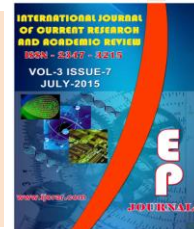




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Association between serum lipid profiles with Alzheimer's disease

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A B S T R A C T

Alzheimer's is one of the most important causes of dementia among the elderly. Some studies indicate that the relationship between cholesterol and Alzheimer's disease is found. The relationship between high-density lipoprotein (HDL) and low density (LDL) cholesterol and role of these factors is also highlighted in the disease process. The aim of this study was evaluation the association between and serum lipid profile with Alzheimer's disease. In a case - control study on neurological diseases department at Tabriz University of Medical Sciences conducted on Alzheimer's patients, lipid profile associated with Alzheimer's disease were studied. In this study, 40 patients with Alzheimer's disease and 40 healthy people as a control group and the following results were obtained. Mean age of case group patients was 77.27 ± 6.03 and mean age of control group patients was 76.22 ± 10.78 year ($P=0.593$). 13 of case group patients and 13 of control group patients was male and 27 of case group patients and 27 of control group patients ($P=1$). Significant difference was not found in Cholesterol, TG, HDL and LDL level between two groups of patients.

Introduction

Dementia can be considered as one of the major progressive neurodegenerative diseases occurring along with a decrease in the patient's perception (1-4). This disease initially occurs with a loss of short-term memory, but the change is very subtle. Dementia progresses at a low rate, and finally occurs with disorder in language and

perception of visual image and spatial relation. In the progressive stages, the patient becomes inflexible, quiet, unable to control urine or feces, and bed-dependant. Death usually occurs as a result of malnutrition, secondary infections, pulmonary embolism, or heart diseases (1-4).

Alzheimer is one of the most important causes of dementia among the elderly. Based on available statistics, over 60% of dementia in the elderly is due to Alzheimer (5).

This disease is made by destruction of cholinergic neurons and other neurons in the cortex. The main changes made in these areas include cortical atrophy, twisted neurofibrillary strands, and amyloid plaques (2, 6-7).

Some of the conducted studies suggest the relationship between cholesterol and Alzheimer (8). Moreover, the relationship between HDL and LDL and cholesterol intensifies the role these factors play in the disease trend (9-10).

The purpose of the study is to investigate the relationship between the lipid profile and Alzheimer.

Materials and methods

In a case-control study we performed in Tabriz on patients with Alzheimer, we investigated the relationship between the lipid profile and Alzheimer.

The population of patients under study included patients with Alzheimer arriving at specialist clinics of the nervous system, where the consent of the patient's family was obtained as detailed on the appended form.

The sampling method in the present study was considered as the purposive-sampling form, and as it was not clear how prevalent the disease was in the specific region and structure of the study, the sample size was considered to be the number of visitors holding the inclusion criteria of the study (for the patient group) and the same number for the control group a year after the plan

was ratified, and we selected 40 patients with Alzheimer and 40 healthy individuals as the control group, and included them in the study.

The probability of the disease was diagnosed based on NINCDS-ADRDA method and MRI or CT-Scan diagnostic experiments.

Other causes of cortical dementia were eliminated based on case histories, and thyroid and B12-level experiments were also performed.

After the forms of written consent and demographic information were obtained from the patient, MMSE test was performed, and the patients with scores lower than 20 were placed in the group under study (patients). All the individuals in the control group will also be selected based on the genders, ages, and habits in the patient group with an emphasis on the lowest difference.

Exclusion criteria of the study

Other causes of cortical dementia: dementia due to Pick's disease and Lewy body Due to multi-infarct

Sub-cortical dementia such as dementia due to Parkinson's disease, hydrocephalus, intracranial masses, and Huntington's disease

Recurring dementia including B12 vitamin shortage, hypothyroidism and neurosyphilis, severe vision and auditory disorder
Severe depression symptoms

Ethical considerations

For observation of ethics in the research, the conscious consent form ratified by the center was used.

Statistical Analysis

The collected data were analyzed by SPSS-17 statistical software. The collected data were expressed as percentage and mean \pm SD. Continuous (quantitative) variables were compared by Independent samples and Paired t test. Categorical (qualitative) variables were compared by contingency tables and Chi-square test or Fisher's exact test. P-value ≤ 0.05 was considered statistically significant.

Result and Discussion

In this study, 40 patients with Alzheimer and 40 healthy individuals as the control group were selected, and the following results were obtained:

The mean age of the patients in the case group was 77.27 ± 6.03 years, and that in the control group was 76.22 ± 10.78 years ($P=0.593$). 13 of the patients in the case group and 13 of the individuals in the control group were men, and 27 of the patients in the case group and 27 of the individuals in the control group were women ($P=1$).

The experimental findings of the patients are displayed in Table 1.

The etiology and pathogenesis of Alzheimer of the sporadic type is to some extent unknown due to its multi-factorial inheritance (11-12). Studies have made it clear that factors such as infections, injury and trauma to the brain, neurotoxic factors, hypoxia, and genetic factors are activators of the innate immune system. As a result of these factors, microglia, the resident macrophages of the central nervous system, transform from resting state with ramified morphology to active state with amoeboid morphology with an acute

neuroinflammatory response, and they cause neuronal neurodegeneration while increasing the expression of cell surface receptors and phagocytizing the neurotoxic factor with secretion of cytokines such as interleukin $\beta 1$, interleukin-6, and tumor necrosis factor and chemokine secretion and nervous as a consequence (13-14).

It has been made clear that in patients with Alzheimer, increase in the TNF- α level increases beta-amyloid peptide production, and brings sAPPs secretion under control (15). Moreover, TNF is an activator of NF- κ B nuclear factor, and, therefore, triggers more TNF production. Besides, increase in COX2 expression and, consequently, increase in the level of free radicals results in injury to and destruction of brain neurons (16). Studies in some populations have proved the role of polymorphisms of inflammatory factor genes, particularly TNF- α (16).

Alzheimer is the most prevalent and important cause of dementia. Important neuropathologic specifications of Alzheimer include deposition of amyloid plaques in the brain parenchyma and meningeal blood vessels as well as occurrence of neurofibrillary tangles in the brain hippocampus and cerebral cortex. Various mutations in APP, PS1, and PS2 genes result in early inheritance of Alzheimer (17-18).

Inflammatory pathway involvement in Alzheimer pathogenesis has been made clear in several studies. Here, TNF- α factor is a kind of proinflammatory cytokine playing an important role in mediation of cell response to injury in the central nervous system. Comparison between the cerebrospinal fluid in the patients with Alzheimer and that in the control group demonstrated an increase in the cytokine level.

Table.1 Lipid profile of patients in two groups

	Group		P
	Case	Control	
Cholestol	191.36±38.07	197.00±47.38	0.515
TG	174.48±88.66	169.28±101.65	0.808
HDL	47.97±9.05	49.85±10.32	0.388
LDL	106.73±28.54	116.94±42.04	0.207

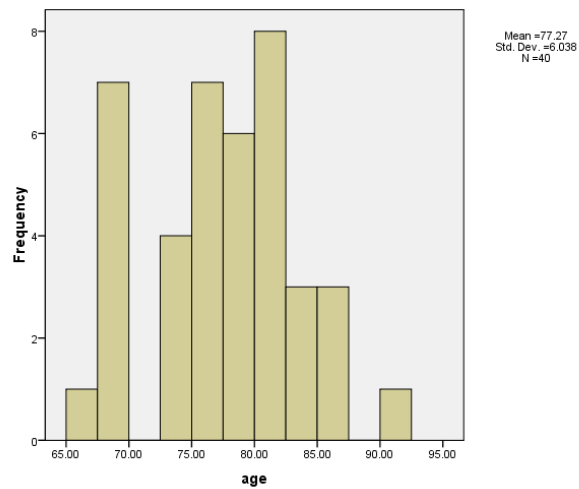


Chart.1 Age distribution of patients in two groups

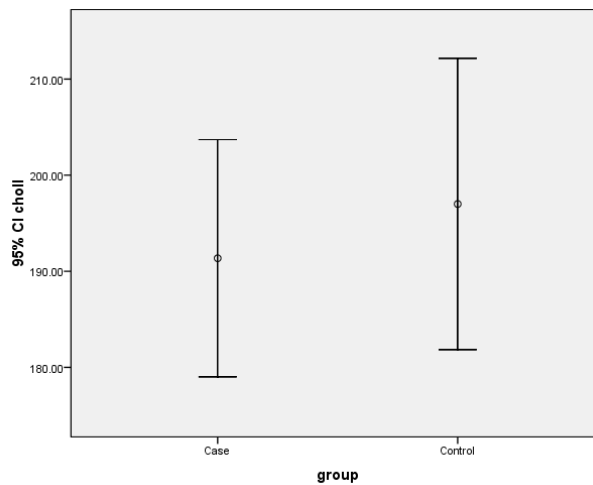


Chart.2 Distribution of cholesterol level of patients in two groups

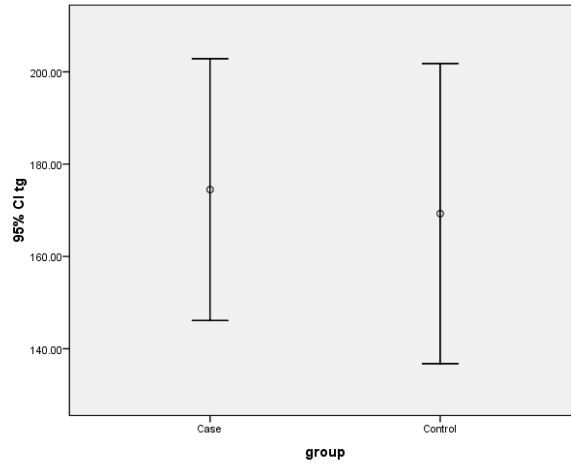


Chart.3 Distribution of TG level of patients in two groups

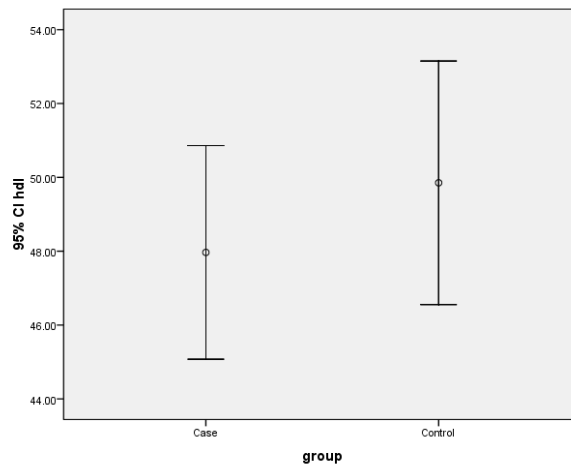


Chart.4 Distribution of HDL level of patients in two groups

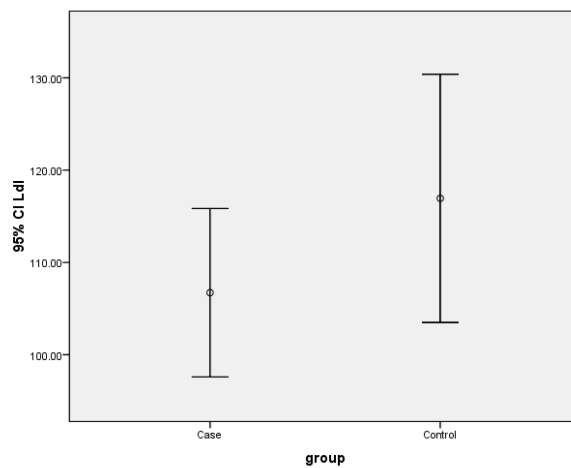


Chart.5 Distribution of HDL level of patients in two groups

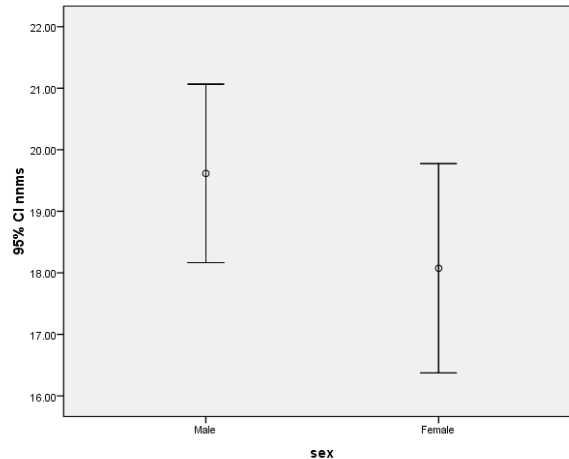


Chart.6 Distribution of MMSE level of patients

The increase in its expression level in the cerebrospinal fluid is related to the destruction of cerebral neurons and apoptosis (19). Moreover, the rise in the level of the cytokine in people with moderate cognitive impairment causes them to suffer from Alzheimer. Case-control epidemiologic studies also made it clear that use of anti-inflammatory drugs makes the disease less probable to occur and also slows down its progression.

β -A4 protein is the major component of plaques. The protein is in turn derived from a larger protein precursor called APP protein, the gene of which is located on chromosome number 21, close to the area affected in Down syndrome (20-21); for this reason, the risk of occurrence of AD in people with Down syndrome is much higher as they have an additional copy of APP gene. High age can be mentioned as another risk factor concerning the disease, as 3% of people between 65 and 74, 19% of people between 75 and 84, and 47% of people over 87 years old suffer from the disease.

In a study conducted by Blennow and colleagues, they stated that use of medicine reducing cholesterol helps prevent Alzheimer from progressing (1).

In a study performed by Hall and colleagues in 2006 on Alzheimer patients in Nigeria, they stated by investigating LDL serum levels in these patients that LDL serum levels in patients with Alzheimer was significantly higher (3).

In our study, the mean LDL in the case group patients was 106.72 ± 28.53 mg/dl, and the mean LDL in the control group patients was 116.94 ± 42.04 mg/dl.

There was no significant difference between the mean blood LDL in the two groups ($P=0.207$).

Conclusion

In this study, 40 patients with Alzheimer were selected as well as 40 healthy individuals as the control group, and the following results were obtained. The mean age of the case group patients was 77.27 ± 6.03 years, and the mean age of the control group was 76.22 ± 10.78 years ($P=0.593$). 13 of the patients in each group were men, and 27 of the patients in each group were women ($P=1$). There was no significant difference between the mean serum cholesterol, TG, HDL, and LDL between the two groups.

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