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EVALUATION OF KNOWLEDGE AND AWARENESS REGARDING DEMENTIA RISK FACTORS AMONG WOMEN ATTENDING A TERTIARY CARE HOSPITAL IN LAHORE

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Abstract

OBJECTIVES: To evaluate the level of knowledge and awareness regarding dementia risk factors among women attending a tertiary care hospital in Lahore. METHODS: It was a cross-sectional study, conducted at Jinnah Hospital, Lahore. Two hundred and fifty females above 50 years of age who anonymously filled proforma, containing information about their demographics, medical history and determinants of dementia were included in the study. The data was entered and analyzed using Statistical Package for Social Sciences version 25.0. RESULTS: Among the 250 female participants in our study, 214 (85.6%) were within the age range of 50–70 years, while 36 (14.4%) were between 71–90 years. The determinants of dementia were assessed, with the most prevalent factor being age ≥65 years, reported in 223 (89.2%) participants. The second most common determinant was a history of head trauma in 190 (76.0%), followed by a family history of dementia in 136 (54.4%), diabetes in 125 (50.0%), sleep disturbances in 64 (25.6%), and the use of sleep aids or medications for urinary urgency in 24 (9.6%). Involvement in family-level decision-making was noted in 114 (45.6%) participants. The least frequently observed determinants were smoking in 11 (4.4%) and alcohol use in 6 (2.4%). A significant association was found between marital status and sleep disturbances (P = 0.003), as well as marital status and involvement in family-level decision-making (P = 0.000). CONCLUSION: A common group for determinants of dementia including age≥65 years, head trauma, family history of dementia, sleep disturbance was found in the study population and further research with a bigger sample size is needed to verify them.

INTRODUCTION

DEMENTIA

Dementia is an overall term for a set of symptoms that is caused by disorders that affect a person's brain. As the world population ages, dementia is becoming an important public health problem (Chou *et. al.*, 2019). Dementia can be defined as a

syndrome of multifactorial etiology. Symptoms may include memory loss and changes in mood and behavior, as well as difficulties with thinking or language that are severe enough to reduce a person's ability to perform everyday tasks and social functioning, leading individuals to dependence and loss of autonomy (Livingston et. al., 2023).

RISK FACTORS FOR DEMENTIA

There are several known risk factors for dementia. Some factors only slightly increase a person's risk while others make it much more likely that the person will develop the condition.

Accordingly, in 2023, "The Lancet Commission on Dementia Prevention, Intervention, and Care" established the risk and protection factors for dementia with the goal to consolidate the advances and the emerging knowledge about what we must do to prevent and manage this disease (Livingston *et. al.*, 2023).

TYPES OF RISK FACTORS OF DEMENTIA

There are two types of risk factors of dementia

1. Modifiable Risk Factors
2. Non-modifiable Risk Factors

PREVALENCE OF RISK FACTORS OF DEMENTIA IN DIFFERENT COUNTRIES

It is estimated that around 50 million people worldwide have dementia, with 60% living in low- and middle-income countries (WHO, 2019). Its enormous social and economic burdens threaten, along with other chronic diseases, the sustainability of health care systems (Canevell et. al., 2020). The costs of dementia are very high for the health system, the family and the community. One of the biggest challenges related to dementia syndromes is the control of risk factors to slow down the evolution and progression of the disease (Livingston et. al., 2023).

It was identified that 35% of the factors are potentially modifiable, and the other 65% are genetic and environmental factors. The fraction of the modifiable factors attributable to the population was calculated, that is, the percentage reduction in new cases over a certain period of time, if a particular risk factor was completely eliminated (Livingston et. al., 2023).

The same analysis of 2023 was later carried out in low- and middle- income countries (Mukadam et. al., 2019), evaluating representative samples from India, China and six countries in Latin America (Cuba, Dominican Republic, Mexico, Peru, Puerto Rico and Venezuela). Modifiable risk factors for dementia accounted for 39.5% of the total in China, 41.2% in India and 55.8% in Latin America. Five factors were more prevalent than those previously identified (Livingston et. al., 2023) low education (10.8, 13.6 and 10.9% in China, India and Latin America, respectively), smoking (14.7, 6.4 and 5.5%), hypertension (6.4, 4.0 and 9.3%), obesity (5.6, 2.9 and 7.9%) and diabetes mellitus (1.6, 1.7 and 3.2%) (Mukadam et. al., 2019).

A new study was carried out in Mozambique, Brazil and Portugal, countries that have a similar culture, but different income patterns. Seven modifiable risk factors were assessed and found to be associated with dementia in 24.4% of the cases in Mozambique, 32.3% in Brazil, and 40.1% in Portugal (Oliveira et. al., 2019). In Brazil, the prevalence of risk attributable to each factor was: physical inactivity (27.4%), low schooling (21.0%), smoking (8.1%), depression (4.7%), high blood pressure and obesity (4.3% each), and diabetes mellitus (2.8%). It was identified that if the prevalence of each factor decreased by 20.0% per decade, there would be a potential reduction of 16.2% in the prevalence of dementia by 2050 (Oliveira et. al., 2019).

MODIFIABLE RISK FACTORS

The modifiable risk factors were divided into those that occur in childhood, middle age and old age. Low schooling (even primary education) in young age was responsible for 8%. Hearing loss (9%), high blood pressure (2%) and obesity (1%) were identified as relevant factors in middle age. In turn, smoking (5%), depression (4%), physical inactivity (3%), social isolation (2%) and diabetes mellitus (1%) were identified in old age ((Livingston et. al., 2023). Some factors were not confirmed as risk factors, but there is evidence of their influence on the development of dementia, and they are referred to as "other factors". They include poor diet, alcohol use, head trauma, monolingualism, visual impairment, and sleep disorders (Livingston et. al., 2023). In July 2020, the document was updated, and included the excessive

alcohol consumption, traumatic brain injury, and air pollution as main risk factors and the percentage of potentially modifiable factors increased to 40% (Livingston et. al. 2020).

Details of modifiable risk factors are described here to show that how these factors contribute to develop dementia.

PHYSICAL INACTIVITY

Physical inactivity can worsen the health of a person's heart, lungs and blood circulation, and make it harder for them to control their blood sugar. It is closely linked to a higher risk of heart disease, stroke and type 2 diabetes, which are all risk factors for dementia.

SMOKING

Smoking damages a person's heart, lungs and blood circulation, particularly the blood vessels in the brain. It causes harmful substances to build up in the brain that cause inflammation and prevent enough oxygen getting to nerve cells. The substances also increase a person's risk of having a stroke, which can lead to vascular dementia.

UNHEALTHY DIET

Eating a diet that lacks a good range of healthy foods may increase a person's risk of dementia. There are many possible reasons. For example, an unhealthy diet increases the risk of high blood pressure which is a risk factor for dementia. Ideally a person should eat lots of fruits and vegetables, wholegrain cereals, fish, low-fat dairy, beans and pulses, and not too much red or processed meats like sausages, ham or bacon. Too much salt (more than a teaspoon per day) is also linked with higher risk of dementia.

TOO MUCH ALCOHOL

Regularly drinking above the recommended amounts of alcohol exposes the brain to high levels of toxic substances that can damage nerve cells over time. The recommended amount of alcohol per week is 14 units, ideally spread over at least three days rather than all at once. Drinking very high levels of alcohol over a long period of time also increases a person's risk of Korsakoff's syndrome and alcohol-related brain damage, which increases the risk of dementia.

NON-MODIFIABLE FACTORS

There are different risk factors of dementia that cannot be changed or modified in the life and are called non-modifiable risk factors. These include: gender and sex, ethnicity, gene and the amount of 'cognitive reserves'. These are discussed in detail as below:

AGEING

The biggest risk factor for dementia is ageing. This means as a person gets older, their risk of developing dementia increases a lot. For people aged between 65 and 69, around 2 in every 100 people have dementia. A person's risk then increases as they age, roughly doubling every five years. This means that, of those aged over 90, around 33 in every 100 people have dementia.

Ageing is a risk factor for dementia because dementia can take a long time to develop. This is because dementia is caused by diseases that damage the brain, such as Alzheimer's disease or vascular disease. It can take these diseases many years to damage the brain enough to cause the symptoms of dementia. This means that the longer a person lives, the more time there is for dementia to develop.

Ageing is also a risk factor for dementia because an older person is likely to be coping with other changes and health conditions that can increase their risk. For example, an older person is more likely to have: high blood pressure, blood vessels in the brain that are damaged, twisted or blocked, a greater risk of having a stroke, cells in the brain that aren't as active as those of younger people, a weaker immune system, a slower ability to recover from injuries.

As a person ages, they will also become more physically frail over time. Along with the changes listed above, this can make a person more likely to develop problems with their thinking and memory. Although older people are at a higher risk of dementia, younger people can still get it. At least 1 in 20 people with dementia developed the condition when they were aged under 65 years.

GENES

There are certain genes that may be passed down (inherited) from a parent that can affect a person's chances of getting dementia. There are two types of these genes: 'familial' genes and 'risk' genes. Familial

genes will definitely cause dementia if they are passed down from a parent to a child. If one parent has a familial gene, their child will have a 1 in 2 chance of inheriting it and developing dementia – usually when they are in their 50s and 60s. Familial genes are very rare for most types of dementia. However, these genes may be the cause of around 1 in 3 cases of frontotemporal dementia, which is a less common type of dementia.

Risk genes increase a person's chances of developing dementia. They are much more common than familial genes. However, unlike familial genes, risk genes do not always cause a person to develop dementia. More than 20 risk genes have been found so far and most of them only slightly increase a person's risk of dementia.

The most important risk gene for dementia is called apolipoprotein E (APOE). Certain versions (variants) of the APOE gene can make a person up to four times more likely to develop Alzheimer's disease than people who don't have this version of the gene. However, it's important to remember that these higher-risk versions still don't always cause dementia. Most people with higher-risk versions of the APOE gene don't ever develop the condition.

COGNITIVE RESERVES

'Cognitive reserve' is a person's ability to cope with disease in their brain. It is built up by keeping the brain active over a person's lifetime. The more cognitive reserve a person has, the longer it takes for any diseases in their brain to cause problems with everyday tasks. This means people with a larger cognitive reserve can delay the start of dementia symptoms for a longer period of time. People with a smaller cognitive reserve are at a higher risk of getting dementia in their lifetime.

The three most important factors that can lead to a smaller cognitive reserve are:

(1) **Leaving education early**: A person who left school at an early age is more likely to have a smaller cognitive reserve than a person who stayed in full-time education for longer or who continued learning throughout their life.

(2) **Less job complexity**: A person who has not used a range of mental skills during their lifetime of work – for example, memory, reasoning, problem-solving, communication and organisational skills – is more likely to have a smaller cognitive reserve.

(3) **Social isolation**: A person who has not interacted much with other people during their life may also have a smaller cognitive reserve. This means these factors are also risk factors for dementia. Whilst a lot of a person's cognitive reserve is built up during their childhood and early adulthood, there are many things a person can do to increase their cognitive reserve later in life, such as staying mentally and socially active.

ETHNICITY

A few studies have suggested that people from Black African, Black Caribbean and South Asian ethnic groups are more likely to get dementia than people from White ethnic groups. This includes a recent study of people living in London which also found that people from Black ethnic groups have the highest level of risk. One possible reason for these differences is that people from Black African, Black Caribbean and South Asian ethnic groups in the UK are more likely to develop diabetes and cardiovascular disease (CVD) as they get older – both diabetes and CVD are important risk factors for dementia.

However, more evidence is needed to be certain that ethnicity itself is a risk factor for dementia. Differences in risk between different ethnic groups may be caused by other factors. For example, some ethnic groups may generally have less access to education and work opportunities.

HEALTH CONDITIONS AND DISEASES

CARDIOVASCULAR FACTORS

A cardiovascular disease (CVD) is a disease that damages the heart or makes it harder for blood to circulate around the body. CVD can greatly increase a person's risk of developing dementia. This means that most risk factors for CVD are also risk factors for dementia. The main CVD risk factors that are known to increase a person's risk of getting dementia are: High blood pressure, increasingly stiff and blocked arteries (known as 'atherosclerosis'), high blood cholesterol levels, being overweight and physically unfit.

TYPE 2 DIABETES

These factors start to have an effect during a person's mid-life (aged 40–65), increasing their risk of developing dementia later in life. Type 2 diabetes is also an important risk factor for people in later life (over 65). These CVD risk factors are most strongly linked to vascular dementia. This is because vascular dementia is directly caused by problems with blood supply to the brain. However, CVD risk factors can also increase a person's risk of developing Alzheimer's disease. Many people can avoid these CVD risk factors and there are many organisations who can provide support with this.

HEARING LOSS

Dementia is more common in people who developed hearing problems during mid-life (aged 40–65). This means that, if a person's hearing worsens in mid-life, their risk of developing dementia when they are older increases. People with hearing problems may be more likely to withdraw from social situations and become more isolated over time. The effort of straining to hear things may also make it harder for other mental processes to work properly.

The diseases that cause dementia can also affect hearing. Studies have shown that using a hearing aid may significantly reduce a person's risk of getting dementia. It's important that a person gets regular hearing tests as they get older.

TRAUMATIC BRAIN INJURIES

Traumatic brain injuries (TBIs) are caused by a blow or jolt to the head – especially if the person is knocked out unconscious. TBIs can start a process in the brain where the substances that cause Alzheimer's disease build up around the injured area. Even if the injury happens when a person is young, it can still increase their risk of developing dementia. If the person suffers several TBIs their risk increases even more. Serious TBIs in younger people are mostly caused by: road traffic accidents, an object accidentally hitting their head, active service in the armed forces, some sports (particularly boxing, cycling, skiing and horse riding).

The risks related to regular but less serious physical blows to the head are still unclear, such as those in football and rugby. There is some evidence that professional football players may have a slightly higher risk of developing dementia when they get older. However, this should be considered alongside the fact that football players generally live longer than other people.

DEPRESSION

People who have had periods of depression in their life also have a higher risk of developing dementia. This may be because depression has harmful long-term effects on the brain and on the way a person thinks and copes with difficulties. It's still not clear if treating a person's depression with antidepressants can reduce their risk of dementia. However, preventing depression from happening in the first place is likely to help.

There are many people who develop depression a few years before they get dementia. However, in these cases, it may be the development of dementia that is causing depression.

SEX AND GENDER

Overall, there are more women than men living with dementia. This is mostly because women tend to live longer than men. The risk of getting dementia is about the same for men and women. However, women who are currently over 80 have a slightly higher risk of getting dementia than men their age. The reasons why women over 80 have a higher risk of dementia than men over 80 are still unclear. It is possible that general differences in the lifestyles of these women and men over time have caused differences in their level of risk. For example, women currently in this age group may have had less access to education or work opportunities than men their age.

Separate to gender, there have also been concerns that levels of sex hormones around the time of menopause may affect a person's risk of dementia. The evidence on this is still unclear. When a person goes through the menopause, their levels of oestrogen and progesterone fall. Some research has suggested that the earlier this happens in someone's life, the higher their risk of dementia. However, clinical trials of hormone replacement therapy (HRT, which replaces these sex hormones) have not shown any effect on the risk of developing dementia. Until

there is clearer evidence, HRT is not recommended as a way to help people reduce their risk of dementia (Montine et. al., 2019).

POTENTIAL MECHANISMS FOR HEALTHY BRAIN AGING

It is increasingly recognized, and indeed rediscovered from earlier understanding across centuries and cultures, that maintenance of brain health across the life span protects from later manifestation of disorders. In addition to the social determinants, a substantial body of evidence suggests that cumulative exposure to vascular risk factors throughout life, potentially starting as early as in utero, and even across generations, with the greatest knowledge from midlife, increases the risk of common neurological outcomes such as stroke and dementia, as well as covert brain lesions. These are likely to diminish capacity to withstand insults and impair brain health but may only be recognized clinically later in life (Gorelick et. al., 2023). We now understand that the mechanisms through which these determinants and vascular risk factors affect brain health include preservation of efficient mechanisms of plasticity, resistance, resilience, and reserve.

Plasticity is the nervous systems' ability to make rapid adaptations to changeable internal and external environmental demands (Pascual-Leone et. al., 2017). Resistance is inferred from an observed absence or lower level of dementia-associated brain injury, relative to an expected greater frequency or severity based on age, genetic factors, or other characteristics of the individual. Resilience is inferred from an observed level of cognitive functioning higher than expected in the face of demonstrated brain injury. Resilience can only be recognized or measured when injury exists and can be related to (near) coincident assessment of function. Consumption or retention of reserve can be measured or inferred as brain structural or physiological premorbid capacity. Examples might be greater than usual synaptic density or enhanced cognitive effectiveness or redundancy because of learned language, educational richness, or occupational complexity before the onset of disease (Montine et. al., 2019).

To identify potential mechanisms that explain the differential effect of potentially modifiable risk and protective factors, the dementia-focused 2020 Lancet Commission structured a systematic review of modifiable risk factors around a life course approach, partially revealing how specific risk and protection are likely to operate from early life stages. All the specific risks identified are related to material, behavioral, and psychological factors that are known to arise from health inequalities within and across societies (Mukadam et. al., 2019).

JUSTIFICATION OF THE STUDY

The estimates of frequency of dementia are important by themselves, as they underline the extent of the health care problem as created by dementia. Although important for health care planners, the frequency of disease in itself is not the most important issue. Rather, we need to gain insight into the mechanisms that cause dementia, to be able to develop therapeutic agents that can slow down or even cure these diseases. But there are few researches available on the subject. Especially in Pakistan no such study was conducted before that has determined risk factors of dementia among women. Therefore it was of utmost importance to conduct such study to see the basic mechanisms leading to dementia.

SIGNIFICANCE OF THE STUDY

For the health care planners, it is very important to know the risk factors in addition to the frequency of disease. This is because we need to gain insight into the mechanisms that cause dementia, and to develop disease management plan. The study will be helpful for the health care planner to identify risk factors of dementia that can be further investigated to see the effect of these factors on the course of the disease. As a result, the findings can be used to establish preventative health education programmes aimed at reducing modifiable risk factors of dementia and enhancing the subjective health of women in the early stages of their lives.

Taken together, the findings suggest that women can avoid these risk factors and engage in healthy behaviours, all of which may help to alleviate dementia symptoms and, in turn, improve quality of life.

PURPOSE OF THE STUDY

Determinants or risk factors of dementia are very important to know in order to establish treatment as well as preventive strategies. The purpose of this study was to assess the frequency of determinants of dementia in women presenting in a tertiary care setting and to determine the relationship of modifiable risk factors with demographic variables of study participants.

RESEARCH QUESTION

What are the frequencies of determinants of dementia among women? And is there any association between these determinants with demographic variables among participating women?

LITERATURE REVIEW

Dementia makes elderly people unable to live their normal lives, while at the same time creating problems of social instability and financial burden (WHO, 2023). As the world's aged population grows, the prevalence of dementia is expected to increase. In 2019, there were about 47 million people with dementia worldwide (or about 5% of the world's elderly population), and the number of people with dementia is expected to increase to 75 million in 2030 and 130 million in 2050 (WHO, 2023). There are prominent factors associated with an increase in the prevalence of dementia, which is higher in women than in men (Musicco ET. AL., 2009).

In a study the evidence on sex differences in the risk for dementia has been studied as the effects of a lifestyle intervention. It was observed that there was higher risk for dementia after age 80 years in women. The positive effects of the lifestyle intervention on cognition did not significantly differ between men and women. Sex-specific analyses suggested that different vascular, lifestyle, and psychosocial risk factors are important for women and men inmid- and late-life. It was concluded that women had higher risk for dementia among the oldest individuals and lifestyle interventions may be effectively implemented among older men and women (Shireen et. al., 2021).

There is increasing focus on social determinants of health and modifiable factors that affect cognition and risk of Alzheimer disease and related dementias (ADRDs). In another study the impact of various social determinants of health, which are potentially reversible, on the incidence, prevalence, and risk of ADRDs and cognition were explored. It was observed that various social determinants of health that affect cognition and risk of ADRDs include: Lower socioeconomic status (SES) less education and manual labor, higher body mass index in midlife and a decreasing body mass index in old age. It was suggested that future work in enhancing education, improving socioeconomic conditions, work, and neighborhood environments, and eliminating racial discrimination could potentially have a drastic impact for the reduction of dementia (Majoka & Schimming 2021).

Old-age dementias are known to disproportionally affect women as well as individuals with low educational attainment. The higher lifetime risk of dementia among women is usually attributed to their longer life expectancy. However, the impact of sex, and subsequent gender inequity, is likely to be more multifaceted than this explanation implies. Not least because of historical inequities in access to education between the sexes and the gender and socio-economic gradients in risk factors such as stress, depression and social isolation. In a study it was sought to test whether differences in educational attainment and experiences of general psychological distress mediate the association between female sex and dementia. It was concluded that the overall findings suggest that social (dis) advantage predicts general psychological distress, which thereby constitutes a potential, and rarely acknowledged, pathway between female sex, education, and dementia. They further underline the importance of attending to both education and distress as 'gendered' phenomena when considering the nature of their associations with dementia. However, the possibility of reverse causality bias must be acknowledged and the need for longitudinal studies with longer follow-up stressed (Hasselgren et. al., 2020).

Brain health as expressed in our mental health and occurrence of specific disorders such as dementia and stroke is vitally important to quality of life,

functional independence, and risk of institutionalization. Maintaining brain health is, therefore, a societal imperative, and public health challenge, from prevention of acquisition of brain disorders, through protection and risk reduction to supporting those with such disorders through effective societal and system approaches. To identify possible mechanisms that explain the differential effect of potentially modifiable risk factors, and factors that may mitigate risk, a life course approach is needed. This is the key to understanding how poor health can accumulate from the earliest life stages. It also allows us to integrate and investigate key material, behavioral, and psychological factors that generate health inequalities within and across communities and societies. This review provides a narrative on how brain health is intimately linked to wider health determinants, thus importance for clinicians and societies alike. There is compelling evidence accumulated from research over decades that socioeconomic status, higher education, and healthy lifestyle extend life and compress major morbidities into later life. Brain health is part of this, but collective action has been limited, partly because of the separation of disciplines and focus on highly reductionist approaches in that clinicians and associated research have focused more on mitigation and early detection of specific diseases. However, clinicians could be part of the drive for better brain health for all society to support life courses that have more protection and less risk. There is an evidence of change in such risks for conditions such as stroke and dementia across generations. The evidence points to the importance of starting with parental health and life course inequalities as a central focus (Hilal et. al.m 2022).

In order to maximize the chances for risk reduction, it is useful to investigate associations of social determinants and lifestyle for brain health. Röhr et. al. 2022 computed the "LIfestyle for BRAin health" (LIBRA) score for baseline participants of the Leipzig Research Centre for Civilization Diseases (LIFE) it was reported that social determinants, particularly socioeconomic factors, are associated with lifestyle for brain health, and should thus be addressed in risk reduction strategies for cognitive decline and dementia. Further it was suggested a social-ecological public health perspective on risk reduction might be more effective and equitable than focusing on individual lifestyle behaviors alone (Rohr et. al., 2022).

Dementia risk reduction is a major and growing public health priority. While certain modifiable risk factors for dementia have been identified, there remains a substantial proportion of unexplained risk. There is evidence that environmental risk factors may explain some of this risk. **Lewis *et. al.* 2020** presented the first comprehensive systematic review of environmental risk factors for dementia. The strength and consistency of the overall evidence for each risk factor identified was assessed. The risk factors were considered in six categories: air quality, toxic heavy metals, other metals, other trace elements, occupational-related exposures, and miscellaneous environmental factors. Few studies took a life course approach. There is at least moderate evidence implicating the following risk factors: air pollution; aluminium; silicon; selenium; pesticides; vitamin D deficiency; and electric and magnetic fields. The review suggested that future research could focus on a short list of environmental risk factors for dementia and further robust, longitudinal studies with repeated measures of environmental exposures are required to confirm these associations **(Lewis *et. al.* 2020)**.

Beama et. al. 2022, examined gender differences in incidence rates of any dementia, Alzheimer's disease (AD) alone, and non-Alzheimer's dementia alone in 16,926 women and men in the Swedish Twin Registry aged 65+. Dementia diagnoses were based on clinical workup and national health registry linkage. Incidence rates of any dementia and AD were greater in women than men, with any dementia rates diverging after age 85 and AD rates diverging around 80. This pattern is consistent with women's survival to older ages compared to men. These findings are similar to incidence rates reported in other Swedish samples **(Christopher et. al., 2022)**.

Bosch et. al., 2023 described the influence of the individual´s determinants and of the macroeconomic social determinants in the prevalence of people with dementia as well as the role of the health policies in the disease control. It was concluded that dementia can be influenced by risk factors in the middle age such as obesity, smoking, hypercholesterolemia, alcoholism and low

educational level. The national plans for dementia increase the quality of the medical care, maximize the health care services and achieve greater equity. It is required that the developing countries increase mutual cooperation and draw strategies to cope with this disease **(Bosch et. al., 2023)**.

METHODOLOGY

DATA COLLECTION INSTRUMENT

A predesigned proforma was used for data collection (Annexure 1). MMSE will be used to assess the severity of dementia.

DESCRIPTION OF THE TOOL

The questionnaire and MMSE were explained to each individual before filling

RESTESTING OF THE TOOL

In start a pilot study was done by filling 15 questionnaire and some modifications were done in the questionnaire.

RELIABILITY AND VALIDITY OF TOOL

The reliability of questionnaire was assessed by applying reliability coefficient chronbac Alpha, α=0.74 which is statistically acceptable.

SETTING AND ITS DESCRIPTION

This study was conducted in Jinnah Hospital, Lahore.

STUDY DESIGN

It was a cross-sectional study

SAMPLING TECHNIQUE

It was a Non-Probability Convenience sampling

PROCEDURE OF DATA COLLECTION:

After taking approval from institutional ethical committee, participants fulfilling inclusion/exclusion criteria were selected from outdoor units by convenience sampling method. Written informed consent was taken for their participation in the study and using their data for research purpose. Participants were ensured about the confidentiality of their personal information. Participant's socio demographic information was noted including, age, weight, height, BMI, marital status (single, married, widowed, separated), education level (primary, middle, matric, intermediate, bachelor and above), monthly income, occupation (housewife, working), family type (nuclear, joint family, living alone) were noted. Medical history including presence of any cardiovascular event like, diabetes, hypertension, smoking, obesity, family history of any cardiovascular disease and physical activity will be noted. MMSE was administered to assess the severity of dementia, total MMSE score was rated as Mild cognitive impairment (18-23), severe cognitive impairment (0-17). Then patients were asked about the determinants of dementia as head trauma, family history of dementia, age≥65 years, diabetes, smoking, sleep disturbance, Sleeping aids or medicine for urinary urgency and involvement in family level decisions (as per operational definition). All this information was collected by a predesigned questionnaire attached by researcher herself.

DATA ANALYSIS PROCEDURE:

All the collected information will be entered and analyzed using SPSS version 22.0. The quantitative variables like, age, monthly income, BMI will be presented by calculating mean and standard deviation. The qualitative variables like, marital status (single, married, widowed, separated), education level (primary, middle, matric, intermediate, bachelor and above), occupation (housewife, working), family type (nuclear, joint family, living alone medical history including presence of any cardiovascular event like, diabetes, hypertension, smoking, obesity, family history of any cardiovascular disease and physical activity, severity of dementia, total MMSE score was rated as Mild cognitive impairment (18-23), severe cognitive impairment (0-17) and determinants of dementia as head trauma, family history of dementia, age≥65 years, diabetes, smoking, Sleep disturbance, Sleeping aids or medicine for urinary urgency and involvement in family level decisions will be presented by calculating frequency and percentages. Data will be stratify for marital status, education level, family type, occupation and severity of dementia to address effect modifiers.

RESULTS

Table 1 shows the frequency and percentage distribution of demographic characteristics of the

study participants (N = 250). The majority of respondents, 196 (78.4%), were between 50–70 years of age, while 54 (21.6%) were in the age group of 71–90 years. Regarding body mass index (BMI), 74 (29.6%) participants fell within the normal to overweight category of 22.0–25.9, 98 (39.2%) were in the 26.0–29.9 range, 56 (22.4%) in the 30.0–33.9 range, and 22 (8.8%) in the highest range of 34.0–37.9. Most participants, 182 (72.8%), had a monthly income between 31,000–60,000 PKR, whereas 54 (21.6%) earned between 61,000–90,000 PKR, and only 14 (5.6%) had an income of 15,000–30,000 PKR. In terms of marital status, the majority were married 165 (66.0%), followed by separated 55 (22.0%), widowed 18 (7.2%), and single 12 (4.8%). Educational level varied, with more than half of the respondents, 142 (56.8%), having primary education, while 41 (16.4%) had middle-level education, 27 (10.8%) matric, 26 (10.4%) intermediates, and only 14 (5.6%) were graduates or above. Regarding occupation, most were housewives 212 (84.8%), while only 38 (15.2%) were working women. Concerning family structure, 144 (57.6%) belonged to nuclear families, 94 (37.6%) lived in joint families, and 12 (4.8%) were living alone.

Table 1: Demographic characteristics of study participants

Frequency and Percentage Distribution of Demographic Variables (N = 250)			
Variable	**Category**	**Frequency**	**Percentage**
Age	50–70 years	196	78.4%
	71–90 years	54	21.6%
BMI	22.0–25.9	74	29.6%
	26.0–29.9	98	39.2%
	30.0–33.9	56	22.4%
	34.0–37.9	22	8.8%
Monthly Income	15000–30000	14	5.6%
	31000–60000	182	72.8%
	61000–90000	54	21.6%
Marital Status	Single	12	4.8%
	Married	165	66.0%
	Separated	55	22.0%
	Widow	18	7.2%
Education Level	Primary	142	56.8%
	Middle	41	16.4%
	Matric	27	10.8%
	Intermediate	26	10.4%
	Graduate and above	14	5.6%
Occupation	Working	38	15.2%
	Housewife	212	84.8%
Family Type	Nuclear	144	57.6%
	Joint	94	37.6%
	Living alone	12	4.8%

Table 2: The health-related characteristics of the participants are summarized in the table. Out of 250 respondents, 148 (59.2%) reported having hypertension, while 102 (40.8%) did not. Diabetes was present in 112 (44.8%) participants, whereas 138 (55.2%) were non-diabetic. A small proportion, 24 (9.6%), were smokers, compared to

226 (90.4%) who had no smoking history. Nearly half of the respondents, 119 (47.6%), had a family history of cardiovascular disease, while 131 (52.4%) did not. Only 14 (5.6%) participants reported engaging in regular physical activity, whereas the majority, 236 (94.4%), were physically inactive. In terms of dementia severity, most participants, 229 (91.6%), were identified with mild cognitive impairment, while 21 (8.4%) had severe cognitive impairment.

Table2: Frequency and Percentage Distribution of Medical History of Participants (N = 250)

Variable	Category	Frequency	Percentage
Hypertension	Yes	148	59.2%
	No	102	40.8%
Diabetes	Yes	112	44.8%
	No	138	55.2%
Smoking	Yes	24	9.6%
	No	226	90.4%
Family History of Cardiovascular Disease	Yes	119	47.6%
	No	131	52.4%
Physical Activity	Yes	14	5.6%
	No	236	94.4%
Severity of Dementia	Mild Cognitive Impairment	229	91.6%
	Severe Cognitive Impairment	21	8.4%
Total		250	100.0%

Determinants of dementia were assessed in 250 females, the most common determinant was age≥65 years as 223(89.2%), head trauma was the second common 190(76.0%), 136(54.4%) subjects were having family history of dementia, 125(50.0%) females were diabetics, Sleep disturbance was observed in 64(25.6%) of femles.24(9.6%) of the subjects were taking sleep aids and medicine for urinary urgency, 114(45.6%) were involved in family level decision, the least common determinants observed in our data were smoking i.e. 11(4.4%) and addiction to alcohol as 6(2.4%).

Figure 1: Determinants of dementia

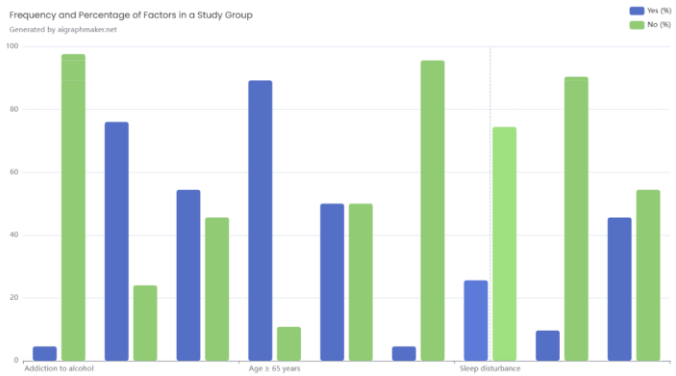
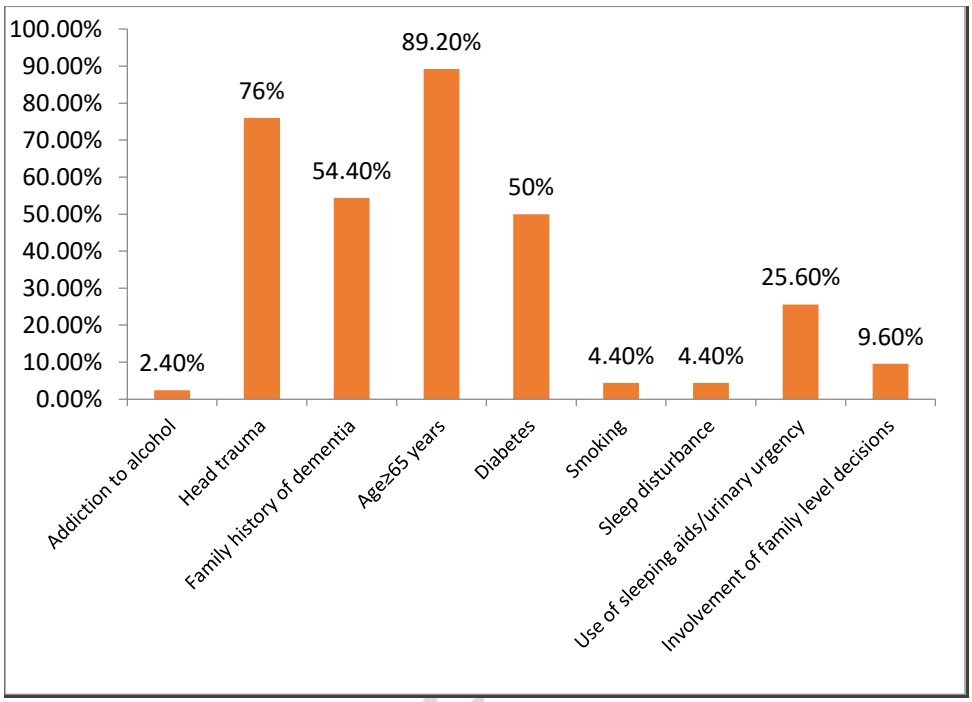


Figure:2
Graphical presentation of determinants of dementia

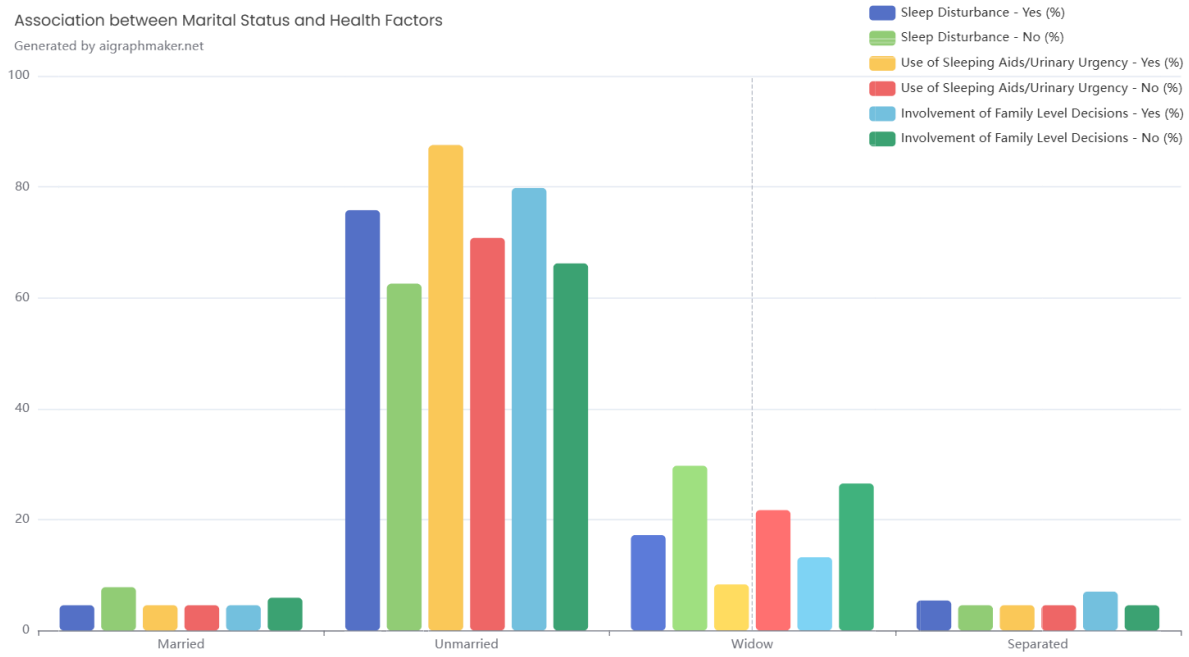


Association between the determinants which can be affected by the participant's marital was developed by applying chi-square test. Out of 186 females who had sleep disturbance 3(1.6%) were married, 141(75.8%) unmarried, 32(17.2%) widows and 10(5.4%) were separated, significant association was found between marital status and sleep disturbance (p=0.003). No association was found between use of sleeping aids and marital status p=0.280. 114 females were involved in family level decisions among these 0(0.0%) were married, 91(79.8%) unmarried, 15(13.2%) were widows and 8(7.0%) were separated, significant association was found between involvement of family level decisions and marital status p=0.000.

Table 4: Stratification with respect to marital status

	Married	Unmarried	Widow	Separated	Total	p-value
Sleep disturbance						
• **Yes**	3(1.6)	141(75.8)	32(17.2)	10(5.4)	186	0.003*
• **No**	5(7.8)	40(62.5)	19(29.7)	0(0.0)	64	
Use of sleeping aids/urinary urgency						
• **Yes**	1(4.2)	21(87.5)	2(8.3)	0(0.0)	24	0.280
• **No**	7(3.1)	160(70.8)	49(21.7)	10(4.4)	226	
Involvement of family level decisions						
• **Yes**						
• **No**	0(0.0)	91(79.8)	15(13.2)	8(7.0)	114	0.000*
	8(5.9)	90(66.2)	36(26.5)	2(1.5)	136	

Figure 3



Family type of study participants was asked and associated with the determinants of dementia which can be affected by it (Sleep disturbance, use of sleeping aids/urinary urgency medicine), no association of family type was found with any of the determinants as shown in table below.

Table 5: Stratification with respect to family type

	Nuclear	Joint	Living alone	Total	p-value
Sleep disturbance • **Yes** • **No**	 119(64.0) 39(60.9)	 61(32.8) 35(39.1)	 6(3.2) 0(0.0)	 186 74	0.262
Use of sleeping aids/urinary urgency • **Yes** • **No**	 18(75.0) 140(61.9)	 6(25.0) 80(35.4)	 0(0.0) 6(2.7)	 24 226	0.386
Involvement in family level decisions • **Yes** • **No**	 76(66.7) 82(60.3)	 36(31.6) 50(36.8)	 2(1.8) 4(2.9)	 114 43	0.536

In our study participants 186 females had sleep disturbance in which 171(91.9%) were housewives and 15(8.1%) were working, 56(87.5%) housewives and 8(12.5%) working females didn't have disturbed sleep p-value= 0.318 shows that there is no association between the sleep disturbance and occupation of the study participants and 22(91.7%) housewives were using sleeping aids/ urinary urgency and 15(8.1%) working females were using them, p-value=0.877 shows no association between use of sleeping aids and occupation.

Table 6: Stratification with respect to occupation

	Housewife	Working	Total	p-value
Sleep disturbance				
• **Yes**	171(91.9)	15(8.1)	186	0.318
• **No**	56(87.5)	8(12.5)	64	
Use of sleeping aids/urinary urgency				
• **Yes**	22(91.7)	2(8.3)	24	0.877
• **No**	205(90.5)	21(9.3)	226	
Involvement of family level decisions				
• **Yes**	104(91.2)	10(8.8)	114	0.830
• **No**	123(91.2)	13(9.6)	136	

DISCUSSION

Dementia represents one of the greatest global health challenges, currently affecting almost 50 million individuals worldwide (Mukadam et al., 2019). With no definitive cure, prevention and risk reduction have become central public health priorities (Livingston et al., 2020; Barnes et al., 2021). However, much of the existing literature has focused primarily on White European populations (Redwood et al., 2022; Sirugo et al., 2019), limiting the generalizability of findings. To develop effective prevention strategies, it is critical to consider variations in dementia risk across ethnicity, culture, and socioeconomic conditions (Resende et al., 2019).

Evidence suggests that dementia risk factors exert differing influences across the life course (Livingston et al., 2020). For example, while smoking is a recognized contributor to dementia, its effect appeared attenuated in this study, possibly due to the low prevalence of smoking among participants. Similarly, the inverse association between body mass index (BMI) and dementia may reflect poor nutrition or prodromal weight loss commonly observed in dementia (Agarwal et al., 2020; Louis et al., 2022). Treatment patterns, such as delayed or inadequate management of chronic conditions, may further modify the influence of established risk factors (Joo et al., 2022).

In our study of 250 females, the most common determinants of dementia were increasing age, with 89.2% aged ≥65 years, followed by head trauma (76%), family history of dementia (54.4%), and diabetes (50%). Sleep disturbance was reported in 25.6%, while only 4.4% were smokers and 2.4% consumed alcohol. Interestingly, family type and occupation showed no association with sleep disturbance or use of sleeping aids, suggesting that lifestyle and biological determinants may play a more dominant role in this population. Unlike findings from some international studies, comorbidities were not significant predictors of dementia onset in our sample (Smith et al., 2022; Bunn et al., 2022). This aligns with evidence suggesting that while comorbidities may shape disease progression, they are not necessarily short-term predictors (Aubert et al., 2019).

Beyond biological determinants, our study highlighted the influence of social inequities on dementia risk. Female sex and low educational attainment were found to predict higher levels of psychological distress, which in turn may increase dementia risk. Although reverse causality cannot be ruled out, these findings emphasize the importance of addressing education and mental well-being as gendered determinants of dementia (Mura et al., 2023). Stress, depression, and social isolation remain particularly relevant, as they disproportionately affect women and those from disadvantaged socioeconomic groups (Hasselgren et al., 2020). Longitudinal studies are urgently needed to clarify causal pathways and to assess sex-specific differences in the timing of risk factors such as cardiometabolic disease (Nebel et al., 2022).

A key finding of this study was the gap between public perceptions and empirical evidence regarding

modifiable risk factors. While participants widely recognized age and genetics as dementia risks, lifestyle-related factors such as smoking and heart disease were often underestimated. For example, 23.2% of participants considered heart disease to carry no dementia risk, and a further 28.3% rated it as low risk, despite strong evidence linking cardiovascular health with dementia outcomes (Deal et al., 2020). Similarly, a large proportion of participants perceived smoking to have little or no influence on dementia. These misperceptions highlight the urgent need for public education initiatives to better communicate the role of modifiable risk factors.

Interestingly, younger adults in the sample were more likely than older adults to recognize the role of modifiable factors such as physical inactivity, social isolation, alcohol use, smoking, and mental illness. This is encouraging from a prevention standpoint, since adopting healthier behaviors earlier in life offers greater potential to delay or prevent dementia onset (Beason-Held et al., 2022). However, differences in risk perception also emerged across educational and income levels. Although higher socioeconomic groups demonstrated somewhat greater awareness, misconceptions remained common even among individuals with higher education. This suggests that dementia risk education should be universal, while also prioritizing outreach to disadvantaged populations who may face greater structural barriers to adopting preventive behaviors.

Overall, the findings reinforce the multifactorial nature of dementia, shaped by both biological determinants (such as age, genetics, diabetes, and head trauma) and social determinants (such as education, psychological distress, and socioeconomic status). Current public health approaches often focus narrowly on individual lifestyle change, but such strategies may be insufficient if broader contextual factors are ignored (Marmot et al., 2022). Adopting a social-ecological model that integrates individual, environmental, and structural determinants could maximize prevention efforts while also addressing inequities in dementia risk (Golden et al., 2012; Rohr et al., 2022).

CONCLUSION

A common group for determinants of dementia including age≥65 years, head trauma, family history of dementia, sleep disturbance were found in the study population and further research with a bigger sample size is needed to verify them.

STUDY LIMITATIONS

In this study the analysis of dementia risk factors was focused on the elderly, which is the main age group that experiences dementia and only women participants were include in the study. However, dementia also occurs in the young and determinants of dementia have sex differences. Therefore, further studies are required to use a sample cohort that includes not only the elderly but also the young that can represents data from both sex. Another limitation of the study was the low small sample size.

RECOMMENDATIONS

Social determinants are linked with lifestyle for brain health and should therefore be addressed in efforts aiming at reducing the risk of cognitive decline and dementia. Robust evidence on the relationship between social determinants and lifestyle factors for brain health is pivotal to inform policy and call politicians to action to move towards effective and equitable risk reduction of cognitive decline and dementia.

A complete health education programme focusing on lifestyle changes such as excellent sleep, stress management, and healthy lifestyle can be implemented. Early detection and management of dementia can be aided by psychosocial therapy. Furthermore it is recommended that routine screening for determinants of dementia identified in this study should be done in elderly female in order to prevent disease and for healthy brain. .

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