

## Original Research

### Assessment of role of magnetic resonance imaging in evaluation of different types of dementia

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#### ABSTRACT:

**Background:** A pervasive impairment in cognitive and social occupational functioning is a hallmark of dementia. The present study was conducted to assess the role of magnetic resonance imaging in evaluation of different types of dementia. **Materials & Methods:** 52 cases of dementia of both genders were selected. Imaging by MRI was conducted utilizing a 1.5 Tesla MR system with a conventional head coil. In terms of imaging, standard MRI and proton magnetic resonance spectroscopy were utilized. **Results:** Out of 52 patients, 32 were females and 20 were males. Different type of dementia was Alzheimer's dementia in 16, vascular dementia in 24 and Parkinson's disease dementia in 12 cases. The difference was non-significant ( $P>0.05$ ). NAA/Cr ratio in posterior cingulate gyrus and ml/Cr ratio in posterior cingulate gyrus in Alzheimer's dementia was 1.52 and 0.81, in vascular dementia was 0.63 and 5.2 and in Parkinson's disease dementia was 1.61 and 0.29 respectively. **Conclusion:** The combination of conventional MRI and MRS is useful in diagnosis of Alzheimer's, vascular and Parkinson's disease dementia.

**Keywords:** psychosis, depression, dementia,

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#### INTRODUCTION

A pervasive impairment in cognitive and social occupational functioning is a hallmark of dementia. It is connected to behavioral problems, psychosis, and depression, among other neuropsychiatric symptoms. More than 90% of dementia cases in both younger and older age groups are caused by Alzheimer's disease (AD), vascular dementia (VaD), frontotemporal dementia (FTD), and dementia with Lewy bodies (DLB).<sup>1</sup>Huntington's disease, postalcoholic dementia, Creutzfeldt-Jakob disease, progressive supranuclear palsy, multiple system atrophy, and corticobasal degeneration (CBD) are some other, less common types of dementia.<sup>2,3</sup>

Although computed tomography (CT) scanning is helpful in identifying Alzheimer's disease (AD), it has been shown to be ineffective at identifying AD in its early stages and differentiating it from other forms of dementia. Magnetic resonance imaging, or MRI, has been extensively researched in AD.<sup>4</sup> Although it is unclear which structure is most important for an early

diagnosis, it exhibits very early abnormalities in the entorhinal cortex and hippocampal regions. Furthermore, it has been shown to be ineffective in differentiating between late-onset Alzheimer's disease (beyond 80 years) and senile dementia. In diagnosing atypical Parkinson's syndrome, MRI results are often normal, including a normal hippocampus.<sup>5</sup> This discovery is significant because it allows us to distinguish this disease from Alzheimer's, the primary differential diagnosis. The Magnetic Resonance Spectrometer (MRS) is a non-invasive device for measuring the chemical compositions of tissues (in vivo) and identifying the functional processes of various organs.<sup>6</sup>The present study was conducted to assess the role of magnetic resonance imaging in evaluation of different types of dementia.

#### MATERIALS & METHODS

The study was carried out on 52 cases of dementia of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Imaging by MRI was conducted utilizing a 1.5 Tesla MR system with a conventional head coil. In terms of imaging, standard MRI and proton magnetic resonance spectroscopy were utilized. The multi-

voxel approach was utilized for proton magnetic resonance spectroscopy. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

**RESULTS**

**Table I Distribution of patients**

Total- 52		
Gender	Male	Female
Number	32	20

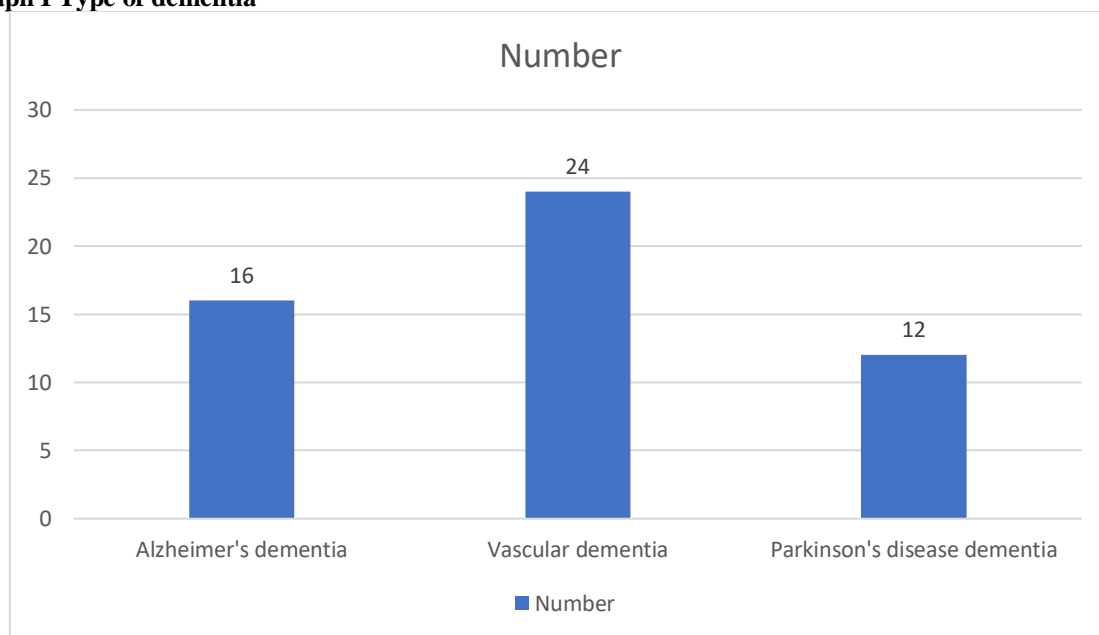
Table I shows that out of 52 patients, 32 were males and 20 were females.

**Table II Type of dementia**

Dementia	Number	P value
Alzheimer's dementia	16	0.75
Vascular dementia	24	
Parkinson's disease dementia	12	

Table II, graph I shows that different type of dementia was Alzheimer's dementia in 16, vascular dementia in 24 and Parkinson's disease dementia in 12 cases. The difference was non-significant (P>0.05).

**Graph I Type of dementia**



**Table III MRS findings**

Dementia	NAA/Cr ratio in posterior cingulate gyrus	mI/Cr ratio in posterior cingulate gyrus
Alzheimer's dementia	1.52	0.81
Vascular dementia	0.63	5.2
Parkinson's disease dementia	1.61	0.29

Table III shows that NAA/Cr ratio in posterior cingulate gyrus and mI/Cr ratio in posterior cingulate gyrus in Alzheimer's dementia was 1.52 and 0.81, in vascular dementia was 0.63 and 5.2 and in Parkinson's disease dementia was 1.61 and 0.29 respectively.

**DISCUSSION**

CT and MRI scans of the brain are useful in diagnosing Vascular Dementia (VaD), with MRI being more sensitive in this regard than CT [6]. Absence of brain vascular lesions CT or MRI is the most essential factor indistinguishing Alzheimer's

dementia from vascular dementia.<sup>7,8</sup>A particularly helpful instrument for analyzing the different forms of dementia is the magnetic resonance spectroscopy (MRS), which measures the metabolites at the nucleus level of the brain cells, including N-acetyl aspartate (NAA), creatine (Cr), choline (Cho), lactate (Lac),

and lipids (Lip).<sup>9</sup> These techniques may be helpful in the diagnosis of neurodegenerative illnesses, as NAA is reduced in the cortical, semioval, and temporal lobes with aging.<sup>10,11</sup> The present study was conducted to assess the role of magnetic resonance imaging in evaluation of different types of dementia.

We found that out of 52 patients, 32 were females and 20 were males. Westman et al.<sup>12</sup> studied the role of magnetic resonance imaging and magnetic resonance spectroscopy in evaluation of dementia patients. The grade of medial temporal lobe atrophy was higher in AD than in the other two types of dementia. Vascular lesions that fulfill these criteria were present in all patients diagnosed as VaD and their Fazekas score was 3, while patients diagnosed as AD and PDD didn't have vascular lesions that fulfill NINDS-AIREN criteria and Fazekas scoring of these patients did not exceed 2. Decreased NAA/Cr ratio in the posterior cingulate gyrus was less valuable in diagnosing AD when compared with elevated ml/Cr. Decreased NAA/Cr ratio in the centrum semiovale, Decreased NAA/Cr ratio in the occipital lobe

We found that different type of dementia was Alzheimer's dementia in 16, vascular dementia in 24 and Parkinson's disease dementia in 12 cases. Du AT et al.<sup>13</sup> explored volume changes of the entorhinal cortex (ERC) and hippocampus in mild cognitive impairment (MCI) and Alzheimer's disease (AD) compared with normal cognition (NC); to determine the powers of the ERC and the hippocampus for discrimination between these groups. This study included 40 subjects with NC, 36 patients with MCI, and 29 patients with AD. Volumes of the ERC and hippocampus were manually measured based on coronal T1 weighted MR images. Global cerebral changes were assessed using semiautomatic image segmentation. Both ERC and hippocampal volumes were reduced in MCI (ERC 13%, hippocampus 11%,  $p < 0.05$ ) and AD (ERC 39%, hippocampus 27%,  $p < 0.01$ ) compared with NC. Furthermore, AD showed greater volume losses in the ERC than in the hippocampus ( $p < 0.01$ ). In addition, AD and MCI also had cortical grey matter loss ( $p < 0.01$ ) and ventricular enlargement ( $p < 0.01$ ) when compared with NC. There was a significant correlation between ERC and hippocampal volumes in MCI and AD (both  $p < 0.001$ ), but not in NC. Using ERC and hippocampus together improved discrimination between AD and CN but did not improve discrimination between MCI and NC. The ERC was better than the hippocampus for distinguishing MCI from AD. In addition, loss of cortical grey matter significantly contributed to the hippocampus for discriminating MCI and AD from NC.

We found that NAA/Cr ratio in posterior cingulate gyrus and ml/Cr ratio in posterior cingulate gyrus in Alzheimer's dementia was 1.52 and 0.81, in vascular dementia was 0.63 and 5.2 and in Parkinson's disease dementia was 1.61 and 0.29 respectively. Summerfield C et al.<sup>14</sup> systematically investigated the

utility of proton magnetic resonance spectroscopy in distinguishing between idiopathic PD with dementia (PDD) and without dementia. Metabolite concentrations were acquired from voxels localized to the basal ganglia and occipital cortex in 14 patients diagnosed as having idiopathic PDD, 12 patients with PD without dementia, and 13 matched control subjects. The 3 groups underwent clinical and neuropsychological assessment. In the occipital region, N-acetylaspartate levels were significantly reduced in the PDD group relative to the PD and control groups. N-acetylaspartate values correlated with neuropsychological performance but not with severity of motor impairment.

The shortcoming of the study is small sample size.

## CONCLUSION

Authors found that the combination of conventional MRI and MRS is useful in diagnosis of Alzheimer's, vascular and Parkinson's disease dementia.

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