A Recent Advance Medical Report or Cross-Sectional Study on Neurological Disorders: Dementia

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Abstract: *Neurology is the medical field focused on studying and treating nervous system disorders. Neurological issues impact the body-wide nervous system and spinal cord. Problems with the brain, spinal cord, or other nerves' structure, chemistry, or electrical function can cause various symptoms. These abnormalities affect the nervous system throughout the body.*

Keywords: Neurology.

I. INTRODUCTION

Neurology is the medical field focused on studying and treating nervous system disorders. Neurological issues impact the body-wide nervous system and spinal cord. Problems with the brain, spinal cord, or other nerves' structure, chemistry, or electrical function can cause various symptoms. These abnormalities affect the nervous system throughout the body.

Neurological conditions significantly impact global health. Recent data from the Global Burden of Disease (GBD) study shows that disorders like Alzheimer's, Parkinson's, multiple sclerosis, epilepsy, and headaches make up 3 percent of the worldwide disease burden. While this may seem small, conditions such as dementia, epilepsy, migraine, and stroke are among the top 50 causes of disability-adjusted life years. Epilepsy affects over 50 million people globally. An estimated 47.5 million people have dementia worldwide, with 7.7 million new cases annually. Alzheimer's disease is the most common form of dementia, accounting for 60-70% of cases.

Many infections can affect the nervous system, including bacterial (e.g., Mycobacterium tuberculosis, Neisseria meningitidis), viral (e.g., HIV, Enteroviruses, West Nile virus, Zika), fungal (e.g., Cryptococcus, Aspergillus), and parasitic (e.g., malaria, Chagas) pathogens.

Neurological disorders impact hundreds of millions of people worldwide. Stroke causes over 6 million deaths annually, with more than 80% occurring in low- and middle-income countries.

The World Health Organization (WHO) defines neurological disorders as any disease affecting the entire nervous system. These include conditions impacting the central nervous system's (CNS) neurons or pathways in the spinal cord or brain, including its components like the cerebrum (cortex), basal ganglia, diencephalon, brain stem (midbrain, pons, and medulla oblongata), and cerebellum. Additionally, disorders affecting the peripheral nervous system, such as those involving cranial nerves or their nuclei, spinal plexuses, peripheral nerves, nerve roots, autonomic nervous system, neuromuscular junction, and muscles, are also considered neurological disorders.

Global Burden of Neurological Disorders:
Neurological disorders caused roughly 10 million deaths and 349 million DALYs worldwide in 2019.
Stroke leads in DALYs and deaths, followed by neonatal encephalopathy from birth asphyxia and trauma.
Between 1999-2019, DALYs from dementias and Parkinson's disease rose significantly, while those from communicable, maternal, neonatal, and nutritional categories dropped sharply.

**Multidisciplinary Team Approach in Neurological conditions:**

Different medical experts collaborate in treating brain and nerve disorders. These include brain doctors, surgeons, physical therapists, nurses, brace makers, and speech specialists, among others. In a team-based approach, each professional helps the same patient within their area of expertise. This method has shown benefits for many neurological issues, like Parkinson's disease and similar conditions.
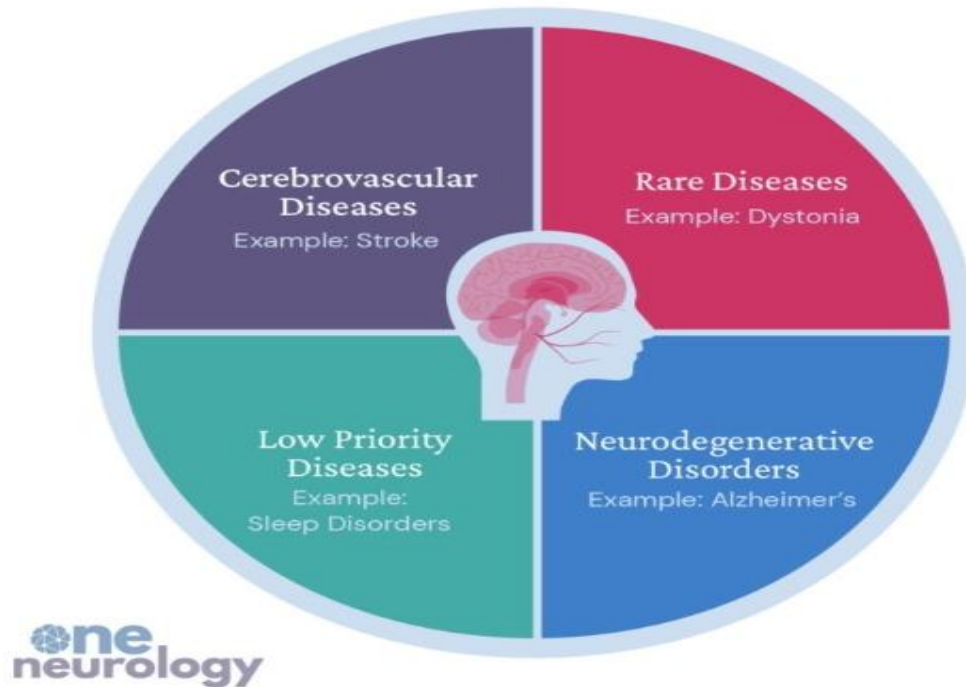
II. CAUSES OF NEUROLOGICAL DISORDER
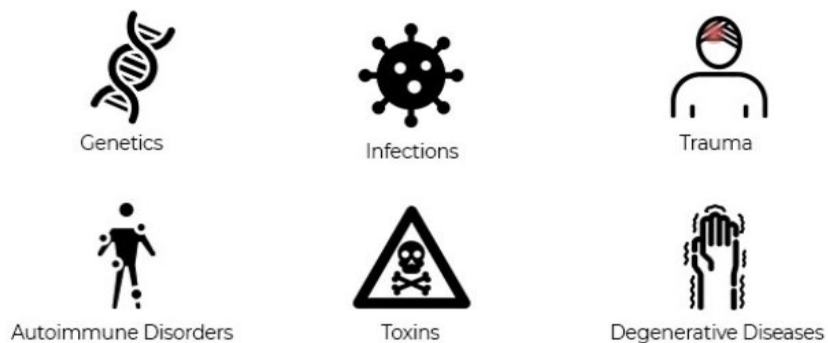
III. ETIOLOGY

Neurological issues stem from various sources, including inherited conditions, birth defects, infections, lifestyle factors, malnutrition, and injuries to the brain, spinal cord, or nerves. [7] Physical harm to the nervous system can result in conditions like traumatic brain or spinal cord injuries. Neurological disorders encompass a broad spectrum, such as epilepsy, learning difficulties, neuromuscular problems, autism, ADD, brain tumours, and cerebral palsy, among others. Some neurological conditions are present from birth, while others may arise from tumours, degeneration, trauma, infections, or structural issues. All neurological disorders, regardless of origin, are significant.

Mental disorders, however, are "Psychiatric illness" that primarily manifest as abnormalities in thoughts, emotions, or behaviours, causing distress or functional impairment. The U.S. National Library of Medicine reports over 600 known neurological diseases. [9-12]

Genetic

Infection

Tumours

Stroke

Stress

Trauma

Toxins

Autoimmune disorders

Degenerative diseases

Medication side effects

Pre/Perinatal causes

Environmental health problems

Lifestyle related causes

Nutrition related causes

Environmental influences

Physical injuries

Congenital abnormalities

Ischemia

Developmental disorders

Neurodegenerative diseases

Demyelinate diseases

Transverse myelitis

Vascular malformations

Other factors [19]

IV. DIAGNOSIS

Assessing and identifying nervous system damage is intricate and multifaceted. Many symptoms appear in various combinations across different disorders. Numerous conditions also lack clear causes, indicators, or tests. This can make diagnosis even more challenging.

To identify a nervous system disorder, a doctor begins with a thorough health history and physical check. They might also use one or more of these tests:

CT scan: This imaging method combines X-rays and computer technology to create detailed pictures of any body part, including bones, muscles, fat, and organs. CT scans offer more detail than standard X-rays. They help diagnose brain, spine, or other nervous system problems. [9]

Electroencephalogram (EEG): This test records the brain's ongoing electrical activity using electrodes attached to the scalp. [18]

MRI: This test uses strong magnets, radio waves, and a computer to make detailed images of body structures. MRI produces more detailed images than CT scans without using radiation.

Electrodiagnostic tests, like electromyography (EMG) and nerve conduction velocity (NCV): These tests assess and diagnose muscle and motor neuron disorders. Electrodes are inserted into muscles or placed on the skin over muscles or muscle groups. Electrical activity and muscle responses are recorded. [16]

Positron emission tomography (PET): This test uses a small amount of radioactive material, a camera, and a computer to check organ and tissue function. It may detect disease onset before imaging tests can. [4]

Arteriogram (angiogram): This X-ray of arteries and veins detects blood vessel blockages or narrowing. [23]

Spinal tap (lumbar puncture): In this test, a special needle is inserted into the lower back, into the spinal canal. This area surrounds the spinal cord and nerves. Spinal canal and brain pressure can then be measured. A small amount of cerebrospinal fluid (CSF) can be removed and tested for infection or other issues. CSF surrounds the brain and spinal cord. [2]

Evoked potentials: This test records the brain's electrical response to visual, auditory, and sensory stimuli. [11-14]

Myelogram: This test uses dye injected into the spinal canal to make structures clearly visible on X-rays. It's used less often now due to widespread MRI availability. [45]

Microtomography: This test uses very high-frequency sound waves. It allows doctors to analyse blood flow in possible stroke cases. This includes carotid ultrasound and transcranial Doppler. [24-25]

Ultrasound (sonography): This imaging test uses high-frequency sound waves and a computer to create images of blood vessels, tissues, and organs. Ultrasounds are used to view internal organs as they work. They also assess blood flow through various vessels. [16]

V. SIGN AND SYMPTOMS

The nervous system is a complex, highly specialized network. It helps us see, smell, walk, and talk, connecting us to the world around us.

Our nervous systems include key body parts: the brain, spinal cord, muscles, and connecting nerves. They handle vital tasks like memory, sensing, language, movement, swallowing, breathing, and even controlling our bladder and bowels.

When part of the nervous system malfunctions, it can cause a neurological disorder. These disorders affect many people yearly, but some may not know they have one. Recognizing symptoms is crucial for proper diagnosis and treatment. Here are six common neurological disorders and how to spot them.

Pain: Headaches, back pain, and other pain types

Muscle issues: Weakness, cramps, or stiffness

Vision problems: Blurry, double, or lost vision

Sensory changes: Numbness, tingling, or loss of feeling

Thinking troubles: Memory loss, language issues, poor focus, or reduced mental ability

Movement problems: Odd movements, walking difficulty, poor balance, or shaking

Sleep issues: Daytime sleepiness or insomnia

Other signs: Trouble swallowing or breathing, bladder or bowel control problems

What Are the Signs of Neurological Disorders?

Neurological disorders manifest in diverse ways, contingent on the specific condition and affected body region. Some cases may lead to emotional manifestations, while others result in physical symptoms. The presentation can differ greatly across various neurological issues. [23]

Emotional Symptoms of Neurological Problems

Physical signs aren't the only indicators of neurological issues - emotional symptoms matter too. You might notice mood changes or unexpected anger. People with these problems can also feel depressed or have false beliefs.

Keep in mind that these signs could point to other health issues as well. If you or someone you know shows these symptoms, it's crucial to get help quickly. Don't hesitate to reach out to us to talk about what's going on. [22]

Physical Symptoms of Neurological Problems

Full or partial immobility

Muscular feebleness

Diminished or absent feeling

Convulsions

Struggle with literacy

VI. PATHOPHYSIOLOGY

Globally, brain disorders have become the top cause of disability and second leading cause of death. Deaths and disabilities from these diseases have risen greatly in the last 30 years, and will likely increase more as populations grow and age. These long-lasting, debilitating conditions bring heavy social and financial burdens, including poor life quality, high healthcare costs, and major productivity losses. There's an urgent need to understand how these disorders work and develop ways to prevent and treat them. This project looks at three main brain diseases: multiple sclerosis (MS), uveoretinitis, and Alzheimer's disease (AD).

MS is a long-term disease where repeated bouts of inflammatory demyelination (when the body's defences attack the protective coating around nerves) cause lasting nerve damage in the brain and spinal cord. This can greatly harm a person's quality of life. It brings high costs for MS patients and their families. The UK has more MS cases than many countries, with about 100,000 people affected. [12-15]

Posterior uveoretinitis (swelling of the eye's middle layer, which can involve the retina, so also called uveoretinitis) often damages retinal tissue and can cause blindness (10% of blindness in developed countries). It has major economic and social impacts. In the UK, about two to five in every 10,000 people get uveitis each year. [8]

Brain circuits: Functional neurological disorders (FND) are linked to problems in brain circuits, affecting things like attention, emotion processing, and sense of control.

**Molecular pathways:** Brain disorders can disrupt molecular pathways and groups of neurons in the brain.

Inflammation and oxidative stress: These are key factors in many brain conditions, including stroke, epilepsy, ALS, and Huntington's disease.

Protein clumping: This is another important factor in many brain conditions. [15]

The number of people with AD worldwide has more than doubled from 1990 to 2016, hurting families, communities, and health systems globally. AD is the most common type of dementia, causing worsening mental decline and marked by beta amyloid buildup.

Currently, there's no cure for MS, uveoretinitis, or AD, and available treatments have many side effects that limit how well they work. Understanding these diseases better at the molecular level will help create improved ways to treat patients and slow disease progress, thus helping patients and families.
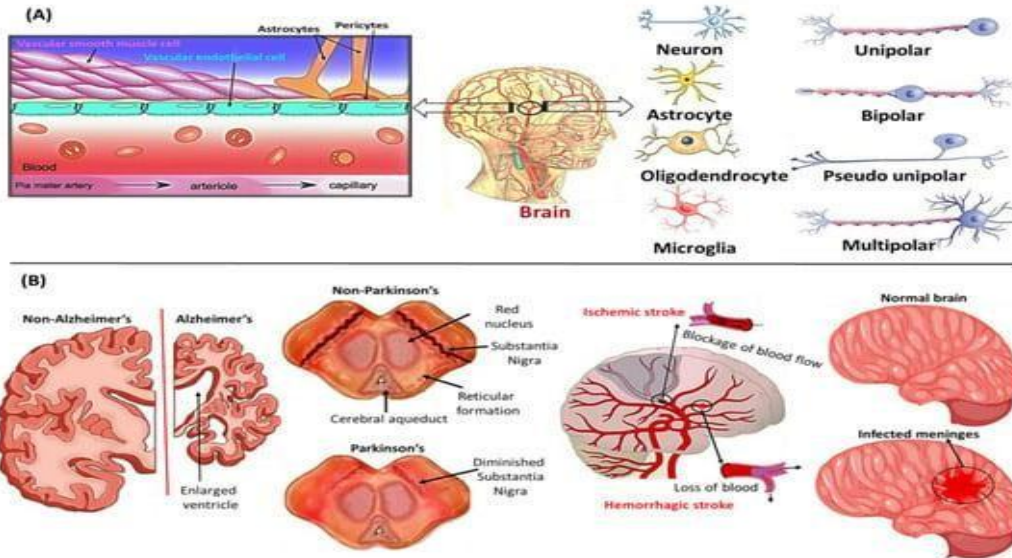
VII. PREVENTION

Prevention is key in managing brain and nerve problems. While not all issues can be avoided, healthy habits can lower risks for some conditions. Factors include genes, lifestyle, and environment. Injuries, getting older, high blood pressure, diabetes, and smoking are big concerns. Knowing and reducing these risks is crucial to prevent surgery needs.

Regular workouts, good food choices, and skipping harmful things like alcohol and cigarettes can help keep your nerves healthy. Protecting your head, like wearing a helmet when biking or playing rough sports, is also important to prevent issues. [12]

Living healthy: This means eating good food for your heart, moving your body often, and not drinking too much. Try to relax more and avoid too much radiation.

Guarding your head: Don't let your head get hurt, as it can harm your brain.

Sleeping enough: Not sleeping well can raise dementia risk and slow your thinking.

Watching drug mix-ups: Taking too many meds or dangerous drugs can cause memory problems and dementia.

Avoiding toxic stuff: Being around pollutants, chemicals, and other harmful things can lead to nerve issues. [19]

Some affecting animate nerve organs questions maybe obviated by changing behaviour determinants, analogous to risk determinants for:

Cardiovascular disorders

Avoidance of drug and intoxicating use

Safe use of motor cabs

Safe management and depository of firearms

Use of hardhats in hazardous explanation extents

Use of guarding stuffing as wanted for sports

Safe swimming practices no diving in ignorant water

Consuming a nutritious diet Consume a diet rich in fruits, vegetables, and whole grains. Steer clear of foods high in trans and saturated fats, such as cheese, butter, red meat, fried foods, and pastries. Regular exercise can improve HDL cholesterol levels, strengthen your heart, and keep your arteries clear. Try to work out three times a week for at least fifteen minutes. Steer clear of dangerous substances Avoid or reduce alcohol and tobacco use. Smoking can lower blood flow to the brain, and excessive alcohol use can cause cognitive impairment and memory loss. Protecting your head When participating in contact sports or other activities that could cause a head injury, wear a helmet. Controlling your cardiovascular risk Heart disease can raise your risk of dementias such as Alzheimer's.

Keeping your blood sugar under control can help lower your risk of dementia. Brain exercises Your brain is constantly changing throughout your life, so you can keep it healthy by engaging in intellectual, emotional, and social activities.

It is impossible to prevent every neurological condition. You lower your chance of suffering an injury or nervous system damage by maintaining your general health and taking precautions when engaging in risky activities, such as wearing a helmet when participating contact sports.

VIII. NEUROLOGICAL DISORDER

DEMENTIA

INTRODUCTION

Cognitive decline, known as dementia, impairs thinking, memory, and reasoning to the point where it disrupts daily life. This broad term describes a decrease in mental abilities that affects everyday tasks. It typically involves memory issues, altered thinking, and behavioural changes. Common symptoms include emotional problems, language difficulties, and reduced motivation. These symptoms often progress through stages over time. Dementia significantly impacts the affected person, their caregivers, and social relationships. Diagnosis requires observing a change from normal mental function and a greater decline than expected with normal aging.

Doctors usually diagnose dementia based on the illness history and cognitive tests with imaging. Blood tests may rule out reversible causes like hypothyroidism and help determine the dementia type. The mini-mental state exam is a common cognitive test. While aging is the biggest risk factor for dementia, it's not a normal part of getting older. Many people over 90 show no signs of dementia. Some risk factors, like smoking and obesity, can be prevented through lifestyle changes. Screening older adults generally doesn't affect outcomes.

Dementia is now the seventh leading cause of death worldwide, with 10 million new cases yearly (one every 3 seconds). There's no known cure for dementia. Doctors often prescribe acetylcholinesterase inhibitors like donepezil, which may help in mild to moderate cases. However, the overall benefit might be small. Many strategies can improve life quality for people with dementia and their caregivers. Cognitive and behavioural treatments may help manage related depression symptoms.

SIGN AND SYMPTOMS:

Dementia symptoms can vary widely. Common signs include issues with:

1. Recent memory.
2. Locating personal items like wallets.
3. Managing finances.
4. Cooking and meal planning.
5. Recalling scheduled events.
6. Navigating familiar areas. [9-11]

Dementia's signs and symptoms are called neuropsychiatric symptoms, also known as behavioural and psychological symptoms of dementia. Behavioural signs may include restlessness, inappropriate actions, reduced sexual inhibition, and verbal or physical aggression, possibly due to cognitive control issues. Psychological symptoms can involve depression, visual hallucinations, false beliefs, lack of interest, and anxiety.

People with dementia also face higher risks of incontinence. They're three times more likely to have urinary and four times more likely to have bowel incontinence compared to others their age. Dementia affects various mental functions like memory, focus, communication, reasoning, judgment, problem-solving, and visual understanding. Potential dementia indicators include getting lost in known places, using odd words for common objects, forgetting close relatives' names, losing old memories, and struggling to finish tasks alone. [14]

CAUSES:

Brain cell damage from various diseases leads to dementia. This harm disrupts normal cell communication, affecting thinking, behaviour, and emotions. The brain's distinct regions control different functions like memory and movement.

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640

When cells in a specific area are harmed, that area can't work properly. Different dementia types are linked to specific cell damage in certain brain areas. In Alzheimer's, high protein levels inside and outside brain cells hinder their health and communication. The hippocampus, the brain's learning and memory hub, often sees initial damage. This is why memory loss is typically an early Alzheimer's symptom. While most brain changes causing dementia are lasting and worsen over time, thinking and memory issues from these conditions may improve with treatment:

1. Depression
2. Medication side effects
3. Excessive alcohol use
4. Thyroid issues
5. Vitamin shortages
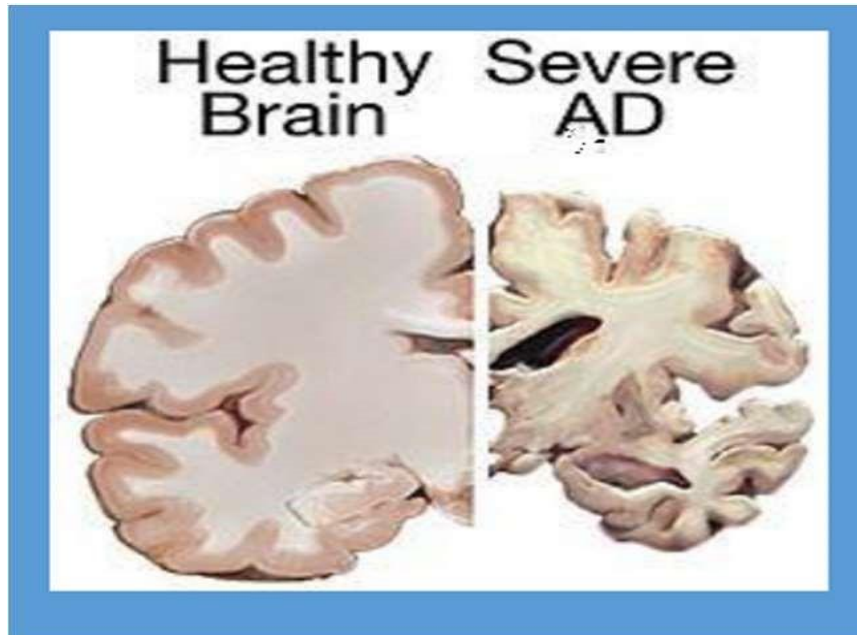
Alzheimer's disease:

Alzheimer's disease causes 60-70% of dementia cases globally. Common signs include short-term memory issues and trouble finding words. People often get lost easily, struggle with reasoning and judgment, and may not realize they have memory problems. The hippocampus is the brain area most impacted by Alzheimer's. The temporal and parietal lobes also shrink. While this brain shrinkage pattern suggests Alzheimer's, it varies between individuals. A brain scan alone isn't enough to diagnose the disease. The condition affects each person differently, making it challenging to identify based solely on brain imaging results.

Vascular:

Circulatory brain disease makes up over 20% of dementia cases, ranking second in frequency. It stems from conditions or damage impacting blood flow to the brain, often involving multiple small strokes. This dementia's signs vary based on the stroke's location and the size of affected blood vessels. Ongoing damage can lead to worsening dementia over time, while a single incident in a key cognitive area like the hippocampus or thalamus may cause rapid mental decline. Aspects of circulatory brain disease might be present in all other dementia types. [12]

Lewy bodies:

Early signs of dementia with Lewy bodies (DLB) include mild thinking problems and sudden confusion. DLB symptoms are more common, worse, and appear earlier than in other dementias. The main signs of DLB are changes in

thinking, alertness, or focus; acting out dreams during sleep; one or more Parkinson's-like symptoms not caused by drugs or stroke; and seeing things that aren't there. These symptoms happen often in DLB patients.

HIV:

HIV-related brain disorder occurs in the late stages of HIV infection, mainly affecting younger individuals. Key signs include disabling mental decline with movement issues, speech problems, and behaviour changes. Mental decline involves slowed thinking, memory troubles, and poor focus. Movement symptoms include loss of fine motor skills, leading to clumsiness, balance problems, and shaking. Behaviour shifts may involve lack of interest, low energy, and reduced emotional responses. Under a microscope, it shows immune cells entering the brain, scarring, pale nerve coatings, changes in nerve cell branches, and brain cell loss. These changes explain the various symptoms seen in this condition.

Mixed dementia:

Multiple forms of dementia, termed mixed dementia, can coexist in roughly 10% of dementia cases. The most prevalent combination is Alzheimer's disease with vascular dementia. This specific mixed dementia type primarily stems from aging, hypertension, and brain blood vessel damage. Identifying mixed dementia can be challenging, as one type often dominates. Consequently, treating individuals with mixed dementia is uncommon, leaving many without potentially beneficial therapies. Mixed dementia may lead to earlier symptom onset and faster deterioration, as it affects more brain regions. The complexity of mixed dementia cases often results in misdiagnosis or incomplete treatment, highlighting the need for improved diagnostic methods and tailored care approaches. [15-16]

Stages:

The progression of dementia is typically outlined in four phases, showing a pattern of worsening mental and functional decline. However, numeric scales offer more precise descriptions. These include the Global Deterioration Scale (GDS or Reisberg Scale), the Functional Assessment Staging Test (FAST), and the Clinical Dementia Rating (CDR). Using the GDS, a more detailed course is mapped out in seven stages, with two further divided into five and six degrees. The final stage is 7(f). These scales help pinpoint each step in the disease's advancement more accurately than the four-stage model. [19-20]

DIAGNOSIS:

Across dementia types, symptoms often look alike, making diagnosis based on symptoms alone challenging. Brain scans can help with diagnosis. In many cases, a brain biopsy is needed for a final diagnosis, but doctors rarely suggest this (though it may be done after death). For older adults, general cognitive screening or early dementia diagnosis hasn't been shown to improve outcomes. However, memory tests are useful for people over 65 who report memory issues.

Doctors use tools like the Neuropsychiatric Inventory or Geriatric Depression Scale. In the past, doctors thought people who complained about memory problems had depression, not dementia (believing those with dementia didn't notice their memory issues). But research now shows many older adults with memory complaints actually have mild cognitive impairment, dementia's earliest stage. Still, depression should always be considered when an older person has memory troubles. Normal aging can cause changes in thinking, hearing, and vision, which can make diagnosing dementia tricky due to similarities. Given how hard it is to predict and diagnose dementia, computer-aided tools using machine learning and AI could help doctors make better decisions.

Short cognitive tests (5-15 minutes) are fairly reliable for dementia screening but can be affected by age, education, and ethnicity. Age and education greatly impact dementia diagnosis. For instance, less educated people are more likely to be diagnosed with dementia than those with more education. While many tests exist, the mini mental state examination (MMSE) is the most studied and widely used. The MMSE helps diagnose dementia when its results are considered alongside an assessment of the person's personality, their ability to perform daily tasks, and their behaviour.

Cognitive testing

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Test	Sensitivity	Specificity
MMSE	71–92%	56–96%
3MS	83–93%	85–90%
AMTS	73–100%	71–100%

Alternative cognitive assessments include the shortened mental test score (AMTS), the "revised mini mental state exam" (3MS), the cognitive Abilities Screening Tool (CAST), the Trail making evaluation, [108], and the clock drawing assessment. The MoCA (Montreal Cognitive Assessment) is a dependable screening test available online at no cost in 35 languages. [15-18]

Another method for screening dementia involves asking a family member or caregiver to complete a survey about the individual's daily cognitive functioning. These surveys offer additional insights to brief cognitive tests. The most well-known questionnaire of this type is the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE). There's not enough evidence to determine the IQCODE's accuracy in diagnosing or predicting dementia. The Alzheimer's Disease Caregiver Questionnaire is another option, with about 90% accuracy for Alzheimer's when filled out by a caregiver. The General Practitioner Assessment of Cognition combines both patient evaluation and informant interview, designed specifically for primary care settings.

Prevention:

A 2020 study expanded the list of dementia risk factors. New additions included heavy drinking, head injuries, and air pollution, alongside existing factors like poor education, high blood pressure, hearing problems, smoking, obesity, depression, lack of exercise, diabetes, and social isolation. Many of these risks can be changed, such as education level, smoking habits, physical activity, and diabetes management. A 2022 review added anaemia and sleep issues to the modifiable risk list. Several factors are linked to vascular health and can potentially be reduced or eliminated. Addressing these risks can lower dementia chances for individuals in their late middle age or older. Tackling multiple factors can lead to better outcomes. Adopting a healthy lifestyle can decrease risk even for those with high genetic susceptibility.

Dental health:

Research suggests weak connections between dental health and cognitive deterioration. Nevertheless, neglecting tooth brushing and gum inflammation may serve as indicators for potential dementia risk. [16]

Oral Bacteria:

Oral bacteria form the connection between Alzheimer's and gum disease. The mouth hosts various bacterial species, including P. gingival is, F. nucleate, P. intermedia, and T. forsythia. Researchers have found six oral treponema spirochetes in Alzheimer's patients' brains. Spirochetes are neurotropic, meaning they damage nerve tissue and trigger inflammation. [4]

It is difficult to prevent dementia because its causes are frequently unknown. However, reducing the risk of heart disease and stroke may help people with dementia brought on by a stroke avoid further declines. Avoid smoking, diabetes, hypertension, and elevated cholesterol. Take up a new hobby, read, or work through a crossword puzzle to keep your mind sharp. Maintain your social engagement. Participate in support groups, church, or community events. Aspirin should be taken as directed by your physician.

Engaging in physical activity, social interaction, mental stimulation, eating a balanced diet, and making thoughtful and secure decisions. Stress management.

• Control extreme ancestry pressure
• Manage glucose
• Maintain a healthy burden
• Eat a active diet
• Stay rationally active
• Treat trial questions
• Sleep well
• Prevent head harm
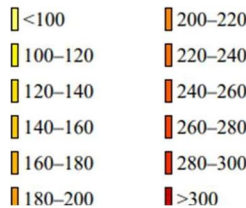• Drink less intoxicating
• Stop smoking use

Epidemiology:
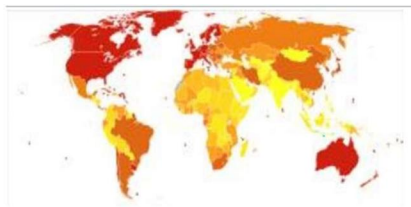
Deaths per million persons in 2012 due to dementia
- 0–4
- 5–8
- 9–10
- 11–13
- 14–17
- 18–24
- 25–45
- 46–114
- 115–375
- 376–1266
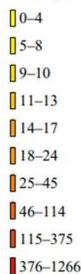
Disability-adjusted life year for Alzheimer and other dementias per 100,000 inhabitants in 2004
- <100
- 100–120
- 120–140
- 140–160
- 160–180
- 180–200
- 200–220
- 220–240
- 240–260
- 260–280
- 280–300
- >300

Dementia affected an estimated 55 million people worldwide in 2021, with nearly 10 million new cases yearly. Projections suggest over 150 million people will have dementia globally by 2050. About 7% of those over 65 have dementia, rising to 10% in areas with higher life expectancy. Roughly 58% of dementia patients live in low- and middle-income countries. Dementia rates vary by region, from 4.7% in central Europe to 8.7% in North Africa/Middle East, with other regions falling between 5.6% and 7.6%. The number of people with dementia is expected to double every 20 years.

Europe (25%), the Americas (18%), and Africa (8%) have varying rates. Dementia risk increases sharply with age, doubling every 6.3 years. It affects 5% of people over 65 and 20-40% of those over 85. Women have slightly higher rates than men after age 65. The disease's course varies, with median time from diagnosis to death ranging from 6.7 years for those diagnosed at 60-69 to 1.9 years for those diagnosed at 90 or older.

Dementia impacts not only patients but also caregivers and society at large. For people 60 and older, dementia ranks as the 9th most burdensome condition according to 2010 Global Burden of Disease estimates. Global dementia costs reached about $818 billion in 2015, a 35.4% increase from $604 billion in 2010.

Affected ages:

Roughly 3% of people aged 65-74 have dementia, rising to 19% for those 75-84, and nearly half of individuals over 85. As lifespans increase, dementia cases are growing. However, for specific age groups in developed countries, rates may be declining due to reduced risk factors, thanks to better financial and educational resources.

Dementia is a leading cause of disability in older adults but can occur before 65, termed early onset or presenile dementia. Less than 1% of Alzheimer's cases involve gene mutations causing much earlier onset, around age 45, known as early onset Alzheimer's. Over 95% of Alzheimer's cases are sporadic (late onset, 80-90 years old).

In 2015, the global cost of dementia was estimated at $818 billion. People with dementia often face excessive physical or chemical restraints, raising human rights concerns. Those with the condition and their caregivers frequently experience social stigma.

IX. CURRENT TRENDS INCLUDING IN THE TREATMENT OF DIMENTIA

Recent years have seen a steady rise in studies exploring natural products for dementia treatment, with a sharp increase in 2020 and 2021. We looked at trends from 2016 to 2021 to gauge the potential of natural products in this field. We searched PubMed and Google Scholar for relevant literature. Common targets included oxidative stress, NF-KB pathway, anti-tau aggregation, and anti-ACHE. We analysed 33 antidementia natural compounds, finding 125 sustainable sources across 65 families, 39 orders, and 7 classes. Families like Burseraceae, Zingiberoside, and Fabaceae, and orders such as Lamiae's, Sapindales, and Myrtales, seem promising for further research. Some natural products, including quercetin, curcumin, acaricide II, berberine, and resveratrol, show versatile applications. We also discuss clinical studies and patents supporting the value of dietary supplements and natural products. Lastly, we outline the broad scope, future challenges, and opportunities for researchers in this area. [3]

INTRODUCTION:

Dementia is a long-term brain disorder that slowly worsens a person's mental abilities. As memory fades, those affected struggle to function on their own as the condition progresses (Burgess et al., 2003; Grabowski and Damasio, 2004; MacDonald et al., 2011). Dementia has several types based on its cause, including Alzheimer's, vascular dementia, Parkinson's, Lewy body dementia, Huntington's, Creutzfeldt-Jakob, and Pick's disease (Ha et al., 2006). So far, no treatment has successfully stopped dementia from getting worse (Abbott, 2011).

Natural remedies from plants, animals, and microbes form the basis for many modern medicines and have been crucial in meeting basic health needs worldwide (Cragg et al., 1997; Newman et al., 2003). Compared to synthetic drugs, natural medicines often work better, last longer, have fewer side effects, and don't lead to antibiotic resistance. There's strong evidence that these natural compounds protect brain cells, suggesting they could help treat dementia. [11-15]

Current studies focus on developing natural product-based treatments for dementia (McNamara et al., 2018; Boespflug et al., 2017; Joo et al., 2019; Kent et al., 2015; Lefevre Arbogast et al., 2018; Goni et al., 2020; Calabro et al., 2019; Bodoni et al., 2021; Shish tar et al., 2020). Natural products remain a key source for new drugs. Understanding the brain-active compounds in certain plants and how they work could lead to new and effective dementia treatments (Atanasov et al., 2015).

Despite extensive research on natural treatments, moving from lab studies to real-world use is difficult (Singla et al., 2022a; Singla et al., 2021a; Singla et al., 2021b). In this review, we sum up and analyse research findings and clinical uses of bioinformatics, data models, medical informatics, imaging informatics, and health informatics for natural product-based drugs. [25]

Over 60 percent of the world's 55 million dementia sufferers reside in low- and middle-income nations. There are almost million new cases annually. Numerous illnesses and traumas to the brain can lead to dementia. The most prevalent type of dementia, accounting for 60–70% of cases, is Alzheimer disease. One of the main causes of disability and dependency among older adults worldwide, dementia is currently the seventh leading cause of death. In 2019, dementia cost economies around the world $1.33 trillion, with informal carers accounting for about half of these expenses (e.g. G. family members and close friends), who tend to them for five hours a day on average. Both directly and indirectly, dementia disproportionately affects women. In addition to providing 70% of the care hours for individuals with dementia, women also have higher disability-adjusted life years and dementia-related mortality rates.

DEMENTIA MANIFESTATION:

Multiple elements can combine to cause dementia. Research indicates antidepressants may be linked to a possible dementia trigger. Depression that starts later in life could lead to early-stage dementia.
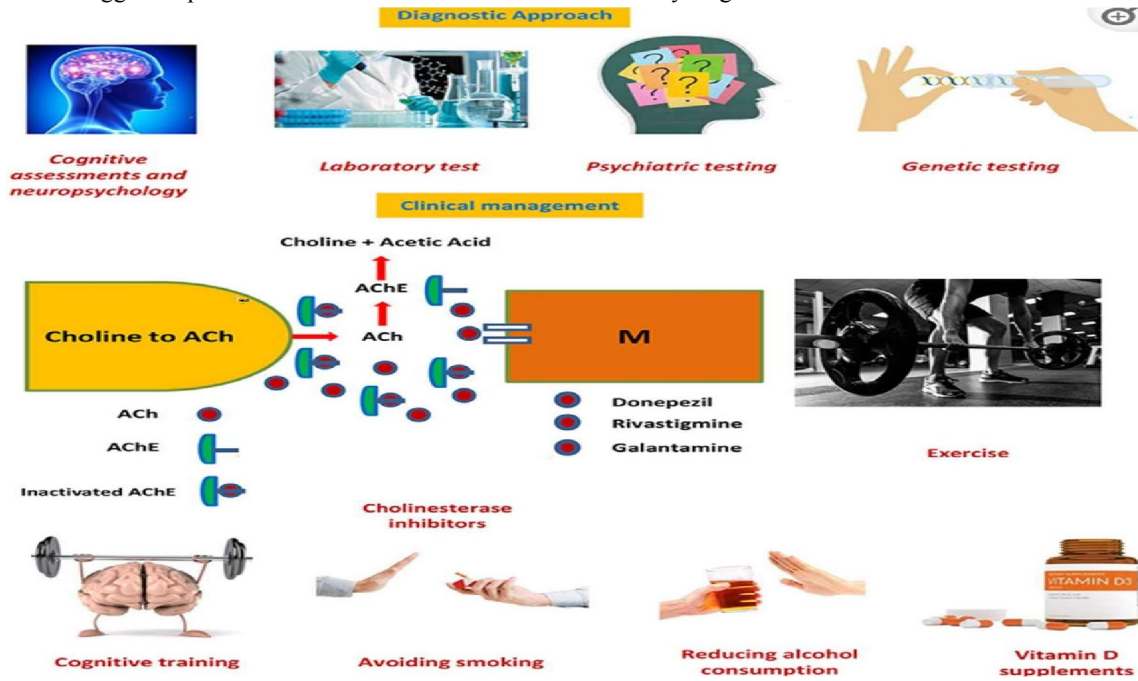
Cognitive

Sporadic forgetfulness.

Difficulty recalling words.

Blanking on important occurrences, such as a trip with relatives, settling an urgent payment, and similar instances.

Trouble remembering how to operate previously known devices like a microwave, iron, computer, and comparable appliances. [5]

Psychological

Melancholy, indifference, misconception.

Emotional numbness and disinterest in daily activities, such as reluctance to join others for meals. [6]

Behavioural

Social isolation and detachment.

Unresponsiveness to stimuli.

Leaving home during late night hours. [7]

MODELLING RETROSPECTIVE DEMENTIA SPENDING (2000-2019)

Healthcare costs for dementia patients in nursing homes were calculated for each area and year. This was done by multiplying the total population by the prevalence, diagnosis and treatment rate, nursing home care rate, and the per-patient cost linked to dementia in nursing homes. For undiagnosed dementia patients in nursing homes, spending was estimated by multiplying the total population by the prevalence, the undiagnosed rate, inpatient treatment rate for undiagnosed cases, and half the per-patient cost for nursing home residents with dementia. [12]

For dementia patients receiving care in the community, spending was figured by multiplying the total population by the prevalence, diagnosis and treatment rate, non-nursing home care rate, and the per-patient cost for community-based dementia care. The total yearly spending on dementia was calculated by adding up nursing home and community care costs for each country, then combining these figures globally for each year. Due to the large share of U.S. health spending, about 30% of global health costs, we used dementia spending estimates for the U.S. from a separate study that focused on measuring healthcare costs by disease in America.

These estimates are based on a comprehensive set of detailed data, using a definition that matches the one used in this study. [19]

Understanding shifts in dementia prevalence requires population-based research conducted over time using representative samples from identical populations.

These studies must employ consistent diagnostic and research methods across periods to ensure valid comparisons.

We analyse global data from 14 such population-based studies across Western Europe, the USA, Japan, and Nigeria; most report declining or stable prevalence and incidence with varying gender differences among countries.

No single factor fully explains these changes, but societal shifts in Western nations have enhanced cognitive reserve and overall health throughout life stages.

Combining analytical epidemiological approaches with neuroscience in population-based studies is crucial to comprehend observed changes, underlying neurobiological mechanisms, and potential policies to maintain such improvements. [21-23]

We projected healthcare expenditures related to dementia from 2000 to 2019 and projected future expenditures from 2020 to 2050 under various scenarios. Data came from two systematic literature reviews and the Global Burden of Diseases   2019 study. We employed meta-regression   to calculate the percentage of dementia-related spending for individuals receiving community-based and nursing home-based care. For the numerous countries without their own underlying estimates, we employed spatiotemporal Gaussian process regression to model diagnosis and treatment rates, nursing home-based and community-based care rates, and unit costs while accounting for data missingness. Future spending projections, which are predicated on continuous growth, project a baseline scenario from 2020 to 2050. Alternative   scenarios evaluated faster   growth   rates   for healthcare   costs,   nursing   home-based   care, and dementia diagnosis and treatment rates. 2019 US dollars or 2019 dollars adjusted for purchasing power parity are used to report all expenditures.

X. CONCLUSION

As our population ages, we're realizing we don't know enough about frailty and dementia. We're unsure how to diagnose them, how they develop, what causes them, and how to treat them. There are many possible ways to help frail and dementia patients, but we don't know which ones work best, when to use them, or in what situations. We need more research to answer these questions.

It takes years to create personalized treatments for diseases affecting one gene or organ. It will take much longer to develop accurate, targeted approaches for complex conditions like frailty or dementia, which affect multiple body systems. We need to start now by designing affordable, long-term studies that work across cultures. We also need to find the best tools and biological markers to measure these conditions.

While we wait for solid evidence, doctors should follow current guidelines for treating frailty and dementia. Researchers should use consistent ways to measure results and reduce bias in their studies. It's also crucial to train healthcare workers and reach out to elderly rights groups to ensure research meets expectations.

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649