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A Descriptive Epidemiological Study to Assess Distribution and Determinants of Diabetes among Older Adults

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ABSTRACT:

Aim: Study aimed to determine diabetes prevalence and factors among older persons.
Material & methods: We performed cross-sectional research where all household members aged 50 years and above in chosen houses were requested to participate. In families without anybody aged 50 years and above, one individual was randomly picked to participate. The research involved 300 patients.
Results: 200 men and 100 women responded. 120 participants were rural, 198 married, and 224 self-employed. The five household wealth quintiles were equally split, with 70 in the wealthiest and 52 in the poorest. Most respondents were physically active, while 72 were not. There were 48 overweight and 39 obese responders. About 60 responders ate enough fruits and vegetables. Rural respondents were rarer than urban ones. College and university graduates had the highest diabetes prevalence, while individuals without formal training had the lowest. Low- and moderate-activity people were more likely to develop diabetes. Fat people were twice as likely to get diabetes as those with a normal BMI.
Conclusion: Our research shows the prevalence of diabetes and related risk factors among older persons. Older age, more education, less physical activity, and obesity increased diabetes risk in the general population. Diabetes risk factors vary by gender, with men having old age and greater education and females' obesity and inactivity.

Keywords: prevalence, determinants, diabetes, older adults

1. INTRODUCTION

Diabetes is a rapidly increasing chronic non-communicable illness that poses significant public health concerns and economic burdens globally. It is projected to become the seventh biggest cause of death worldwide by 2030. It is a metabolic condition characterized by persistent hyperglycemia resulting from defects in insulin action, insulin secretion, or both.[1,2] In 2015, the International Diabetes Federation reported that over 415 million individuals have diabetes mellitus, and this number is projected to increase to 642 million by 2040.[3] In developing nations such as those in Asia, diabetes is the primary factor leading to the

emergence of epidemics and accounts for about 60% of the worldwide illness burden related to diabetes mellitus. 1.4 Diabetes prevalence varies across age groups, with older individuals facing a greater risk than younger individuals.[5] Moreover, there is a higher prevalence of diabetes among urban residents compared to those living in rural regions.[6,7]

The high occurrence of diabetes mellitus in Asian nations is attributed to swift socio-economic changes such as economic prosperity, lifestyle habits, fast urbanization, and dietary shifts.[8] It is linked to obesity, dyslipidemia, and hypertension. High blood sugar levels linked to diabetes may lead to severe health issues such cardiovascular disease (CVD) and dysfunction of the renal, ocular, vascular, and neurological systems. Social and economic variables such as income, education level, employment, physical activity levels, weight status, health behaviors, living circumstances, and demographic factors strongly impact the development of pre-diabetes and diabetes.

The physiological or genetic variables connecting diabetes and cardiovascular disease are not well-researched. Diabetes has been associated with behavioral traits in the population, including lack of physical activity, unhealthy diet, insufficient consumption of fruits and vegetables, tobacco usage, and alcohol intake.[6] Studies have shown that maintaining proper glycemic control may greatly reduce the likelihood of diabetes-related complications and slow down the advancement of the illness.

The research aimed to investigate the prevalence and factors influencing diabetes in older persons.

2. MATERIAL & METHODS

We conducted a cross sectional study and all household members aged 50 plus years in selected households were invited to participate in the study while one person was randomly selected for households with no person aged 50 years and above.300 patients were included in the study.

Methodology

An individual questionnaire was used to collect the socio-demographic characteristics, work history and benefits, health state descriptions, anthropometrics, performance tests and biomarkers, risk factors and preventive health behaviours.

Measures

Socio-demographic factors

The interviewers classified the respondent's gender as male or female by observation. Participants provided their age in years, which was then categorized into age groups of 50–59 years, 60–69 years, and 70 years and older. Information on participants' living location (rural or urban) and marital status (never married, currently married or cohabiting, and separated, divorced, or widowed) was gathered.

Socioeconomic factors

Participants were requested to indicate their greatest degree of education, which was classified into four groups: elementary, secondary, college, and university. Wealth quintiles were determined using household assets using principal component analysis, with quintile 1 denoting the least affluent and quintile 5 denoting the most affluent families. Employment status was determined by asking two questions: "Have you ever been employed?" and "Who is or was your employer in your current or most recent primary job?"

Health behaviors

The Global Physical Activity Questionnaire (GPAQ) was used to assess the intensity, duration, and frequency of physical activity in occupational, transport-related, and leisure time settings. Three categories of physical activity - low, moderate, and high - were determined based on the total time spent, number of days, and intensity of physical activity

during a typical week.11,12 Alcohol and smoking were evaluated using the WHO STEPwise method to monitoring of Non-communicable Disease Risk Factors (STEPS). A 24-hour recall method was used to assess the consumption of fruits and vegetables by asking participants about the number of servings of each they typically consume in a day. Respondents who had less than five servings of both fruits and vegetables per week were categorized as having inadequate intake, whereas those who received five or more servings of both fruits and vegetables per week were categorized as having sufficient consumption.

Anthropometric measurements

The participants' weight and height were assessed using conventional tools. The Body Mass Index (BMI) was determined using weight in kilograms (kg) and height squared in meters (m2). Participants were categorized according to their Body Mass Index (BMI) as follows: underweight (<18.5 kg/m2), normal (18.5 to 24.9 kg/m2), overweight (25 to 29.9 kg/m2), and obese (>30 kg/m2).

Dependent variable

Self-reported diabetes was determined by asking participants whether they had ever been diagnosed with diabetes or if a doctor had informed them of elevated blood sugar, omitting cases related to pregnancy.

Statistical analysis

Descriptive statistics were used to depict the weighted sample characteristics and the prevalence of diabetes. The relationship between diabetes prevalence and risk variables was analyzed using the chi-square test. Statistical analysis was conducted using SPSS 20. Odds ratios with p-values below 0.05 were deemed statistically significant.

3. RESULTS

Table 1: Demographic, socioeconomic and behavioural characteristic of the respondents

Characteristics	Male N=200	Female N=100	Total	*p*-value
	n (%)	*n* (%)	n	
Age				
50–59 years	84 (42)	38 (39)	122	
60–69 years	48 (24)	28 (28)	76	0.52
70 years and above	68 (34)	34 (34)	102	
Residence				
Urban	120 (60)	60 (60)	180	0.52
Rural	80 (40.)	40 (40)	120	
Marital Status				
Never Married	4 (2)	2 (2)	6	
Currently Married/Cohabiting	168 (86)	30 (30)	198	<0.01
Separated/Divorced/Widowed	28 (14)	68 (68)	96	
Level of Education				
No Schooling	90 (45)	65 (65)	155	
Primary or <6 year Schooling	44 (22)	20 (20)	64	<0.01

Secondary/High School	56 (28)	12 (12)	68	
College/University	10 (5)	3 (3)	13	
Wealth Quintile				
1 (Lowest)	32 (16)	20 (20)	52	
2	34 (17)	21 (21)	55	
3	40 (20)	21 (21)	61	<0.01
4	42 (21)	20 (20)	62	
5 (Highest)	52 (26)	18 (18)	70	
Type of Employer				
Never Employed/Work	4 (2)	2 (2)	6	
Public	28 (14)	5 (5)	33	
Private	12 (6)	2 (2)	14	<0.01
Self-employed	140 (70)	84 (84)	224	
Informal	16 (8)	7 (7)	25	
Physical Activity				
Low	42 (21)	30 (30)	72	
Moderate	24 (12)	12 (12)	36	<0.01
High	132 (66)	58 (58)	190	
Alcohol Consumption				
Non Drinkers	66 (33)	52 (52)	118	
Daily Drinkers	62 (31)	12 (12)	74	<0.01
Occasional Drinkers	44 (22)	22 (22)	66	
Former Drinkers	28 (14)	14 (14)	42	
Smoking				
Non-Smokers	120 (60)	92 (92)	212	
Current Daily Smokers	24 (12)	3 (3)	27	<0.01
Former Smokers	36 (28)	5 (5)	41	
Fruit/Vegetables intake				
Adequate	40 (20)	20 (20)	60	0.45
Inadequate	160 (80)	80 (80)	240	
Body Mass Index				
Underweight	40 (20)	18 (18)	58	
Normal	110 (55)	45 (45)	155	<0.01
Overweight	30 (15)	18 (18)	48	
Obese	20 (10)	19 (19)	39	

200 men and 100 women responded. 120 respondents were rural, 198 married, and 224 self-employed. The five household wealth quintiles were evenly divided, with 70 respondents in the highest and 52 in the lowest. Most respondents were physically active, while 72 were not. However, 48 and 39 responders were overweight and obese. About 60 responders ate enough fruits and vegetables.

Table 2: Prevalence of diabetes according to socioeconomic and health behavioural characteristics of the respondents

Characteristics	Male	Female	Total	*P*-value
	% (95% CI)	% (95% CI)	% (95% CI)	$(\chi 2)^a$
Age				
50–59 years	2.46 (1.52–3.95)	3.27 (2.08–5.08)	2.85 (1.99–4.01)	
60–69 years	5.76 (3.50–8.66)	5.78 (3.55–9.05)	5.65 (3.88–8.08)	0.01
70 years and above	2.55 (1.45–4.59)	4.90 (3.51–7.01)	3.74 (2.70–5.17)	
Residence				
Rural	1.96 (1.21–3.15)	2.71 (1.79–4.18)	2.33 (1.65–3.27)	
Urban	5.48 (3.61–7.93)	7.06 (5.35–9.25)	6.24 (4.75–8.03)	<0.01
Level of Education				
No Schooling	1.04 (0.53–2.11)	3.72 (2.71–5.09)	2.60 (1.92–3.53)	
Primary	3.01 (1.61–5.59)	4.48 (2.75–7.07)	3.67 (2.50–5.32)	<0.01
Secondary/High School	4.786(3.01–6.82)	8.12 (4.73–15.8)	5.71 (4.02–7.68)	
College/University	16.5 (9.50–27.1)	8.18 (2.63–23.4)	15.2 (8.70–22.7)	
Wealth Quintile				
1 (Lowest)	0.64 (0.19–1.97)	3.66 (2.10–6.41)	2.24 (1.34–3.79)	
2	2.27 (1.10–4.78)	1.70 (0.84–3.50)	1.97 (1.20–3.30)	
3	1.85 (1.00–3.53)	3.11 (1.70–5.72)	2.49 (1.59–3.92)	<0.01
4	3.75 (2.14–6.53)	7.03 (4.24–11.2)	5.25 (3.58–7.54)	
5 (Highest)	6.81 (4.29–10.1)	7.82 (5.57–11.0)	7.20 (5.33–9.45)	
Type of Employer				
Never Employed	0.00 (0.00–0.00)	4.42 (1.11–21.5)	2.53 (0.66–11.4)	
Public	6.75 (3.63–10.8)	6.48 (3.12–13.0)	6.69 (4.06–9.85)	
Private	6.90 (3.37–14.0)	0.00 (0.00–0.00)	5.28 (2.64–10.9)	0.02
Self-employed	2.65 (1.81–3.89)	4.65 (3.56–5.96)	3.69 (2.89–4.68)	
Informal	1.09 (0.29–4.70)	2.53 (0.99–6.85)	1.79 (0.85–4.20)	
Physical Activity				
Low	5.93 (3.55–8.90)	7.38 (5.63–9.62)	6.74 (0.42–8.51)	
Moderate	5.21 (3.00–9.07)	7.05 (4.28–12.1)	6.10 (0.42–9.01)	<0.01
High	2.18 (1.42–3.41)	2.49 (1.64–3.80)	2.32 (0.42–3.15)	

Fruits/Vegetables Intake				
Adequate	3.27 (1.63–5.26)	4.78 (2.81–7.59)	4.01 (2.61–5.46)	
Inadequate	3.37 (2.44–4.75)	4.42 (3.47–5.74)	3.87 (3.11–4.92)	0.85
Alcohol				
Non Drinkers	2.18 (1.26–3.95)	4.34 (3.27–5.84)	3.47 (2.70–4.58)	
Daily Drinkers	2.29 (1.21–4.35)	0.67 (0.17–2.68)	1.88 (1.01–3.55)	<0.01
Occasional Drinkers	5.23 (2.79–8.53)	4.74 (2.85–7.44)	4.99 (3.26–6.97)	
Former Drinkers	5.61 (3.11–9.96)	7.22 (3.79–13.4)	6.38 (4.02–10.1)	
Smoking				
Non-Smokers	3.29 (2.32–4.78)	4.65 (3.70–5.95)	4.09 (3.36–5.10)	
Daily Smokers	1.84 (0.54–6.10)	4.01 (1.07–14.6)	2.34 (0.96–5.68)	0.41
Former Smokers	4.17 (2.37–6.43)	1.79 (0.13–6.29)	3.86 (2.16–5.74)	
Body Mass Index				
Underweight	1.09 (0.38–3.05)	2.02 (0.91–4.59)	3.11 (2.33–4.22)	
Normal	3.08 (2.08–4.61)	3.16 (2.08–4.87)	1.52 (0.81–2.89)	<0.01
Overweight	4.35 (2.22–6.99)	4.60 (2.71–7.71)	4.48 (2.92–6.29)	
Obesity	7.74 (4.22–14.5)	9.97 (6.91–14.6)	9.10 (6.48–13.2)	

Urban respondents showed a far higher frequency than rural respondents. Respondents aged 60–69 had a prevalence of 5.65% (95% CI: 3.88–8.08) and those aged 50–59 had 2.85% (95% CI: 1.99–4.01). Diabetes was also associated with higher education among college and university graduates and lowest among individuals without formal training. Furthermore, high-wealth families were far more prevalent than low-wealth ones. Those with poor physical activity showed a considerably greater prevalence of diabetes than those with high exercise. Obesity prevalence was 9.1% (95% CI: 6.48–13.2) and normal BMI prevalence was 1.52% (95% CI: 0.81–2.89).

4. DISCUSSION

A chronic condition that causes considerable morbidity and mortality, type 2 diabetes mellitus (T2DM) was the ninth largest cause of death globally in 2008.[15] Insufficient insulin release, decreased insulin action, or both cause persistent hyperglycaemia in diabetes, which is linked to obesity, dyslipidemia, and hypertension.[16] Importantly, diabetes-related hyperglycaemia may lead to cardiovascular disease (CVD) and renal, ocular, vascular, and nervous system dysfunction. In 2006, the Republic of Ireland (ROI) spent over 10% of its health spending on diabetes care, according to study on the economic effects of T2DM.[17] Globally, T2DM is becoming a major public health concern.[18]

200 men and 100 women responded. 120 respondents were rural, 198 married, and 224 self-employed. The five household wealth quintiles were evenly divided, with 70 respondents in the highest and 52 in the lowest. Most respondents were physically active, while 72 were not. Only men with senior age had a higher risk of diabetes. Early childhood exposure to

biological, social, and behavioral diabetes risk factors may explain this connection.[19] Additionally, diabetes prevalence rose dramatically with schooling. It was high among university and college graduates compared to the general population and men. In Ghana[20], men have a greater education level than females, as shown in our research. High education has also been related to sedentary lives, dietary changes, and less physical exercise owing to job pressure, raising cumulative health risk.[21-24] Our research found that male education was connected with bad health behaviors (low physical activity, smoking, and drinking) and socioeconomic characteristics (urban residency and wealth).A recent US analysis suggested that the HbA1c test would not dramatically impact T2DM prevalence and that 97.7% of participants would stay diabetes-categorized[19], although data is still inconclusive.[20]

However, 48 and 39 responders were overweight and obese. About 60 responders ate enough fruits and vegetables. Urban respondents showed a far higher frequency than rural respondents. Respondents aged 60–69 had a prevalence of 5.65% (95% CI: 3.88–8.08) and those aged 50–59 had 2.85% (95% CI: 1.99–4.01). Diabetes was also associated with higher education among college and university graduates and lowest among individuals without formal training. Furthermore, high-wealth families were far more prevalent than low-wealth ones. Those with poor physical activity showed a considerably greater prevalence of diabetes than those with high exercise. Obesity prevalence was 9.1% (95% CI: 6.48–13.2) and normal BMI prevalence was 1.52% (95% CI: 0.81–2.89). In Ghanaian research, obesity is an independent risk factor for diabetes.[25,26]

Diabetes was twice as common in 60-69-year-olds as in 50-59-year-olds. Those with university and secondary education were five and two times more likely to develop diabetes than those without schooling. Participants with low and moderate physical activity were more likely to be diabetic than those with high activity, and obese responders were twice as likely to have diabetes as those with normal BMI. Another major risk factor for diabetes in older persons was inactivity. In women, physical inactivity was an independent diabetes risk factor. Similar findings in Kenya and Nigeria showed that more women than males had poor physical activity.[27,28] Literature also links physical inactivity to obesity by increasing saturated fatty acid levels and insulin insensitivity.[29]

5. CONCLUSION

Our research shows the prevalence of diabetes and related risk factors among older persons. Older age, more education, less physical activity, and obesity increased diabetes risk in the general population. Diabetes risk factors vary by gender, with men having old age and greater education and females obesity and inactivity. Thus, existing prevention programs should focus on social determinants of diabetes, sustained physical activity, and good nutrition from an early age to reduce exposure and diabetes prevalence in old age.

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