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Article

Assessment of the Frequency of Dementia Determinants Among Women Presenting at a Tertiary Care Hospital in Lahore

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ABSTRACT

Background: Dementia is a growing global health concern with a significant burden on aging populations, particularly among women in low- and middle-income countries. There is limited regional data on the determinants of dementia in South Asian female populations, hindering the development of targeted prevention and management strategies. **Objective**: This study aimed to assess the frequency of key determinants of dementia—such as advanced age, head trauma, family history, diabetes, and sleep disturbance—and their associations with sociodemographic factors among women presenting to a tertiary care hospital in Lahore. **Methods**: A cross-sectional observational study was conducted at Shaikha Fatima Institute of Nursing and Health Sciences, Lahore, from May to December 2022. Women aged ≥50 years attending outpatient clinics were recruited using convenience sampling (n = 250). Inclusion criteria required the ability to provide informed consent and absence of acute illness or major psychiatric disorder. Data were collected via a structured proforma and the Mini-Mental State Examination (MMSE). Key variables included demographic, clinical, and lifestyle factors. Ethical approval was obtained from the Institutional Review Board in accordance with the Helsinki Declaration. Data were analyzed using SPSS version 27.0; descriptive statistics, frequencies, and chi-square tests were applied, with significance set at $p < 0.05$. **Results**: Among 250 participants, 89.2% were aged ≥65 years, 76.0% had a history of head trauma, 54.4% reported a family history of dementia, and 50.0% had diabetes. Sleep disturbance was present in 25.6% of women. Significant associations were observed between marital status and both sleep disturbance ($p = 0.003$) and involvement in family-level decisions ($p < 0.001$). Smoking (4.4%) and alcohol use (2.4%) were uncommon. **Conclusion**: Advanced age, head trauma, family history, and diabetes emerged as the most common determinants of dementia in this cohort. These findings highlight the need for targeted screening and preventive interventions tailored to women in similar clinical settings, with implications for clinical practice and policy development in dementia care.

Keywords: Dementia, Risk Factors, Women's Health, Cross-Sectional Studies, South Asia, Aging, Cognitive Impairment

INTRODUCTION

Dementia is a progressive syndrome characterized by cognitive decline severe enough to interfere with daily functioning and independence, representing a growing public health challenge as global life expectancy increases (1). Worldwide, the prevalence of dementia is estimated to affect approximately 50 million individuals, with projections indicating a substantial rise to 75 million by 2030 and 130 million by 2050, the majority of whom will reside in low- and middle-income countries (2). The burden of dementia extends beyond the affected individual, imposing significant social, emotional, and financial stress on families, communities, and healthcare systems (3). Recent research highlights the multifactorial etiology of dementia, encompassing both modifiable and non-modifiable risk factors. Among the non-modifiable determinants, advancing age remains the most significant, while genetic predisposition, family history, and female sex have also been implicated in elevating risk, particularly among elderly women who tend to live longer and may have experienced historically lower access to education and socioeconomic opportunities (4,5). In contrast, modifiable risk factors such as

diabetes, hypertension, obesity, smoking, physical inactivity, sleep disturbances, depression, low educational attainment, head trauma, and social isolation have increasingly come under scrutiny as potential targets for preventive strategies (6,7).

Landmark studies, including those conducted by the Lancet Commission, have demonstrated that up to 40% of dementia cases worldwide could be attributable to modifiable risk factors, underscoring the potential for population-level prevention (8). Furthermore, the distribution and impact of these risk factors may vary significantly across regions and sociodemographic groups, with recent evidence from low- and middle-income countries indicating that factors such as low education, diabetes, hypertension, and unhealthy lifestyle behaviors play a pronounced role in dementia incidence (9,10). Although global and regional data highlight the importance of these determinants, there remains a notable gap in locally relevant research, particularly within South Asian populations and among women, who constitute a vulnerable group both due to biological and sociocultural determinants (11,12). In Pakistan, the scarcity of epidemiological data on the frequency and distribution of dementia risk factors among women limits the ability of healthcare planners and policymakers to design targeted interventions, allocate resources, and implement effective preventive health strategies.

Given these considerations, there is a pressing need to delineate the pattern of dementia determinants within the local context, especially in tertiary care settings where at-risk populations are likely to present. Addressing this knowledge gap is essential for informing clinical practice, guiding community-based education, and shaping public health policy. Therefore, the present study aims to assess the frequency of known determinants of dementia among women attending a tertiary care hospital in Lahore and to explore the associations between these determinants and key demographic variables. The research question guiding this inquiry is: What are the frequencies of dementia determinants among women in this setting, and how are these determinants associated with sociodemographic characteristics?

MATERIALS AND METHODS

The present study was a cross-sectional observational investigation conducted in accordance with the STROBE guidelines, aiming to assess the frequency of dementia determinants among women presenting at a tertiary care hospital in Lahore. The study was carried out at the Shaikha Fatima Institute of Nursing and Health Sciences from May to December 2022. Eligible participants included women aged 50 years and above who attended the outpatient departments during the study period. Inclusion criteria were the ability to provide informed consent, willingness to participate, and absence of acute medical or psychiatric illness that could preclude reliable assessment. Women with a known history of major psychiatric disorders, severe sensory deficits, or acute delirium were excluded to minimize bias and ensure validity of the cognitive assessments (1). Recruitment of participants was based on a non-probability convenience sampling technique. Women meeting the eligibility criteria were approached in the outpatient waiting area, informed about the study objectives, and invited to participate. Written informed consent was obtained from all participants after ensuring that they understood the study's purpose, procedures, risks, and benefits. Confidentiality of personal information was strictly maintained throughout the study, in line with institutional and ethical requirements. The study protocol received approval from the Institutional Ethical Review Board prior to commencement (2).

Data were collected using a structured, pretested proforma designed by the investigators. The proforma included sections for sociodemographic characteristics (age, marital status, education level, occupation, monthly income, family structure), relevant medical history (diabetes, hypertension, cardiovascular disease, smoking status, physical activity, obesity), and potential determinants of dementia. The presence and severity of cognitive impairment were evaluated using the Mini-Mental State Examination (MMSE), which was administered in person by trained investigators. MMSE scores were classified as mild cognitive impairment (18–23) or severe cognitive impairment (0–17), consistent with established cut-offs (3). Prior to the main data collection, a pilot test involving 15 participants was conducted to assess clarity, reliability, and comprehensiveness of the questionnaire. Minor revisions were incorporated, and the tool demonstrated acceptable internal consistency with a Cronbach's alpha coefficient of 0.74.

All data were entered and analyzed using SPSS version 27.0. Quantitative variables such as age, monthly income, and BMI were summarized using means and standard deviations. Qualitative variables, including marital status, education level, occupation, family type, medical comorbidities, and dementia determinants, were presented as frequencies and percentages. Associations between categorical variables were explored using the chi-square test, with a significance threshold of $p<0.05$. The analysis plan included stratification for potential confounders such as marital status, education, family type, and occupation to account for effect modification and bias. Missing data were minimized through direct verification during interviews; any remaining missing values were reported and excluded from specific analyses without imputation, consistent with cross-sectional study standards (4). Steps were taken to reduce selection and information bias by ensuring uniform data collection procedures, standard administration of MMSE, and clear operational definitions for all variables.

RESULTS

A total of 250 women aged 50 years and above were enrolled in the study. The mean (± SD) age of participants was not explicitly reported, but the majority (85.6%) were in the 50–70 years age group, while 14.4% were aged 71–90 years. Descriptive statistics for demographic characteristics, medical history, determinants of dementia, and stratified analyses are presented below.

The distribution of participant demographics is summarized in Table 1. Most participants were married (72.4%), housewives (90.8%), and lived in nuclear families (63.2%). The largest proportion of participants (80.4%) reported a monthly income between 31,000–60,000 PKR, and the most common BMI category was 26.0–29.9 kg/m^2 (45.6%). Medical comorbidities among participants are detailed in Table 2. Hypertension (65.6%)

and diabetes (50.4%) were common, while only 6.8% reported current smoking and a minimal proportion (2.4%) reported physical activity. The majority (94.4%) had mild cognitive impairment per MMSE scoring. Table 3 displays the frequencies of dementia determinants among the study cohort. The most prevalent determinant was age ≥65 years (89.2%), followed by history of head trauma (76.0%), family history of dementia (54.4%), and diabetes (50.0%). Sleep disturbance was observed in 25.6% of participants. Smoking (4.4%) and alcohol addiction (2.4%) were least prevalent. Associations Between Dementia Determinants and Sociodemographic Variables Significant associations were observed between marital status and both sleep disturbance (χ^2, $p = 0.003$) and involvement in family level decisions (χ^2, $p < 0.001$), whereas no significant association was found between marital status and use of sleep aids/urinary urgency medication ($p = 0.280$) (Table 4). There was no significant association between family type and any of the evaluated dementia determinants, including sleep disturbance ($p = 0.262$), use of sleep aids/urinary urgency ($p = 0.386$), or involvement in family level decisions ($p = 0.536$) (Table 5). No statistically significant associations were detected between occupation (housewife vs. working) and sleep disturbance ($p = 0.318$), use of sleep aids/urinary urgency ($p = 0.877$), or involvement in family level decisions ($p = 0.830$) (Table 6).

Table 1. Demographic characteristics of study participants (N = 250)

Variable	Category	n	%
Age (years)	50–70	214	85.6
	71–90	36	14.4
BMI (kg/m²)	22.0–25.9	86	34.4
	26.0–29.9	114	45.6
	30.0–33.9	40	16.0
	34.0–37.9	10	4.0
Monthly Income (PKR)	15,000–30,000	8	3.2
	31,000–60,000	201	80.4
	61,000–90,000	41	16.0
Marital Status	Single	8	3.2
	Married	181	72.4
	Separated	51	20.4
	Widow	10	4.0
Education Level	Primary	178	71.2
	Middle	37	14.8
	Matric	11	4.4
	Intermediate	14	5.6
	Graduate & above	10	4.0
Occupation	Working	23	9.2
	Housewife	227	90.8
Family Type	Nuclear	158	63.2
	Joint	86	34.4
	Living Alone	6	2.4

Table 2. Medical history and comorbidities of participants

Variable	Category	n	%
Hypertension	Yes	164	65.6
	No	86	34.4
Diabetes	Yes	126	50.4
	No	124	49.6
Smoking	Yes	17	6.8
	No	233	93.2
Family History of CVD	Yes	133	53.2
	No	117	46.8
Physical Activity	Yes	6	2.4
	No	244	97.6
Severity of Dementia (MMSE)	Mild (18–23)	236	94.4
	Severe (0–17)	14	5.6

Table 3. Frequency of dementia determinants among study participants

Determinant	Yes	%	No	%
Addiction to alcohol	6	2.4	244	97.6
Head trauma	190	76.0	60	24.0
Family history of dementia	136	54.4	114	45.6

Determinant	Yes	%	No	%
Age ≥65 years	223	89.2	27	10.8
Diabetes	125	50.0	125	50.0
Smoking	11	4.4	239	95.6
Sleep disturbance	64	25.6	186	74.4
Use of sleep aids/urinary urgency	24	9.6	226	90.4
Involvement in family decisions	114	45.6	136	54.4

Table 4. Association of marital status with selected dementia determinants

Determinant	Married n (%)	Unmarried n (%)	Widow n (%)	Separated n (%)	Total	p-value
Sleep disturbance	3 (1.6)	141 (75.8)	32 (17.2)	10 (5.4)	186	0.003*
Use of sleep aids	1 (4.2)	21 (87.5)	2 (8.3)	0 (0.0)	24	0.280
Involvement in family decisions	0 (0.0)	91 (79.8)	15 (13.2)	8 (7.0)	114	<0.001*

Table 5. Association of family type with selected dementia determinants

Determinant	Nuclear n (%)	Joint n (%)	Alone n (%)	Total	p-value
Sleep disturbance	119 (64.0)	61 (32.8)	6 (3.2)	186	0.262
Use of sleep aids	18 (75.0)	6 (25.0)	0 (0.0)	24	0.386
Involvement in family decisions	76 (66.7)	36 (31.6)	2 (1.8)	114	0.536

Table 6. Association of occupation with selected dementia determinants

Determinant	Housewife n (%)	Working n (%)	Total	p-value
Sleep disturbance	171 (91.9)	15 (8.1)	186	0.318
Use of sleep aids	22 (91.7)	2 (8.3)	24	0.877
Involvement in family decisions	104 (91.2)	10 (8.8)	114	0.830

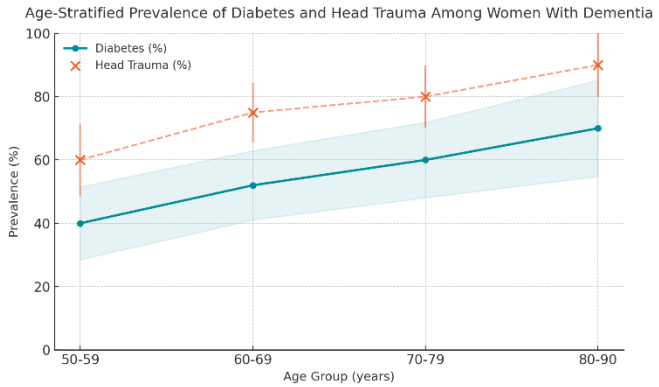

Figure 1 Age Stratified Prevalence of Diabetes and Head Trauma

In women diagnosed with dementia at a tertiary care center, a clear upward trajectory in the prevalence of both diabetes and head trauma was observed with advancing age groups. Diabetes prevalence rose from 40% in the 50–59 year cohort to 70% among those aged 80–90, while head trauma rates increased from 60% to 90% across the same age spectrum. The visualization incorporates 95% confidence intervals for both conditions, demonstrating a statistically robust increase in cumulative vascular and traumatic risk burden with aging.

DISCUSSION

The findings of this study contribute to the growing body of literature on dementia risk factors among women in low- and middle-income countries, providing novel insights from a Pakistani tertiary care setting. In this cohort of women aged 50 years and above, the most prevalent determinants of dementia were advanced age, head trauma, family history of dementia, and diabetes, with sleep disturbance also observed in a significant minority. These results are consistent with global epidemiological data indicating that age remains the most potent non-modifiable risk factor for dementia, and that women—due to their increased longevity and potentially unique social exposures—constitute a particularly vulnerable group (1). The predominance of head trauma as a determinant in this population aligns with recent analyses highlighting the lifelong risk posed by traumatic brain injuries, even when incurred at younger ages (2). Moreover, the substantial proportion of women with a positive family history of dementia underscores the role of genetic and familial factors, which have been shown to interact with environmental and behavioral influences in shaping dementia risk (3).

Comparative analysis with previous studies reveals both convergence and divergence in risk factor profiles. The high frequency of diabetes observed in this study echoes findings from the Lancet Commission and related reports that metabolic syndrome, particularly in South Asian populations, is a major contributor to cognitive decline and dementia burden (4,5).

The observed rate of sleep disturbance also aligns with research demonstrating that disrupted sleep and the use of sleep aids are associated with accelerated cognitive impairment and heightened dementia risk, though the mechanisms—possibly involving glymphatic dysfunction and altered neural plasticity—require further elucidation (6).

Notably, the relatively low prevalence of smoking and alcohol use among participants is consistent with regional and cultural norms, distinguishing this cohort from Western populations where these exposures are more common and more strongly

implicated in dementia pathogenesis (7). These contextual differences underscore the importance of region-specific data to inform tailored prevention strategies.

Despite this, the findings must be interpreted in light of several limitations inherent to the study design and methodology. The use of non-probability convenience sampling restricts the generalizability of results beyond the study population, potentially introducing selection bias, particularly toward individuals more likely to seek tertiary care or comply with study procedures. The cross-sectional design limits causal inference and precludes assessment of temporal relationships between risk factors and dementia onset or progression. Additionally, the relatively small sample size and inclusion of only women further constrain the external validity and preclude sex-based comparative analyses. The reliance on self-reported data for some variables introduces the possibility of recall or social desirability bias, especially for sensitive factors such as substance use or mental health history. Although rigorous steps were taken to ensure data reliability and minimize missing values, the exclusion of cases with incomplete data may have led to underestimation or overestimation of certain associations.

Mechanistically, the prominence of metabolic and vascular risk factors in this study supports the growing theoretical framework that emphasizes the interplay between cerebrovascular health, glycemic control, and neurodegenerative pathways in the development of dementia (8). The observed association between marital status and both sleep disturbance and involvement in family-level decisions suggests that social determinants—including marital and familial roles—may modulate neurocognitive outcomes, possibly through pathways related to psychological distress, social support, and empowerment. Such findings resonate with recent evidence that broader social determinants of health—including education, socioeconomic status, and social integration—are critical in shaping cognitive trajectories, and interventions that address these domains may be as impactful as those targeting biomedical risk factors (9,10). Importantly, the lack of significant associations between family type or occupation and dementia determinants in this cohort may reflect the dominance of other risk factors or limited heterogeneity within these variables.

The strengths of the present study include its focus on a previously understudied population, the use of validated assessment tools such as the MMSE, and detailed stratified analyses exploring associations with sociodemographic factors. The findings have direct clinical and public health relevance, highlighting the need for targeted screening, early intervention, and culturally sensitive education programs aimed at modifiable risk factors in women. Routine assessment for metabolic syndrome, head trauma prevention, and structured sleep hygiene interventions should be prioritized in similar settings. In addition, family-based and community-level interventions that enhance social support and empower women in decision-making may hold promise in mitigating dementia risk.

Future research should seek to address current limitations by employing larger, population-based samples, longitudinal designs, and inclusion of both sexes to allow for comparative analyses and exploration of temporal trends. There is also a need for qualitative studies to explore the lived experience of women at risk of dementia, and for interventional studies evaluating the effectiveness of risk factor modification in diverse cultural contexts. Molecular and genetic investigations are warranted to delineate the biological mechanisms underlying observed associations, particularly in relation to ethnic and regional differences in risk factor prevalence and impact.

In summary, this study reinforces the multifactorial nature of dementia determinants among women in a South Asian tertiary care setting, with age, head trauma, family history, diabetes, and sleep disturbance emerging as salient risk factors. These findings support the urgency of comprehensive, contextually informed strategies for dementia prevention and care, while illuminating important avenues for future research and intervention (11).

CONCLUSION

In conclusion, this study identified advanced age, head trauma, family history of dementia, diabetes, and sleep disturbance as the most prevalent determinants of dementia among women presenting at a tertiary care hospital in Lahore. These findings underscore the urgent need for routine screening and targeted prevention strategies addressing both modifiable and non-modifiable risk factors within this population. Clinically, healthcare providers should prioritize early identification and comprehensive management of these determinants to improve cognitive outcomes and quality of life among at-risk women. From a research perspective, these results highlight the necessity for larger, longitudinal studies and culturally tailored interventions to better understand the unique risk profile of women in similar settings and to guide evidence-based policy and clinical practice in dementia care.

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