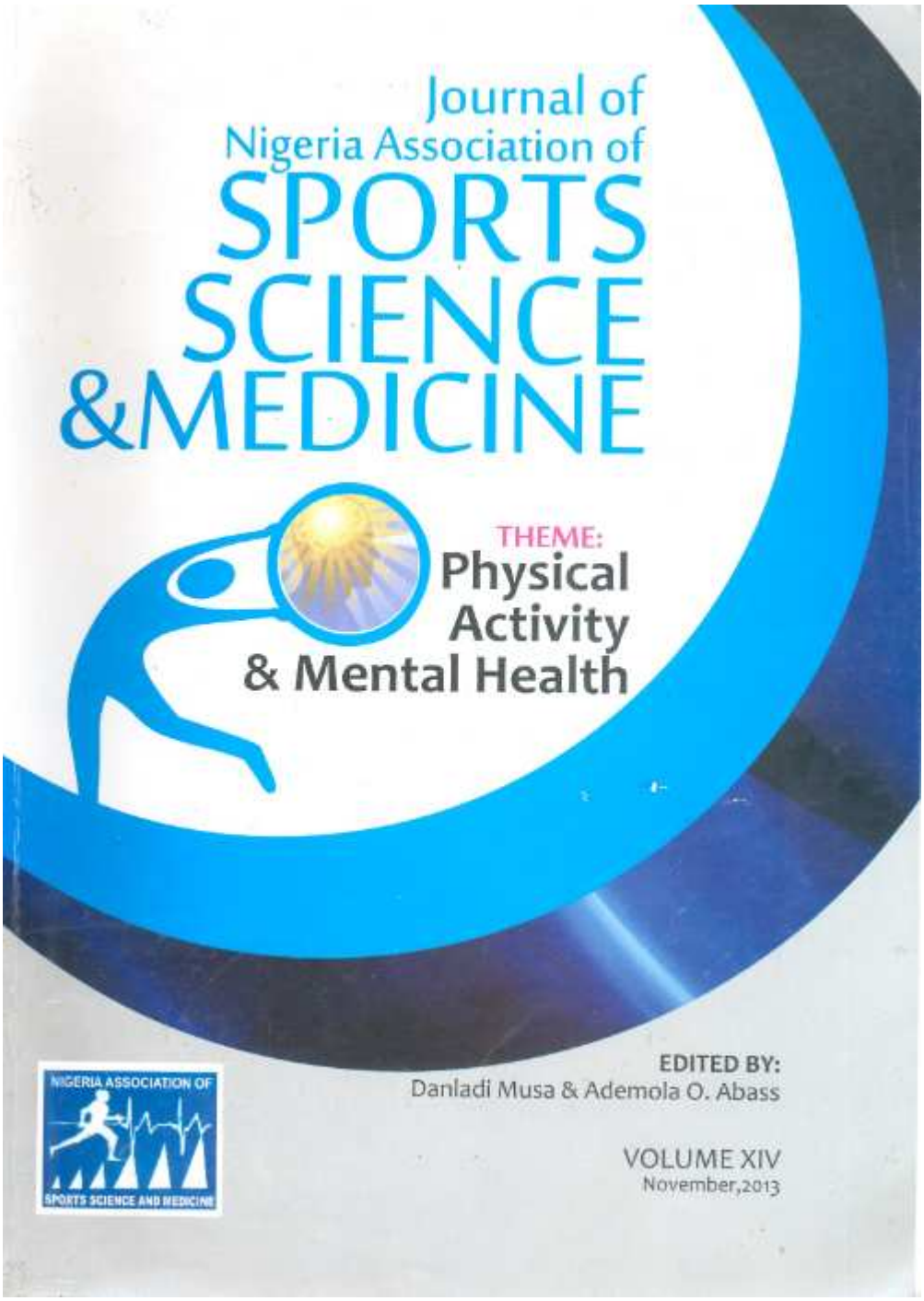
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EXERCISE AS A THERAPEUTIC STRATEGY FOR CONTROLLING DEMENTIA SYNDROMES

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ABSTRACT

This paper informs on dementia as a severe and significant deterioration which affects about 7% of people under the age of 80 years. Dementia could have early, intermediate or severe onset, all of which could either be reversible or not. Symptoms include forgetfulness, poor judgment, difficulty in communicating, anxiety and some other problems associated with normal task performance. Most treatments for dementia will neither reverse nor stop the disease but could reduce the symptoms and slow the disease progression. Exercise could be used with a number of strategies to slow down and control the progression of dementing symptoms among affected people.

INTRODUCTION

Dementia otherwise known as organic brain disorder is a term which is used to describe a collection of symptoms that include decreased intellectual functioning which interferes with normal life functions. It is usually used to describe people who have two or more major life functions impaired or lost. This loss could affect processes such as memory, language, perception, judgment or reasoning; The affected individual may also lose emotional and behavioral control. As the conditionprogresses, personality changes and the person could have problem solving abilities reduced or completely lost (Davis, 2012). Traditionally, dementia means madness in Latin and it is viewed as a serious loss of global cognitive ability in a previously unimpaired person, beyond what might be expected from normal aging. It may be static the result of a unique global brain injury or progressive, resulting in longterm decline due to damage or disease in the body (Fadil, Borazanci, Haddou, Yahyaoui, Korniychuk, Jaffe, & Minagar, 2009). The Centre for Disease Control and Prevention (CDC) classified dementia as a severe mental illness in many countries including the United States of America and in the United Kingdom (Crutch & McCulloch, 2011; Waldemar, Dubois & Emre, 2007).

According to Mensulam, (2009), dementia is not a single disease but rather a nonspecific illness syndrome (set of signs and symptoms). It is normally required to be present for at least 6 months to be diagnosed. Cognitive dysfunction that has been seen only over shorter times, particularly, less than weeks, could be diagnosed as delirium and not dementia. Although dementia is far more common in the geriatric population, it can occur before the age of 65, in which case it is termed "early onset dementia." In all types ofgeneral cognitive dysfunction, higher mental functions are affected first in the process.
In the later stages of the condition, affected persons may be disoriented in time, place and person (i. e not knowing what day of the week, day of the month, or even what year it is). In place, not knowing where they are and in person not knowing oneself or others around them.
The World Health Organization estimated that in 2005, 0.38% of people worldwide had dementia and that the prevalence would increase to 0.44% in 2015 and to 0.56% in 2030. According to Ferri et al (2005), approximately 24.3 million people had dementia worldwide in 2005, with 4.6 million new cases every year. Christian (2009) estimated that the number of people with dementia will double every two decades and reach 81.1 million by 2040. The rate of increase is expected to be faster in developing countries which have rapidly-growing life expectancies. These figures call for urgent preventive and management attention to dementia as a health condition, especially among the aged.

Symptoms of Dementia

Symptoms of dementia can be classified as either reversible or irreversible, depending upon the etiology of the disease. These symptoms include anxiety, apathy, difficulty in communicating, difficulty in concentrating, insomnia, memory loss, poor judgment and confusion. Symptoms of senile dementia worsen over time (Schuller, Beckett & Gettings, 2010). The symptoms could vary considerably among individuals depending on the underlying causes. The symptoms may be very obvious or very subtle and go unrecognized for some time. However, the first sign of dementia is usually loss of short-termmemory. The person repeats what he just said or forgets where (s)he put an object just a few minutes ago. Other symptoms and signs as revealed by Hale and Frank (2012), and Schuller, Beckett and Gettings (2010) include the following:

Early dementia

- Forgetting names, appointments, or whether or not the person has done something; losing things
- Difficulty performing familiar tasks - Driving, cooking a meal, household chores, managing personal finances

- Personality -changes (for example, sociable person becomes withdrawn or a quiet person is coarse and silly)
- Uncharacteristic behavior
- Mood swings, often with briefperiods of anger or rage
- Poor judgment
- Behavior disorders - Paranoia and suspiciousness
- Decline in level of functioning but able to follow established routines at home
- Confusion, disorientation in unfamiliar surroundings - may wander, trying to return to familiar surroundings

Intermediate dementia

- Worsening of symptoms seen in early dementia, with less ability to compensate
- Unable to carry out activities ofdaily living (e. g. bathing, dressing, grooming, feeding, using the toilet) without help
- Disrupted sleep (often napping in the daytime, up at night)
- Unable to learn new information
- Increasing disorientation and confusion even in familiar surroundings
- Greater risk of falls and accidents due to poor judgment and confusion
- Behavior disorders - Paranoid delusions, aggressiveness, agitation, inappropriate sexual behavior

- Hallucinations, inattention, poor concentration, loss of interest in the outside world
- Abnormal moods (anxiety, depression)

Severe dementia

- Worsening of symptoms seen inearly and intermediate dementia
- Complete dependence on others for activities of daily living
- May be unable to walk or move from place to place unassisted
- Impairment of other movements such as swallowing - Increased risk of malnutrition, choking, and aspiration (inhaling foods and beverages, saliva, or mucus into lungs)
- Complete loss of short- and long-term memory - may be unable to recognize even close relatives and friends
- Complications - Dehydration, malnutrition, problems with bladder control, infections, aspiration, seizures, pressure sores, injuries from accidents or falls.

The person may not be aware of these problems, especially the behavior problems. This is especially true in the later stages of dementia. People with irreversibleor untreated dementia present a slow, gradual decline in mental functions and movements over several years. Total dependence and death, often from infection, are the last stages (Hale & Frank, 2012).

Causes of Dementia

Dementia could result from death and damage of nerve cells in the brain, genetics and possibly the formation of different types of inclusions in the brain cells. Some conditions however may resemble some aspects of dementia but have their specific and different causes. These conditions are usually treatable and have better outcomes. Examples are depression, delirium, mild cognitive impairment and age-related cognitive decline. As explained by David (2012), Ahlskog, Geda,

Graff-Radford, & Petersen (2011) and Insel & Roth (2010), the causes of dementia as a disorder could be due to any or combination of the following factors:

1. Alzheimer's disease (AD): This has been described as the most common cause of dementia in geriatric population; i.e. people over age 65. Almost all brain functions, including memory, movement, language, judgment, behavior and abstract thinking, are affected.

2. Vascular dementia: This is the second most common cause of dementia, caused by brain damage from cerebrovascular or cardiovascular problems (strokes) or other problems that inhibit vascular function. The symptoms of vascular dementia are similar to Alzheimer's disease but personality and emotions are affected only late in the disease.

3. Lewy body dementia: This cause is also common and progressive. Thecells in the brain's cortex die and other contain abnormal structures (Levey bodies); symptoms overlap with Alzheimer's disease but also include hallucinations, shuffling gait and flexed posture with symptoms that may vary daily.

4. Fronto-temporal dementia: This dementia is linked to degeneration of nerve cells in the frontal and temporal brain lobes. In this case, genetic linkage is implicated. The patients who are usually between ages 40 and 65 have judgment and social behavior problems such as stealing, neglecting responsibilities, increased appetite, compulsive behavior and eventual motor skill problems and memory loss.

5. HIV-associated dementia: This is due to infection of the brain with HIV virus. Symptoms include impaired memory, apathy, social withdrawal and concentration problems.

6. Huntington's disease: This is a heredity disorder caused by a faulty gene. Children of persons with the disorder have a 50% chance of getting the disease. Symptoms begin in individuals between the ages of 30-40. Patterns of change that could be observed include personality changes such as anxiety, depression.Psychotic

behavior, severe dementia, involuntary jerky, arrhythmic movements of the body is exhibited as the disease progresses.

7. Dementia pugilistica: This type of dementia is also termed Boxer's syndrome. It is due to repeated traumatic injury to the brain. Thepatients usually present with parkinsonism (tremors, gait abnormalities) and other changes depending on where brain injury has happened.

8. Epileptic dementia: This is a progressive mental and intellectual deterioration that occurs in a small fraction of cases of epilepsy; it is thought by some to be caused by degeneration of neurons resulting from circulatory disturbances during seizures.

9. Cortico-basal degeneration: is a progressive nerve cell loss in multiple areas of the brain. Symptoms begin at about age 60 on one side of the body and include poor coordination and rigidity with associated visual-spatial problems that can progress to memory loss, hesitant speech and dysphagia (difficulty in swallowing).

10. Dementias in children: While infections, trauma and poisoning can lead to dementia in both children and adults, there are some dementias that are unique to children but may result in mental problems, seizures, reduction or loss of motor skills, blindness, neuro-degeneration and death

Other conditions that may cause dementia include reactions to medications, endocrine and metabolic problems, nutritional deficiencies, gene mutation, infections, subdural hematomas, poisoning, brain tumors, anoxia (lack of oxygen), heart and lung problems. Dementia can also be caused by a severe vitamin B12 deficiency as a result of pernicious anaemia or severe bowel problems, or through brain damage as a result of an accident or injury.

Classification of Dementia

Dementing disorders can be classified in many different ways. These classification schemes attempt to group disorders that have particular features in common, such as whether they are progressive or what parts of the brain are affected. Some frequently used classifications include the following:

- Cortical dementia: dementia where the brain damage primarily affects the brain's cortex or outer layer. Cortical dementias tend to cause problems with memory, language, thinking and social behavior.

- Sub-cortical dementia: dementia that affects parts of the brain below the cortex. Sub-cortical dementia tends to cause changes in emotions and movement in addition to problems with memory.

- Progressive dementia: dementia that gets worse over time, gradually interfering with more and more cognitive abilities.

- Primary dementia: dementia such as AD that does not result from any other disease.

- Secondary dementia: dementia that occurs as a result of a physical disease or injury.

Risk factors for dementia

Researchers have identified several risk factors that affect the likelihood of developing one or more kinds of dementia. Some of these factors are modifiable while others are not. Authors (David, 2012; Crutch & McCulloch, 2011; Waldemar, Dubois & Emre, 2007; Ogunniyi, Baiyewu, Gureje, Hall, Siu , Gao , Farlow , Oluwole , Komolafe & Hendrie, 2000) identified the risk factors for dementia generally to include the following:

- Age. The risk of Alzheimer's disease, vascular dementia, and several other dementias goes up significantly with advancing age.

- Genetics/family history. Evidence from studies has linked the development of dementia to a history ofthe disease in families

- Smoking and alcohol use. Recent studies (David, 2012; Crutch & McCulloch, 2011; Waldemar, Dubois & Emre, 2007) have found that smoking significantly increases the risk of mental decline and dementia. People who smoke have a higher risk of atherosclerosis and other types of vascular disease, which may be the underlying

causes for the increased dementia risk. Studies also have found that drinking large amounts of alcohol appears to increase the risk of dementia. However, other studies have suggested that people who drink moderately have a lower risk of dementia than either those who drink heavily or those who completely abstain from drinking.

- Atherosclerosis. Atherosclerosis is the buildup of plaque - deposits of fatty substances, cholesterol and other matter - in the inner lining of an artery. Atherosclerosis is a significant risk factor for vascular dementia, because it interferes with the delivery of blood to the brain and can lead to stroke.

- Cholesterol. High levels of low-density lipoprotein (LDL), the so-called bad form of cholesterol, appear to significantly increase a person's risk of developing vascular dementia.

- Plasma homocysteine. Researchhas shown that a higher-than-average blood level of homocysteine - a type of amino acid - is a strong risk factor for the development of AD and vascular dementia.

- Diabetes. Diabetes is a risk factor for both Alzheimer's Diseases and vascular dementia. It is also a known risk factor for atherosclerosis and stroke, both of which contribute to vascular dementia.

- Mild cognitive impairment.People with mild cognitive impairment do have a significantly increased risk of dementia compared to the rest of the population.

- Down syndrome. Most people with Down syndrome develop characteristic Alzheimer's disease plaques and neurofibrillary tangles by the time they reach middle age.

Diagnosing Dementia

Methods such as patient's medical and family history, physical examination, neurological evaluations, cognitive and neuropsychological testing, CT's, MRI's and other brain scans, mental status exams, electroencephalograms, blood tests, psychiatric evaluations, and some pre-symptomatic tests are available for some patients that may have a genetic link to dementia.

Prevention of Dementia

Ahlskog, Geda, Graff-Radford, & Petersen, (2011) opined that the use of medications have no proven neuroprotective effect on dementia. Other preventive strategies may delay the onset of dementia in some people. These strategies include maintaining tight control over body glucose levels and engaging in intellectually stimulating activities such as social interactions, chess, crosswordpuzzles and playing a musical instrument. Mental activities may stimulate the brain in a way that increases the person's "cognitive reserve" which is the ability to cope with or compensate for the pathologic changes associated with dementia.

Exercise Prescription for dementia

Exercise has been used with a number of strategies to slow down and control the progression of dementing symptoms among affected people. Long-term regular exercises have been documented to produce significant benefit on cognition, dementia risk and perhaps dementia progression (Andel, et al, 2008; Larson, et al, 2006; Heyn, et al, 2004). It has been proven to have an attenuating effect on brain aging and resilience to dementing neurodegenerative mechanisms. Exercise may benefit the demented patient by improving both symptoms and quality of life. For the same level of brain deterioration, physically active people exhibit higher levels of cognitive functioning than sedentary people. It is thought that physically active people have a 'cognitive reserve' that is used when other areas of the brain are damaged (Ahlskog, Geda, Graff-Radford & Petersen, 2011).
The exercise parameters cannot be precisely defined but the connotation is aerobic exercise that is sufficient to increase the heart rate and the need for oxygen. Presumably, this must be sustained for at least 20-30 minutes per session and ongoing. Ultimately, this translates into what physiologists characterize as cardiovascular fitness, objectively assessed with measurement of oxygen uptake during peak exercise (such as on a treadmill); this is reported as peak oxygen consumption per unit time with higher values indicating better fitness.
An exercise routine may decrease the severity of symptoms of dementia as well as lead to increased mobility and independence. According to Ahlskog, Geda, Graff-Radford, & Petersen, (2011), Raji & Lopez (2010) and Kruger (2009), an exercise routine for slowing the progression of dementia should be composed of four components which are:

1. Aerobic Exercise: An aerobic training programme, improves cardiovascular health as well as brain health. It is associated with decreased risk of stroke and the related dementia. Physical activity may also decrease the beta-amyloid proteins, leading to decreased amyloid plaque and decreased disruption between neurons. For maximum health benefit, 30-minutes of aerobic activity should be performed most days of the week. This need not be intense and the patient should be able to talk throughout. The 30-minutes can be split into smaller, 10-minutes segments if that is more desirable. When beginning a training programme, the patient could start with an interval as short as 5-minutes and progress.

2. Strength training: Strength training programme can help combat the loss of muscle mass associated with aging. It can improve independence, mobility and balance. Specifically, daily tasks such as getting out of bed, getting out of chairs and climbing stairs become easier with increased strength. Ideally, 10-15 repetitions of 8-10 exercises should be performed 2 or 3 times per week. The resistance should be great enough that each set of repetitions is difficult to complete. Resistance may be applied with bands or light weights. If the sets are completed easily, the resistance should be increased. Strength training has shown improvement of executive functions and associative memory in dementia syndromes.

3. Balance exercises: These can be performed almost anywhere. Balance is position specific, so both standing balance and sitting balance should be targeted. With improved standing balance, there is decreased risk of falls and fractures. Standing on one-leg, with or without assistance, will help improve standing balance. Sitting balance can be improved by sitting on a chair, couch, or balance ball, with the lower back straight, and lifting an arm or a leg into a different position. Also, chair stands can be included. The more unstable the sitting surface is, the more difficult the exercise will be. More advanced exercises such as backwards walking and leaning can be gradually added into the programme.

4. Flexibility exercises are best performed with the aid of a personal trainer, training partner or care giver. Flexibility exercises can improve back pain and shoulder pain and increase range of motion. All training programmes should be entered into gradually and only after checking with a physician.

CONCLUSION

There are certainly challenges in starting and keeping a patient in an exercise mogramme. However, older adults are among the most willing to begin exercise programmes as they are more aware of health issues. With dementia patients, there may be additional challenges as the disease progresses. However, there are many techniques that may help combat challenges that arise. The improvement in functioning and quality of life should make the challenge worthwhile.
Most treatments for dementia will neither reverse or stop the disease but could reduce the symptoms and slow the disease progression. However, regular exercise in addition to tight glucose control by persons with diabetes, intellectual stimulatingactivities, lowering cholesterol and homocysteine levels, education and controlling inflammation of body tissues have proven to be efficacious in slowing the disease progression.

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