 66 (73.3%) did not consume alcohol. Smoking was reported by 34 patients (37.8%), whereas 56 (62.2%) were non-smokers. The majority of participants (75, 83.3%) consumed a mixed diet, while 15 (16.7%) followed a vegetarian diet. High salt intake was reported by 13 patients (14.4%), whereas 77 (85.6%) did not have excessive salt intake. Regarding physical activity, 64 patients (71.1%) were physically active, while 26 (28.9%) had a sedentary lifestyle.

**Table 9. Personal History of the Study Participants (N = 90)**

| Variable | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Alcohol consumption | Yes | 24 | 26.7 |
| | | | |
| | No | 66 | 73.3 |
| Smoking | Yes | 34 | 37.8 |
| | No | 56 | 62.2 |
| Diet type | Mixed diet | 75 | 83.3 |
| | Vegetarian diet | 15 | 16.7 |
| High salt intake | Yes | 13 | 14.4 |
| | No | 77 | 85.6 |
| Physical activity | Active | 64 | 71.1 |
| | Sedentary | 26 | 28.9 |

**VI. Comorbidities**

The distribution of comorbidities among the study participants is presented in Table 10. Hypertension was the most common comorbidity, affecting 54 patients (60.0%). Other comorbidities included chronic kidney disease (10, 11.1%), hypothyroidism (6, 6.7%), coronary artery disease (6, 6.7%), dyslipidaemia (4, 4.4%), cirrhosis (2, 2.2%), and extrapulmonary tuberculosis (1, 1.1%).

**Table 10. Comorbidities among the Study Participants (N = 90)**

| Comorbidity | Present, n (%) | Absent, n (%) |
|---|---|---|
| Hypertension | 54 (60.0) | 36 (40.0) |
| Chronic kidney disease | 10 (11.1) | 80 (88.9) |
| Hypothyroidism | 6 (6.7) | 84 (93.3) |
| Coronary artery disease | 6 (6.7) | 84 (93.3) |
| Dyslipidaemia | 4 (4.4) | 86 (95.6) |
| Cirrhosis | 2 (2.2) | 88 (97.8) |
| Extrapulmonary tuberculosis | 1 (1.1) | 89 (98.9) |

**VII. Physical Examination**

The physical examination findings of the study participants are summarized in Tables 11–13. The mean body mass index (BMI) was 25.97 ± 3.66 kg/m², with values ranging from 18.5 to 35.4 kg/m². The mean waist circumference was 88.0 ± 10.74 cm, with a range of 58–110 cm (Table 11).Pallor was present in 38 patients (42.2%), while pedal oedema was observed in 11 patients (12.2%) (Table 12).Systemic examination was unremarkable in the majority of patients. On abdominal examination, 3 patients (3.3%) had a distended abdomen with shifting dullness, while epigastric tenderness and striae were observed in one patient (1.1%) each. Neurological examination revealed rigidity in one patient (1.1%). Respiratory examination demonstrated crepitations in 7 patients (7.8%), decreased air entry in 2 (2.2%), and wheeze in 1 (1.1%). Cardiovascular examination revealed a pansystolic murmur in 2 patients (2.2%), whereas the remaining patients had normal findings (Table 13).

**Table 11. Anthropometric Measurements of the Study Participants (N = 90)**

| Variable | Mean ± SD | Minimum | Maximum |
|---|---|---|---|
| BMI (kg/m²) | 25.97 ± 3.66 | 18.5 | 35.4 |
| Waist circumference (cm) | 88.00 ± 10.74 | 58 | 110 |

**Table 12. General Physical Examination Findings (N = 90)**

| Finding | Present, n (%) | Absent, n (%) |
|---|---|---|
| Pallor | 38 (42.2) | 52 (57.8) |
| Pedal oedema | 11 (12.2) | 79 (87.8) |

**Table 13. Systemic Examination Findings (N = 90)**

| System | Finding | Frequency (%) |
|---|---|---|

| | | |
|---|---|---|
| Abdominal | Within normal limits | 85 (94.4) |
| | Distended abdomen with shifting dullness | 3 (3.3) |
| | Epigastric tenderness | 1 (1.1) |
| | Striae | 1 (1.1) |
| Neurological | Within normal limits | 89 (98.9) |
| | Rigidity | 1 (1.1) |
| Respiratory | Within normal limits | 80 (88.9) |
| | Crepitations | 7 (7.8) |
| | Decreased air entry | 2 (2.2) |
| | Wheeze | 1 (1.1) |
| Cardiovascular | Within normal limits | 88 (97.8) |
| | Pansystolic murmur | 2 (2.2) |

**VIII. Biochemical Profile**

The gender-wise comparison of biochemical parameters was done. Females had significantly lower mean serum glutamic-pyruvic transaminase (SGPT) levels (27.56 ± 15.91 IU/L) than males (45.39 ± 55.23 IU/L; $p$=0.031). Conversely, females had significantly higher mean triglyceride levels (154.15 ± 67.89 mg/dL) compared with males (125.49 ± 60.71 mg/dL; $p$=0.041). No statistically significant sex differences were observed for hemoglobin, total leucocyte count, platelet count, red cell indices, fasting blood sugar, HbA1c, SGOT, alkaline phosphatase, total protein, albumin, urea, creatinine, total cholesterol, HDL, LDL, or urine albumin-creatinine ratio (all $p$>0.05).

Anemia was present in 72 patients (80.0%), while 18 patients (20.0%) had normal hemoglobin levels (Table 15). The prevalence of anemia was comparable between females (80.4%) and males (79.5%), with no statistically significant difference ($p$=0.915).

**Table 15. Prevalence of Anemia among the Study Participants (N = 90)**

| Variable | Frequency | Percentage (%) |
|---|---|---|
| Anemia present | 72 | 80.0 |
| No anemia | 18 | 20.0 |
| Total | 90 | 100.0 |

**IX. Glycaemic Control**

Based on HbA1c values, 72 patients (80.0%) had poorly controlled diabetes (HbA1c >7%), whereas 18 (20.0%) had good glycaemic control (Table 16). Poor glycaemic control was observed in 78.4% of females and 82.1% of males, with no significant difference between the sexes ($p$=0.671) .

**Table 16. Glycaemic Control among the Study Participants (N = 90)**

| Glycaemic Control | Frequency | Percentage (%) |
|---|---|---|
| Poorly controlled | 72 | 80.0 |
| Well controlled | 18 | 20.0 |
| Total | 90 | 100.0 |

**X. Nephropathy (Albuminuria)**

Urine albumin-creatinine ratio (ACR) was moderately increased in 59 patients (65.6%), severely increased in 25 (27.8%), within the normal range in 5 (5.6%), and in the nephrotic range in one patient (1.1%) (Table 17. The distribution of albuminuria categories did not differ significantly between females and males ($p$=0.791) (Table 17).

**Table 17. Distribution of Urine Albumin-Creatinine Ratio (N = 90)**

| Urine ACR Category | Frequency | Percentage (%) |
|---|---|---|
| Normal | 5 | 5.6 |
| Moderately increased albuminuria | 59 | 65.6 |
| Severely increased albuminuria | 25 | 27.8 |
| Nephrotic-range albuminuria | 1 | 1.1 |
| Total | 90 | 100.0 |

**XI. Microvascular Complications and Cognitive Function**

The distribution of diabetic retinopathy, neuropathy, and cognitive function among the study participants is summarized in Table 18. Moderate non-proliferative diabetic retinopathy (NPDR) was the most common retinal finding, affecting 34 patients (37.8%), followed by mild NPDR in 29 (32.2%), severe NPDR in 15 (16.7%), proliferative diabetic retinopathy (PDR) in 3 (3.3%), while 9 patients (10.0%) had no evidence of retinopathy. Neuropathy was present in 49 patients (54.4%), whereas 41 (45.6%) had no neuropathy. The mean Mini-Mental State Examination (MMSE) score was 29.20 ± 1.62, with scores ranging from 22 to 30.

**Table 18. Distribution of Retinopathy, Neuropathy, and Cognitive Function among the Study Participants (N = 90)**

| Variable | Category/Parameter | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Retinopathy | Absent | 9 | 10.0 |
| | Mild NPDR | 29 | 32.2 |
| | Moderate NPDR | 34 | 37.8 |
| | Severe NPDR | 15 | 16.7 |
| | Proliferative diabetic retinopathy (PDR) | 3 | 3.3 |
| Neuropathy | Present | 49 | 54.4 |
| | Absent | 41 | 45.6 |
| Cognitive Function (MMSE) | Mean ± SD | 29.20 ± 1.62 | — |
| | Minimum | 22 | — |
| | Maximum | 30 | — |

**DISCUSSION**

The prevalence of diabetes mellitus (DM) among the elderly has increased substantially over recent decades, primarily due to increased life expectancy, population ageing, and lifestyle changes. This growing burden has emerged as a major global public health challenge affecting both developed and developing countries. According to Chentli et al., nearly half of the elderly population is either diabetic or prediabetic, while up to 80% exhibit some degree of dysglycaemia, highlighting the magnitude of the problem in this age group.16

Older adults with diabetes are particularly vulnerable to chronic complications and multiple comorbidities. Cardiovascular disease, visual impairment, cognitive decline, frailty, and functional disability occur more frequently in elderly individuals with diabetes than in younger patients. Furthermore, diabetes has been associated with an increased risk of neurodegenerative disorders, including Alzheimer's disease.16

Kirkman et al. reported that older adults with diabetes experience the highest incidence of major lower-extremity amputations, myocardial infarction, visual impairment, and end-stage renal disease compared with any other age group.[17] Individuals aged 75 years and older are at an even greater risk, with higher rates of emergency department visits for hypoglycaemia, hospitalizations, and mortality related to hyperglycaemic crises.[17]

Given the rising prevalence of diabetes and its substantial impact on morbidity, mortality, functional independence, and quality of life in older adults, understanding the clinical profile of elderly patients with diabetes mellitus is essential. Such information can facilitate early identification of complications, optimize individualized management strategies, and ultimately improve health outcomes in this vulnerable population.The mean age of the study population was 70.0 ± 5.0 years, with most patients belonging to the early seventh decade of life. Similar findings have been reported by Medhi et al., who observed a mean age of 68.71 years, and by Banegas et al., who documented a mean age of 70.9 years.[18-19] Anoop,Manju et. al and Xin Li et al. also reported a mean age of 72.5 years among elderly diabetic patients.[20,21] These findings reinforce the observation that diabetes is predominantly a disease of older adults and remains a major contributor to morbidity in this age group. Aging-related changes in insulin sensitivity, pancreatic β-cell function, and vascular integrity may contribute to disease progression and complications. Females constituted 56.7% of the study population, indicating a slight female predominance. This observation is consistent with the findings of Wonde et al., who reported that 64.1% of their participants were female.[22] In contrast, Chowta et al. and Medhi et al. reported a more balanced gender distribution.[23,18] The higher prevalence among elderly women may be attributed to postmenopausal hormonal changes, longer life expectancy, and greater utilization of healthcare services. These factors may increase both the incidence and detection of diabetes among older females. Mahaptra H, Gupta PK, Paul A, Nampalliwar A, Bansal M,et al. had reported that clinical presentation was dominated by osmotic symptoms, paraesthesia, nocturia, fatigue, weight loss, visual disturbances, and breathlessness. Osmotic symptoms reflect persistent hyperglycemia and inadequate glycemic control, whereas paraesthesia suggests diabetic neuropathy resulting from chronic nerve injury.[24] Notably, 80% of patients had poorly controlled diabetes, which likely contributed to the high prevalence of symptoms and complications. The occurrence of breathlessness may also indicate underlying cardiovascular involvement, a common comorbidity in elderly diabetic patients. Most patients (88.9%) had a previous diagnosis of diabetes, with a mean disease duration of 8.89 years. This finding underscores the chronic nature of diabetes and the cumulative risk of microvascular and macrovascular complications associated with prolonged disease duration. In comparison, Wonde et al. reported a

median disease duration of 47 months.[22] The majority of patients in the present study were receiving oral hypoglycemic agents, while a smaller proportion required insulin therapy either alone or in combination with oral agents. Similar observations were reported by Medhi et al., where 80% of participants were known diabetics.[18] Long-term diabetes management requires individualized therapeutic strategies to achieve optimal glycemic control while minimizing adverse effects. Lifestyle factors play an important role in diabetes progression and outcomes. In the present study, 26.7% of patients consumed alcohol, 37.8% were smokers, and 28.9% were physically inactive. Wonde et al. reported a higher prevalence of alcohol consumption (50%), whereas Banegas et al. reported a lower prevalence of smoking (24.7%).[22,19] Smoking is a well-established risk factor for cardiovascular disease, nephropathy, and neuropathy, while physical inactivity contributes to obesity and insulin resistance. Consequently, lifestyle modification remains a cornerstone of diabetes management in elderly individuals. Hypertension was the most common comorbidity, affecting 60% of patients, followed by chronic kidney disease, hypothyroidism, and coronary artery disease. Similar observations have been reported in previous studies evaluating elderly diabetic populations. Wonde et al. reported that 34.5% of their patients had associated chronic illnesses and 42.1% experienced diabetic complications.[22] The coexistence of multiple comorbidities significantly complicates diabetes management and increases the risk of adverse cardiovascular and renal outcomes. Therefore, a multidisciplinary approach focusing on comprehensive risk-factor management is essential. The mean BMI of 25.97 kg/m² indicated that most patients were overweight. Excess body weight is strongly associated with insulin resistance and poor metabolic control. Gender differences were also observed in biochemical parameters, with males demonstrating significantly higher liver enzyme levels and females exhibiting higher cholesterol and LDL-cholesterol concentrations. Similar findings were reported by Aderibigbe et al., who observed significantly higher cholesterol and LDL-C levels among female diabetic patients.[25] These findings are clinically relevant because elevated LDL-cholesterol is a major determinant of cardiovascular mortality. Anemia was highly prevalent, affecting 80% of patients. This prevalence is considerably higher than that reported by Chowta et al., who documented anemia in 31.5% of elderly diabetic patients.[18] Anemia in diabetes may result from chronic kidney disease, nutritional deficiencies, chronic inflammation, or other age-related factors as studied by Manju et el.[26] Its presence is associated with reduced functional capacity, poorer quality of life, and increased cardiovascular risk. Therefore, regular hematological assessment should be incorporated into routine diabetic care. Microvascular complications were highly prevalent in the present study. Albuminuria was present in nearly 95% of patients, indicating significant renal involvement and increased cardiovascular risk. Albuminuria in diabetic's were more in those who had serum magnesium level lower than normal as reported by Sharma P, Kapoor D, Manju, Singh G.[27] Diabetic retinopathy was detected in 90% of patients, with moderate non-proliferative diabetic retinopathy being the most common stage. This prevalence is substantially higher than that reported by Xin Li et al., who observed diabetic retinopathy in 15.96% of patients.[22] Neuropathy was identified in 54.4% of patients, reflecting the high burden of chronic hyperglycemia-related nerve damage. These findings emphasize the importance of routine screening and early intervention to prevent progression of diabetic complications. The mean Mini-Mental State Examination (MMSE) score was 29.2, suggesting preserved cognitive function in most patients. Although diabetes is associated with an increased risk of cognitive impairment and dementia, maintenance of cognitive health is critical for treatment adherence, self-management, and decision-making. Regular cognitive assessment should therefore be considered as part of comprehensive geriatric diabetes care. The findings of the present study highlight the substantial burden of poor glycemic control, hypertension, chronic kidney disease, anemia, albuminuria, retinopathy, and neuropathy among elderly diabetic patients. Consistent with the recommendations of the American Diabetes Association, elderly individuals require individualized glycemic targets, routine screening for complications, aggressive management of cardiovascular risk factors, and multidisciplinary care to optimize outcomes and improve quality of life.[17]

**Conclusion:**The study collected extensive data on various aspects of diabetes in the elderly, including age, gender, symptoms, personal history, comorbidities, examination findings, and laboratory investigations. This comprehensive approach allows for a detailed understanding of the clinical profile of elderly diabetic patients. The study specifically targets an older population (≥65 years), a demographic that is often underrepresented in diabetes research. This focus addresses a significant gap in the literature and provides valuable insights into the unique challenges faced by elderly diabetics. The study provides a thorough analysis of the symptoms experienced by elderly diabetic patients, highlighting the multisystemic impact of the disease and the importance of symptom management.

**Limitations**:

The study was cross-sectional nature limits the ability to infer causality or track changes over time. Longitudinal studies would provide more robust data on the progression of diabetes and its complications in the elderly. The findings are based on a specific population, which may limit the generalizability to other regions or countries with different demographic and healthcare profiles. Limited Genetic Data: The study does not extensively explore genetic factors that could influence diabetes prevalence and management among the elderly, which is an important area for future research.

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Conflicts of interest :-Nil

**REFERENCES**

1.Hu Y, Liu W, Chen Y, Zhang M, Wang L, Zhou H, et al. Combined use of fasting plasma glucose and glycated hemoglobin A1c in the screening of diabetes and impaired glucose tolerance. Acta Diabetol. 2010;47:231-6. doi:10.1007/s00592-009-0143-2.

2. d'Emden MC, Shaw JE, Jones GR, Cheung NW. Guidance concerning the use of glycated haemoglobin (HbA1c) for the diagnosis of diabetes mellitus. Med J Aust. 2015;203(2):89-90. doi:10.5694/mja15.00041.
3. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care. 2008;31(Suppl 1):S55-S60. doi:10.2337/dc08-S062.
5. Fowler MJ. Microvascular and macrovascular complications of diabetes. Clin Diabetes. 2008;26(2):77-82.
5. Heydari I, Radi V, Razmjou S, Amiri A. Chronic complications of diabetes mellitus in newly diagnosed patients. Int J Diabetes Mellit. 2010;2(1):61-3.
6. Borissova AM, Shinkov A, Kovatcheva R, Vlahov J, Dakovska L, Todorov T. Changes in the prevalence of diabetes mellitus in Bulgaria (2006-2012). Clin Med Insights Endocrinol Diabetes. 2015;8:41-5. doi:10.4137/CMED.S24742.
7. Nguyen TH, Nguyen TN, Fischer T, Ha W, Tran TV. Type 2 diabetes among Asian Americans: prevalence and prevention. World J Diabetes. 2015;6(4):543-7. doi:10.4239/wjd.v6.i4.543.
8. Lam DW, LeRoith D. The worldwide diabetes epidemic. Curr Opin Endocrinol Diabetes Obes. 2012;19(2):93-6. doi:10.1097/MED.0b013e328350583a.
9. Kalra S, Kumar A, Jarhyan P, Unnikrishnan AG. Endemic or epidemic: measuring the endemicity index of diabetes? Indian J Endocrinol Metab. 2015;19(1):5-7. doi:10.4103/2230-8210.144633.
10. Sloan FA, Bethel MA, Ruiz D Jr, Shea AM, Feinglos MN. The growing burden of diabetes mellitus in the US elderly population. Arch Intern Med. 2008;168(2):192-9. doi:10.1001/archinternmed.2007.35.
11. Caspersen CJ, Thomas GD, Boseman LA, Beckles GL, Albright AL. Aging, diabetes, and the public health system in the United States. Am J Public Health. 2012;102(8):1482-97. doi:10.2105/AJPH.2011.300616.
12. Hornick T, Aron DC. Managing diabetes in the elderly: go easy, individualize. Cleve Clin J Med. 2008;75(1):70-8. doi:10.3949/ccjm.75.1.70.
13. Meenu S, Kapoor D, Manju, Singh G, Sharma P. Effect of dapagliflozin on hepatic steatosis and fibrosis in type 2 diabetes mellitus with non-alcoholic fatty liver disease. Int J Sci Res. 2024;13(7):59-61. doi:10.36106/ijsr.
14. Orimo H, Ito H, Suzuki T, Araki A, Hosoi T, Sawabe M. Reviewing the definition of "elderly". Geriatr Gerontol Int. 2006;6(3):149-58.
15. Sinclair A, Dunning T, Colagiuri S. Managing older people with type 2 diabetes: global guideline. Brussels: International Diabetes Federation; 2013.
16. Chentli F, Azzoug S, Mahgoun S. Diabetes mellitus in elderly. Indian J Endocrinol Metab. 2015;19(6):744-52. doi:10.4103/2230-8210.167553.
17. Kirkman MS, Briscoe VJ, Clark N, Florez H, Haas LB, Halter JB, et al. Diabetes in older adults. Diabetes Care. 2012;35(12):2650-64. doi:10.2337/dc12-1801.
18. Medhi GK, Dutta G, Borah P, Lyngdoh M, Sarma A. Prevalence of diabetes and its relationship with body mass index among elderly people in a rural area of northeastern state of India. Cureus. 2021;13(1):e12747. doi:10.7759/cureus.12747.
19. Banegas JR, López-García E, Graciani A, Guallar-Castillón P, Gutierrez-Fisac JL, Alonso J, et al. Relationship between obesity, hypertension and diabetes, and health-related quality of life among the elderly. Eur J Cardiovasc Prev Rehabil. 2007;14(3):456-62. doi:10.1097/HJR.0b013e3280803f29.
20. Anoop, Kapoor D, Manju. Hemogram profile of patients with type 2 diabetes mellitus in a rural tertiary care referral hospital. Int J Sci Res. 2024;13(12):13-16. doi:10.36106/ijsr.
21. Li X, Wang Z. Prevalence and incidence of retinopathy in elderly diabetic patients receiving early diagnosis and treatment. Exp Ther Med. 2013;5(5):1393-6. doi:10.3892/etm.2013.1021.
22. Wonde TE, Ayene TR, Moges NA, Bazezew Y. Health-related quality of life and associated factors among type 2 diabetic adult patients in Debre Markos Referral Hospital, Northwest Ethiopia. Heliyon. 2022;8(8):e10182. doi:10.1016/j.heliyon.2022.e10182.
23. Chowta N, Shenoy A, Adhikari P, Chowta M. Analysis of hemogram profile of elderly diabetics in a tertiary care hospital. Int J Nutr Pharmacol Neurol Dis. 2013;3(2):126-30. doi:10.4103/2231-0738.112836.
24. Mahapatra H, Gupta PK, Paul A, Nampalliwar A, Bansal M, et al. Comparative analysis of clinical outcome in patients with type 2 diabetes mellitus on monotherapy versus combination therapy. Cureus. 2026;18(2):e104344. doi:10.7759/cureus.104344.
25. Aderibigbe MA, Obafemi TO, Olaleye MT, Akinmoladun AC. Effects of gender, age and treatment duration on lipid profile and renal function indices in diabetic patients attending a teaching hospital in south-western Nigeria. Afr Health Sci. 2018;18(4):900-8. doi:10.4314/ahs.v18i4.8.
26. Manju, Kapoor D, Singh G. Pattern of anaemia in geriatric patients: a hospital-based observational study. Int J Toxicol Pharmacol Res. 2022;12(4):54-60.
27. Sharma P, Kapoor D, Manju, Singh G. Correlation of serum magnesium level with HbA1c in type 2 diabetes mellitus: a rural tertiary care study. J Cardiovasc Dis Res. 2023;14:1421-6.