

Review on Diagnosis of Alzheimer's Disease using MRI

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ABSTRACT: The brain is an organ that serves as the centre of the nervous system in all vertebrates and invertebrates. Human race stands superior among the species all because of efficient functioning of brain. Traumatic brain injury (TBI) is one of the leading causes of death and disability worldwide. Over the past three decades, research has linked moderate and severe TBI to a greater risk of developing Alzheimer's disease. In this work, software based diagnosis system to help doctors for easier prognosis is proposed. Here the acquired images using Magnetic resonance imaging (MRI) are processed to diagnose whether a person is diseased or not.

KEYWORDS: Magnetic resonance imaging, Alzheimer's disease, nervous system, vertebrates and invertebrates.

I. INTRODUCTION

Dementia is the disease of brain, causing loss of cognitive functions like reasoning, memory and other mental abilities due to trauma or normal ageing. Alzheimer disease accounts for 60-80% of dementia [1]. Over the past few decades, research has linked moderate and severe TBI to a greater risk of developing Alzheimer's disease [2]. It is classified into various types namely Alzheimer's disease, vascular dementia, Dementia with Lewy bodies, Front temporal lobar degeneration, Mixed dementia, Parkinson's disease, Creutzfeldt- Jakob disease and Normal pressure hydrocephalus[3].

Alzheimer's disease as one type of dementia can cause problems to human memory, thinking and behavior [1]. According to survey in 2010, approximately 35.6 million people worldwide suffer from Alzheimer's disease. Nowadays Alzheimer's is progressive disease, where dementia symptoms gradually worsen over a number of years, in its early stage, memory loss in mind, but with last stage Alzheimer's, individual loses the ability to carry on conversation and respond to their environment [4][5]. Few symptoms of Alzheimer's diseases are poor judgment, misplacing things, poor decision making, complete loss of memory etc.

A study published in the March 23, 2016, online edition of the *Journal of Neurology* mentions that a history of TBI may accelerate the age of onset of cognitive impairment by two or more years. These results were consistent with other studies that indicate TBI is a significant risk factor for cognitive decline in older adults and associated with an earlier age of onset in people with mild cognitive impairment and Alzheimer's disease. More research is needed to confirm the possible link between TBI and Dementia and to understand why moderate, severe and repeated mild TBIs may increase risk [6].

II. LITERATURE REVIEW

AD involves various risk factors such as Age, Genetics, Smoking, Consuming alcohol and Cholesterol [1][3]. This disease causes cell death, tissue nerves damages in the brain. Hence, the brain forms will shrink dramatically and so

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does all the brain functions. Alzheimer's diagnosis is carried at 3 different stages: initially consulting the General physician, followed by neuropsychological tests and taking MRI scans reports [4]. Research group of Alzheimer's association carried a survey; according to that 66% of the demented will be having AD but a few percent will be diagnosed at the earlier at the right time. The rest will not be diagnosed [1]. This signifies the importance of early diagnosis. The most serious TBIs require specialized hospital care and can require months of inpatient rehabilitation. Most TBIs are mild and can be managed with either a short hospital stay for observation or at-home monitoring followed by outpatient rehab, if needed [6][7].

Alzheimer's disease can be diagnosed at three different stages consulting the G.P, Conducting neuropsychological tests and scans [8]. Alzheimer's disease can also be diagnosed using neuro physiological assessment [3]. Strategies for treating Alzheimer's or another specific type of dementia are the same for individuals with and without a history of TBI. However, because CTE is a relatively new area of exploration for researchers and physicians, formal clinical guidelines for diagnosing and managing this condition do not yet exist. Several major research initiatives are under way to gain further insight into the patterns of injury and brain changes that may be implicated in CTE, and to develop new strategies for prevention, diagnosis and treatment [9].

III. METHODOLOGY

In image acquisition, the MRI of affected region in brain is considered. Fig. 1 shows the flow diagram of the proposed work. In pre-processing the noise reduction and feature extraction is performed. Fig. 2 shows loss of neurons in AD affected brain and Fig.3 shows the cross sectional view of the normal and AD affected brain [12]. Comparison between healthy and diseased brain by microscopic view is shown in Fig. 4 [12]. Classification is made on the bases of the shape and size of the AD affected brain.

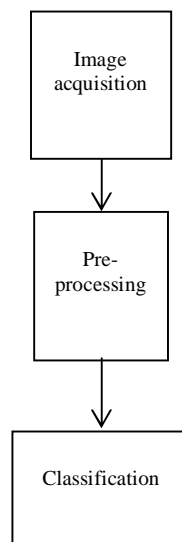


Fig. 1 Flow diagram of the work

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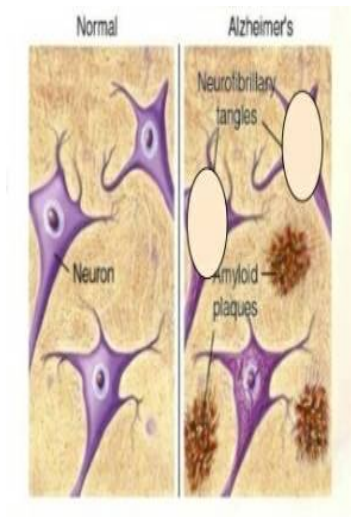


Fig. 2 Loss of neurons with gliosis

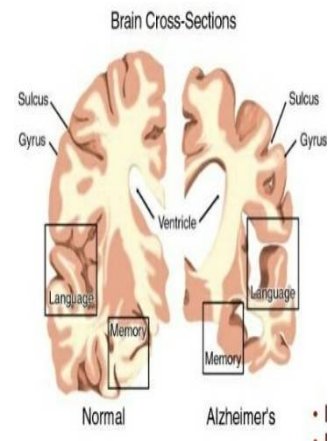


Fig. 3 Gross and microscopic view of brain

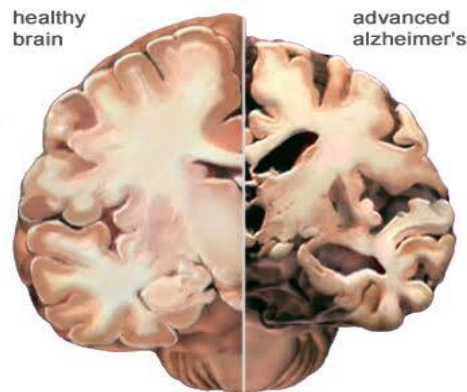


Fig. 4 Comparison between healthy and diseased brain

IV. CONCLUSION

This system can be implemented in hospitals for correct, easy and accurate diagnosis of injury. Its outcome can be used for betterment in prognosis. This system focuses on a new emerging approach in the diagnosis of AD. Depending upon the shape of the brain of the AD affected person, it is categorized as AD due to aging or TBI. This system can be implemented in hospitals for correct, easy and accurate diagnosis of injury. Its outcome can be used for betterment in prognosis.

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