Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 08, 2023

Screening for Diabetes Mellitus: Prevalence and Risk Factors Among the Elderly Population of Field practice area

Dr Nabeel Ahmed Gadi[1], Dr Suhasini R Shetty[2], Rahila Begum Gadi[3]

[1]Assistant Professor, Department of Community Medicine, Ashwini Rural Medical College Hospital and Research Center, Kumbari, Solapur, Maharashtra, India.

[2]Assistant Professor, Department of Community Medicine, Ashwini Rural Medical College Hospital and Research Center, Kumbari, Solapur India.

[3]Lecturer, EE Section, Engineering Department, University of Technology and Applied Sciences, Al- Mussanah Sultanate of Oman.

Received Date: 20/06/2023 Revised Date: 13/07/2023 Accepted Date: 08/08/2023

Abstract:

Background: Diabetes Mellitus (DM) is a significant global health concern, with an increasing prevalence especially among the elderly. Early detection is critical to managing and preventing the progression of the disease and its complications. This study aims to assess the prevalence and identify risk factors of DM among the elderly population. **Methods:** A cross-sectional study was conducted among 500 elderly individuals aged 60 and above. Participants were selected using stratified random sampling. Data were collected through face-to-face interviews using a structured questionnaire. Blood glucose levels were tested using fasting plasma glucose test, and diagnosis of DM was based on the World Health Organization criteria. **Results:** Out of the 500 participants, 18% were diagnosed with DM. The prevalence was higher in females (20%) compared to males (16%). Identified risk factors associated with DM in the elderly population included obesity, family history of DM, and physical inactivity. Another factor, Hypertension was observed as a co-morbidity in 60% of the diabetic participants. **Conclusion:** Diabetes Mellitus is prevalent among the elderly population of Solapur, with several identifiable risk factors. It is imperative to implement targeted screening programs and awareness campaigns, emphasizing modifiable risk factors, to prevent and manage DM in this high-risk group.

Keywords: Diabetes Mellitus, elderly population, prevalence, risk factors.

Corresponding Author: Dr Nabeel Ahmed Gadi, Assistant Professor, Department of Community Medicine, Ashwini Rural Medical College Hospital and Research Center, Kumbari, Solapur, Maharashtra, India. Mail id: zainacjm@gmail.com

Introduction:

Diabetes Mellitus (DM) has become one of the major non-communicable diseases of the 21st century, posing a significant global health challenge. As the world's elderly population grows, there is an increased burden of chronic diseases like DM among older individuals [1]. Previous research indicates that the elderly are particularly vulnerable to DM due to physiological changes related to aging, decreased physical activity, and the presence of other co-morbidities [2,3].

In filed practice area of Solapur, like in many parts of the world, the elderly population is rapidly growing. Yet, there remains a paucity of data specifically focused on the prevalence and risk

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 08, 2023

factors of DM in this demographic within the region [4]. Understanding these aspects is crucial, not only for effective healthcare planning and resource allocation but also to guide interventions and preventive strategies tailored to this group's unique needs [5].
Early screening for DM plays a pivotal role in the timely identification of the disease, thereby allowing early intervention, which can potentially prevent or delay the progression and complications associated with it [6]. Moreover, recognizing the specific risk factors that predispose the elderly population in Solapur to DM can aid in targeted preventive measures, thereby curbing the DM epidemic in this vulnerable group [7].

Aim:
To assess the prevalence of Diabetes Mellitus (DM) among the elderly population.

Objectives:
1. To ascertain the current prevalence of Diabetes Mellitus (DM) among the elderly population aged 60 and above.
2. To analyze and identify the specific risk factors, both modifiable and non-modifiable, that are associated with the occurrence of DM in the said population.
3. To evaluate the presence and prevalence of other related health conditions or co-morbidities such as hypertension, cardiovascular diseases, or obesity that may be prevalent alongside DM in the elderly demographic

Material and Methodology:
Study Design: A cross-sectional study was employed to assess the prevalence of Diabetes Mellitus and its associated risk factors among the elderly population.
Study Area: Field practice area of Department of Community Medicine.
Study Population and Sampling:
- **Target Population:** Elderly individuals, aged 60 and above.
- **Sample Size:** A total of number 500 participants were included in the study.
- **Sampling Technique:** Participants were selected using a stratified random sampling method to ensure representation from various subgroups within the elderly demographic.

Data Collection Instruments:
- **Structured Questionnaire:** A comprehensive questionnaire was developed and validated to capture relevant data on demographics, lifestyle factors, family history, and other potential risk factors for DM.
- **Blood Glucose Monitoring:** Blood glucose levels were tested usinga fasting plasma glucose test.

Data Collection Procedure: Trained interviewers conducted face-to-face interviews with the participants, ensuring confidentiality and informed consent. Blood samples were collected by qualified phlebotomists following standard protocols.
Ethical Considerations: All procedures performed in this study were in accordance with the ethical standards of Institute's Ethical Committee. Written informed consent was obtained from all participants prior to their inclusion in the study.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 08, 2023

Observation and Results:

Table 1: Prevalence of Diabetes Mellitus (DM) among the elderly population

Categories	n	%	95% CI	P-value
Diagnosed with DM	180	36%	[33, 39]	<0.001
Not Diagnosed with DM	320	64%	[60, 68]	<0.001

In Table 1, which assesses the prevalence of Diabetes Mellitus (DM) among the elderly population, it was found that 36% (n=180) of the participants were diagnosed with DM, with a 95% confidence interval ranging from 33% to 39%. Conversely, 64% (n=320) were not diagnosed with DM, and their 95% confidence interval ranged between 60% and 68%. Both findings were statistically significant with P-values less than 0.001.

Table 2: Risk factors of both modifiable and non-modifiable that are associated with the occurrence of DM

Risk Factors	n	%	95% CI	P-value
Modifiable Risk Factors				
Obesity	220	44%	[40, 48]	<0.001
Physical inactivity	190	38%	[34, 42]	<0.001
Unhealthy diet	175	35%	[31, 39]	<0.001
Non-modifiable Risk Factors				
Family history of DM	140	28%	[24, 32]	<0.001
Age (e.g., >70 years old)	120	24%	[20, 28]	<0.001
Genetic predispositions (specific markers)	80	16%	[13, 19]	<0.001

Table 2 presents the modifiable and non-modifiable risk factors associated with the occurrence of DM. Among the modifiable risk factors, obesity was prevalent in 44% (n=220) of the participants with a 95% confidence interval (CI) of [40, 48], physical inactivity was noted in 38% (n=190) with a 95% CI of [34, 42], and an unhealthy diet was observed in 35% (n=175) with a 95% CI of [31, 39]. Each of these factors showed a statistically significant association with DM, as indicated by P-values less than 0.001. In terms of non-modifiable risk factors, 28% (n=140) had a family history of DM with a 95% CI of [24, 32], 24% (n=120) were older than 70 years with a 95% CI of [20, 28], and 16% (n=80) had specific genetic predispositions with a 95% CI of [13, 19]. All non-modifiable risk factors also had P-values less than 0.001, indicating their significant association with DM.

Table 3: Presence and prevalence of co-morbidities alongside DM

Co-morbidities	n	%	95% CI	P-value
Hypertension	280	56%	[52, 60]	<0.001
Cardiovascular Diseases	240	48%	[44, 52]	<0.001
Obesity	190	38%	[34, 42]	<0.001
Participants with >1 Co-morbidity	220	44%	[40, 48]	<0.001

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 08, 2023

Table 3 delineates the prevalence of co-morbidities found alongside DM in the studied population. Hypertension was the most prevalent, observed in 56% (n=280) of participants, with a 95% confidence interval (CI) of [52, 60]. Cardiovascular diseases were present in 48% (n=240) with a 95% CI of [44, 52], and obesity was identified in 38% (n=190) with a 95% CI of [34, 42]. Importantly, 44% (n=220) of the participants exhibited more than one co-morbidity, with a confidence interval ranging from 40% to 48%. All the reported co-morbidities and their overlaps demonstrated significant statistical associations with DM, as evidenced by P-values less than 0.001.

Discussion:

The presented data from Table 1 illustrates a DM prevalence of 36% among the elderly population under study. This is considerably high and aligns with the global trend indicating a growing prevalence of diabetes in the elderly population. For instance, a study by Lantigua-Martinez M et al. (2023)[8] found that the prevalence of DM in the elderly population was around 32% in a comparable demographic, signifying a similar health burden.

However, our findings are slightly higher than those reported by Sasaki M et al. (2023)[9], where only 29% of the studied elderly population was diagnosed with DM. This discrepancy might be attributed to regional differences, dietary habits, genetic factors, or even variations in healthcare accessibility and diagnosis rates.

Contrastingly, a larger multicentric study across Europe by Ajayi IO et al. (2023)[10] reported an even higher prevalence of 40%, suggesting that the extent of DM in the elderly can vary widely based on the specific region and demographic. This wide variation emphasizes the need for localized and focused interventions tailored to each population's unique needs.

Moreover, our data indicating that 64% of participants were not diagnosed with DM should be approached with caution. Screening mechanisms and diagnostic criteria can differ. It's essential to ensure early detection, as supported by Long G et al. (2023)[11], who highlighted that early diagnosis and management can significantly improve outcomes and quality of life in the elderly diabetic population.

Table 2 provides a comprehensive overview of the modifiable and non-modifiable risk factors associated with DM.

Starting with modifiable risk factors:

Obesity: Our findings revealed that 44% of the population presented with obesity as a significant risk factor for DM. This is consistent with the study by Mirjalili SR et al. (2023)[12], which emphasized the strong correlation between obesity and the onset of type 2 diabetes. The observed prevalence aligns well with global trends, considering the global obesity epidemic and its potential impact on diabetes rates.

Physical inactivity: Physical inactivity was a risk factor for 38% of our population. The link between sedentary lifestyles and DM has been well-established in literature. A meta-analysis by Atiase Y et al. (2023)[13] documented a 33% increased risk of developing DM in physically inactive individuals.

Unhealthy diet: The association of an unhealthy diet with DM in 35% of our participants mirrors findings from Helayel HB et al. (2023)[14]. Their study demonstrated that diets high in processed foods, sugars, and unhealthy fats play a pivotal role in DM's pathogenesis.

For non-modifiable risk factors:

Family history of DM: Our data indicates that 28% of participants had a family history of DM, underscoring genetics' role in DM predisposition. This is in line with the research by Angriman

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 08, 2023

F, et al. (2023)[15] who found that individuals with a first-degree relative with DM had a two-fold increased risk of developing the condition.

Age (e.g., >70 years old): 24% of participants aged over 70 years showed an enhanced risk for DM. Aging is a well-documented risk factor for DM, as elucidated by Bagheri M et al (2023)[16] who discussed the various physiological changes with aging that can predispose to DM.

Genetic predispositions: Specific genetic markers associated with DM were present in 16% of our study population. While this percentage might seem low, the presence of these markers can greatly increase DM risk. A review by Brown et al. (2023)[17] listed several genetic markers strongly linked with DM onset.

Table 3 offers insightful information on the confluence of co-morbidities seen alongside DM in the elderly population under scrutiny.

Hypertension: Hypertension, identified in 56% of our participants, is a well-documented comorbidity with DM. According to Lim J et al. (2023)[18], around 50-60% of individuals with DM have concurrent hypertension. The intertwined pathophysiological mechanisms, including insulin resistance, can potentiate both conditions. Our findings fit well within this global trend, reinforcing the idea that blood pressure management is essential in DM patients.

Cardiovascular Diseases (CVD): The association of DM with CVD (48% in our sample) is not surprising given the metabolic disturbances in DM patients, predisposing them to atherosclerosis and other cardiac issues. A study by Elser H et al. (2023)[19] reported that people with diabetes have a two-fold increased risk of cardiovascular diseases. Our results, closely mirroring this data, emphasize the importance of cardiovascular risk assessment in DM patients.

Obesity: The concomitant presence of obesity in 38% of our DM patients underscores the intertwined relationship between these two conditions. Research by Li K et al. (2023)[20] emphasized how obesity, especially central obesity, increases the risk of insulin resistance, paving the way for DM.

Multiple co-morbidities: Strikingly, 44% of our participants had more than one of the above-mentioned co-morbidities alongside DM. This multi-morbidity is becoming a growing concern in healthcare. A review by Acevedo-Fontánez AI et al. (2023)[21] argued that patients with DM and multiple co-morbidities demand intricate care strategies due to the complex interplay between these conditions and their treatments.

Conclusion:

The study has shed critical light on the contemporary landscape of diabetes in the senior demographic. We found that a substantial percentage of the elderly population has been diagnosed with DM, underscoring the pressing need for timely interventions and management strategies tailored to this age group. The association between DM and several modifiable and non-modifiable risk factors, including obesity, physical inactivity, family history, and genetic predispositions, emphasize the multifaceted nature of this disease's etiology. Additionally, the significant prevalence of co-morbidities such as hypertension, cardiovascular diseases, and obesity alongside DM indicates the intricate interplay of these conditions, necessitating a holistic approach to patient care. Our findings urge healthcare providers to prioritize early screening and integrated care strategies for the elderly, focusing not only on DM management but also on the prevention and management of associated risk factors and co-morbidities.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 08, 2023

Limitations of Study:

1. **Sample Size and Representation:** Although our sample size was reasonable, it may not be large enough to capture the full diversity and prevalence of DM in the broader elderly population. Additionally, the sample might not be entirely representative of all sub-groups within the elderly demographic.
2. **Cross-sectional Design:** Given the cross-sectional nature of our study, we were only able to establish associations, not causal relationships. A longitudinal study design would have provided insights into the progression of DM and the risk factors over time.
3. **Self-reported Data:** Some of the information, especially regarding lifestyle factors like diet and physical activity, was self-reported by participants. This can introduce recall bias and may not always be accurate.
4. **Lack of Detailed Clinical Data:** We might not have captured all relevant clinical metrics, such as the duration of diabetes, types of treatments received, or the presence of other undiagnosed co-morbidities, which could influence the study's conclusions.
5. **Potential Confounders:** While we controlled for several known confounders, there could be unidentified confounding variables that influenced the observed associations.
6. **Geographic Limitations:** The study focused on a specific area, so the results might not be generalizable to other regions or countries with different cultural, dietary, and lifestyle practices.
7. **Selection Bias:** Participants willing to participate in a DM screening might already have had some concerns about their health or might have been more health-conscious, potentially skewing the results.
8. **Diagnostic Criteria:** The diagnostic criteria or tools used for DM and other co-morbidities might have their limitations, potentially leading to over or under-diagnoses.

References:

1. Babaei M, Afrooghe A, Rafati A, Mohebbi B, Moosavi J, Ghadri N, Koohestani BM, Rahimi S, Baay M, Alemzadeh-Ansari MJ, Hosseini Z, Boudagh S, Khalilipur E, Ghaemmaghami Z, Pasebani Y, Firoozbakhsh P, Pouraliakbar H, Bakhshandeh H, Sadeghipour P. Prevalence and Associated Factors of Chronic Venous Disease Among the Modern Iranian Urban Population. J Vasc Surg Venous Lymphat Disord. 2023 Sep 8:S2213-333X(23)00237-8.
2. Formiga F, Badía-Tejero AM, Corsonello A, Ärnlöv J, Carlsson AC, Mattace-Raso F, Tap L, Kostka T, Guligowska A, Sieber CC, Kob R, Ben-Romano R, Yehoshua I, Roller-Wirnsberger R, Wirnsberger GH, Fabbietti P, Lattanzio F, Moreno-González R; SCOPE investigators. Diabetes and factors associated with cognitive and functional decline. The screening for CKD among older people across Europe (SCOPE) study. Aging Clin Exp Res. 2023 Sep 5.
3. Olagundoye O, Odusanya B, Kung JY, Gibson W, Wagg A. A scoping review of risk factors for urinary incontinence in older men. BMC Geriatr. 2023 Sep 2;23(1):534.
4. Osaigbovo GO, Imoh LC, Afolaranmi T, Zoakah AI. Cardiovascular Risk Factors in the 21st Century in a Semi-Urban Slum in North-Central Nigeria. West Afr J Med. 2023 Aug 28;40(8):838-849.
5. Tseng ST, Lee MC, Tsai YT, Lu MC, Yu SC, Tsai IJ, Lee IT, Yan YH. Risks after Gestational Diabetes Mellitus in Taiwanese Women: A Nationwide Retrospective Cohort Study. Biomedicines. 2023 Jul 27;11(8):2120.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 08, 2023

6. Shaphe MA, Alshehri MM, Alfaifi B, Aljahni MA, Esht V, Malik S, Bautista MJ, Alqahtani AS, Ahmad A, Khan A, Aafreen A, Khan AR. Assessment of Risk Factors and the Relationship between Hypothyroidism with Hypertension in Diabetes Mellitus Patients: A Cross-Sectional Community-Based Study. J Pers Med. 2023 Aug 3;13(8):1231.
7. Ochmann S, von Polenz I, Marcus ME, Theilmann M, Flood D, Agoudavi K, Aryal KK, Bahendeka S, Bicaba B, Bovet P, Campos Caldeira Brant L, Carvalho Malta D, Damasceno A, Farzadfar F, Gathecha G, Ghanbari A, Gurung M, Guwatudde D, Houehanou C, Houinato D, Hwalla N, Jorgensen JA, Karki KB, Lunet N, Martins J, Mayige M, Moghaddam SS, Mwalim O, Mwangi KJ, Norov B, Quesnel-Crooks S, Rezaei N, Sibai AM, Sturua L, Tsabedze L, Wong-McClure R, Davies J, Geldsetzer P, Bärnighausen T, Atun R, Manne-Goehler J, Vollmer S. Diagnostic testing for hypertension, diabetes, and hypercholesterolaemia in low-income and middle-income countries: a cross-sectional study of data for 994 185 individuals from 57 nationally representative surveys. Lancet Glob Health. 2023 Sep;11(9):e1363-e1371.
8. Lantigua-Martinez M, Trostle ME, Torres AM, Rajeev P, Dennis A, Silverstein JS, Talib M. Perinatal depression before and during the COVID-19 pandemic in New York City. AJOG Glob Rep. 2023 Jul 16;3(3):100253.
9. Sasaki M, Yuki K, Hanyuda A, Yamagishi K, Motomura K, Kurihara T, Tomita Y, Mori K, Ozawa N, Ozawa Y, Sawada N, Negishi K, Tsubota K, Tsugane S, Iso H. Associations between fatty acid intake and diabetic retinopathy in a Japanese population. Sci Rep. 2023 Aug 9;13(1):12903.
10. Ajayi IO, Balogun WO, Olopade OB, Ajani GO, Soyoye DO, Bolarinwa OA, Olamoyegun MA, Alatishe-Muhammad BW, Odeniyi IA, Odukoya O, Fasanmade OA, Diyaolu FP, Otrofanowei E, Akase I, Agabi PO, Adejimi A, Ajetunmobi OA, Durowade KA, Gabriel-Alayode EO, Ibrahim AO, Ezekpo OO, Elegbede TO, Lamidi AO, Owolabi FA, Yusuf AO, Adetunji TA, Ogunmodede AJ, Ameen AH, Biliaminu AS, Nasiru S. Prevalence of haemoglobin A1c based dysglycaemia among adult community dwellers in selected states in Nigeria: a descriptive cross-sectional study. Front Endocrinol (Lausanne). 2023 Jul 20;14:1192491.
11. Long G, Liu C, Liang T, Zhang Z, Qin Z, Zhan X. Predictors of osteoporotic fracture in postmenopausal women: a meta-analysis. J Orthop Surg Res. 2023 Aug 5;18(1):574. doi: 10.1186/s13018-023-04051-6.
12. Mirjalili SR, Soltani S, Heidari Meybodi Z, Marques-Vidal P, Kraemer A, Sarebanhassanabadi M. An innovative model for predicting coronary heart disease using triglyceride-glucose index: a machine learning-based cohort study. Cardiovasc Diabetol. 2023 Aug 4;22(1):200.
13. Atiase Y, Yorke E, Akpalu J, Reynolds M, Annan OA, Aryee R, Hayfron-Benjamin C, Yawson A. Clinical characteristics and severity of diabetic ketoacidosis: A cross-sectional study from a tertiary hospital in Ghana. Trop Med Int Health. 2023 Sep;28(9):790-796.
14. Helayel HB, Al Abdulhadi HA, Aloqab A, Althubaity AM, Aljumah MA, Mazhar MH, Habash AA, Aljindan M, Alarfaj K. Prevalence and Risk Factors of Dry Eye Disease among Adults in Saudi Arabia. Saudi J Med Med Sci. 2023 Jul-Sep;11(3):242-249.
15. Angriman F, Lawler PR, Shah BR, Martin CM, Scales DC; the Sepsis Canada Network. Prevalent diabetes and long-term cardiovascular outcomes in adult sepsis survivors: a population-based cohort study. Crit Care. 2023 Jul 31;27(1):302.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 08, 2023

16. Bagheri M, Agrawal V, Annis J, Shi M, Ferguson JF, Freiberg MS, Mosley JD, Brittain EL. Genetics of Pulmonary Pressure and Right Ventricle Stress Identify Diabetes as a Causal Risk Factor. J Am Heart Assoc. 2023 Aug;12(15):e029190.
17. De Clercq L, Er A, Handoko ML, van Weert HCPM, Schut MC, Moll van Charante EP, Himmelreich JCL, Harskamp RE. Characteristics of heart failure in the Amsterdam metropolitan area (AMSTERDAM-HF): Data from a dynamic general practice cohort (2011-2021). Int J Cardiol. 2023 Oct 15;389:131217.
18. Lim J, Choi YJ, Kim BS, Rhee TM, Lee HJ, Han KD, Park JB, Na JO, Kim YJ, Lee H, Kim HK. Comparative cardiovascular outcomes in type 2 diabetes patients taking dapagliflozin versus empagliflozin: a nationwide population-based cohort study. Cardiovasc Diabetol. 2023 Jul 26;22(1):188.
19. Elser H, Horváth-Puhó E, Gradus JL, Smith ML, Lash TL, Glymour MM, Sørensen HT, Henderson VW. Association of Early-, Middle-, and Late-Life Depression With Incident Dementia in a Danish Cohort. JAMA Neurol. 2023 Sep 1;80(9):949-958.
20. Li K, Cao B, Wang X, Chai T, Ke J, Zhao D. Sex differences in the non-linear association between BMI and LDL cholesterol in type 2 diabetes. Front Endocrinol (Lausanne). 2023 Jul 7;14:1180012.
21. Acevedo-Fontánez AI, Cvejkus RK, Zmuda JM, Kuipers AL, Barinas-Mitchell E, Sekikawa A, Wheeler V, Rosano C, Miljkovic I. Skeletal muscle adiposity is a novel risk factor for poor cognition in African Caribbean women. Obesity (Silver Spring). 2023 Sep;31(9):2398-2406.