Predicting Dementia After Stroke

Thesis

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In Neuropsychiatry

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List of Abbreviations

ACA .....Anterioe Cerebral Artery

AD .....Alzheimer's Disease

AF.....Atrial Fibrillation

APOE ε4.....Apolipoprotein ε4

AS.....Atherosclerosis

BBB .....Blood Brain Barrier

BDNF.....Brain Dried neurotrophic factor

CAA .....Cerebral Amyloid Angiopathy

CAM.....Confusion Assessment Method

CBC .....Complete Blood Counts

CBF .....Cerebral Blood Flow

CES-D.....Centers for Epidemiologic Studies Depression Scale

CIND.....cognitive impairment no dementia

CMBs.....Cerebral microbleeds

CT.....Computed Tomography

DSM.....Diagnostic Statistical Manual of Mental Disorders

DWI .....Diffusion Weighted Imaging

FT4.....Free Thyroxine

FTLD .....Fronto-Temporal Lobar Degeneration

GCS .....Glasgow Coma Score

GDS .....Geriatric Depression Scale

HbA1c.....Hemoglobin A1c (Glycated hemoglobin)

HDL .....High Density Lipoprotein

ICD-10.....the International Classification of Diseases 10th version

IGF .....Insulin-Like Growth Factor

List of Abbreviations

LDL.....Low Density Lipoprotein

MCA.....Middle Cerebral Artery

MCI.....Mild Cognitive Impairment

MCI.....mild cognitive impairment

MD.....Mixed type dementia

MedDiet.....Mediterranean-type diet

MIE.....Multi-Infarct Encephalopathy

MMSE.....MiniMental State Examination

MRI .....Magnetic Resonance Imaging

mRS .....modified rankin scale

NCD .....Neurocognitive Disorder

NEECHAM .....the Neelon and Champagne confusion scale

NFTs.....Neurofibrillary Tangles

NINCDS–ADRA .....National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer's disease and Related Disorders Associations

NSAIDs .....Non-steroidal Anti-inflammatory Drugs

PA.....Physical Activity

PAQUID .....Persons Ages Quid

PCA .....Posterior Cerbral Artery

PET.....Positron emission tomography

PSCI .....Post-stroke cognitive impairment

PSD.....Post stroke dementia

PUFA .....poly-unsaturated fatty acids

SID .....Strategic Infarct Dementia

SPECT .....single photon-emission computed tomography

List of Abbreviations

SVD .....Small Vessel Disease

TIA .....Transient Ischemic Attacks

TSH .....thyroid-stimulating hormone

UK .....United Kingdom

VaD.....vascular dementia

VaMCI.....Vascular Mild Cognitive Impairment

VCI .....Vascular Cognitive Impairment

WMHs .....white matter hyperintensities

WMLs.....White Matter Lesions

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INTRODUCTION

Stroke: The world health organization defines stroke clinically as "rapidly developing clinical signs of focal (at times global) disturbance of cerebral function, lasting for more than 24 hours or leading to death, with no apparent cause other than of vascular origin". Stroke therefore, encompasses three major cerebrovascular disorders: ischemic stroke, primary intracerebral hemorrhage and spontaneous subarachnoid hemorrhage.

Hypertension is the most common and powerful risk factor for stroke after advanced age. Cardiac diseases is another major risk factor particularly atrial fibrillation other risk factors include tobacco smoking, hyperlipidemia, diabetes mellitus, previous transient ischemic attacks (TIA) ***(Fredm and Lazzaro, 2012).***

Approximately 17 million people had a stroke in 2010 and 33 million people have previously had a stroke and were still alive. Between 1990 and 2010 the number of strokes decrease by approximately 10% in the developed world and increased by 10% in the developing world. Overall, two thirds of strokes occurred in those over 65 years old ***(Feigin et al., 2014).***

Dementia is a progressive impairment of cognitive functions occurring in clear consciousness. Global

impairment of intellect is essential feature manifested as difficulty with memory, attention, thinking and comprehension. It affects 5% of people older than 65 years and 20% to 40% of those older than 85 years of all cases 50%to 60% of Alzheimer type ***(Sadock and Alcott, 2010).***

Among the most important dementing disorders are Alzheimer disease and vascular related dementia is the second most common dementia ***(Marder, 2012).***

Epidemiological studies identify several potential risk factors for Alzheimer disease. Most consistence risk factors include advanced age, family history and Apo protein genotype. Other risk factors include hypertension, stroke and fasting homocysteine level ***(Zabar, 2012).***

Risk factors for vascular dementia are considered the same as those for stroke ***(Kirk and David, 2010).***

Around two thirds of individuals with dementia live in low and middle income countries, where the sharpest increases in numbers are predicted ***(Prince and Jackson, 2009).***

In 2013 **Kelsy** documented that dementia resulted in about 1.7 million deaths up from 0.8 million in 1990

About 20% of ischemic stroke patients will develop dementia within 3-6 months ***(Leys, 2005).***

More than 60% of stroke patients develop substantial cognitive impairment ***(Sivakumar, 2014).***

Risk factors for developing dementia after stroke include: age, female sex, low level of education, diabetes mellitus, cigarette smoking, white matter changes and left sided infract ***(Pendlebury and Rothwell, 2009).***

Not all demented patients who have had stroke, have vascular dementia. Patients after stroke can be diagnosed either with vascular, degenerative or mixed dementia ***(Salvadori and Pantoni, 2012).***

Rational of the work

Sedentary life style and low educational level are risk factors to develop dementia. Whereas healthy diet habits, aerobic exercise and high educational level with more than one language experience are protective factors against developing dementia. Dementia affects cognitive functions and affected people need special care. Stroke is a disabling problem in itself. While post stroke dementia is an additional disability. Preventive measures are best to be taken is such condition. Therefore, an updated assessment to the above variables, in order to predict dementia after stroke. This may help to provide scientific basis, to whom it may concern, to raise public awareness with the importance of language education, healthy diet and aerobic exercise.

Hypothesis:

Sedentary life style and low education level, are variables that predict dementia after stroke.

Aim of the work

To determine predictors of cognitive impairment and dementia after stroke.

ISCHEMIC STROKE

Stroke, according to the American Heart Association (AHA) definition, is a sudden loss of brain function due to disturbance in the cerebral blood supply with symptoms lasting at least 24 hours or leading to death ***(Kopyta and Zimny, 2015).***

Stroke is the second leading cause of death worldwide ***(Bhatti et al., 2013).***

The two main types of stroke are ischemic and hemorrhagic, accounting for approximately 85% and 15%, respectively ***(Osama et al., 2014).***

I. Etiological subtypes of ischemic stroke:

A. Embolic:

Clot that forms at another location in the circulatory system, usually the heart and large arteries of the upper chest and neck. Clot breaks, loose and is carried by the blood stream and gets wedged in medium- sized branching arteries ***(Aggarawal et al., 2010).*** Microemboli can break away from a sclerosed plaque in the carotid artery or from cardiac sources such as atrial fibrillation, or a hypokinetic left ventricle ***(Hinkle and Guanci, 2007).*** Embolism to the brain may be arterial or cardiac in origin. Commonly recognized cardiac causes for emboli include atrial

fibrillation, sinoatrial disorder, recent acute myocardial infarction (AMI), subacute bacterial endocarditis, cardiac tumors, and valvular disorders, both native and artificial ***(Mohr, 1997).***

In approximately one-third of ischemic stroke patients, embolism to the brain originates from the heart, especially in atrial fibrillation ***(Stoll et al., 2008).*** Besides clot, fibrin, pieces of atheromatous plaque, materials known to embolize into the central circulation such as fat, air, tumor or metastasis, bacterial clumps, and foreign bodies contribute to this mechanism ***(Hinkl and Guanci, 2007).***

According to stroke databases from Western countries, cardioembolism is the most common cause of ischemic stroke ***(Kim et al., 2014).*** Embolic strokes usually present with a neurologic deficit that is maximum at onset ***(Shamas, 2011).***

B. Atheroerosclerotic stroke:

It accounts approximately for 14%-25%of ischemic stroke and affects men twice more than women. The most common sites of atherosclerosis related to stroke are the junction of common and internal carotid artery, the origin of middle and anterior cerbral arteries, the origins of vertebral arteries. The atherosclerotic plague may cause progressive stenosis of an artery and finally its occulsion and infraction ***(Fizsimmons and Lazzaro, 2012).***

C. Lacunar stroke:

It accounts for 15%-30%of ischemic strokes. These infraction are usually less than 1cm in diameter and caused by occlusion of single small penetrating artery that supplies one of the deeper structure in brain the cause of occlusion generally considered to be endothelial damage due to long standing hypertension diabetes ***(Fizsimmons and Lazzaro, 2012).***

D. Cryptogenic stroke:

Accounts between 20%-40% of ischemic strokes it appears to be embolic cause but despite complete diagnostic evaluation no apparent source of embolism found ***(Fizsimmons and Lazzaro, 2012).***

E. Other causes of ischemic stroke:

Accounts for less than 5% of ischemic strokes. Arterial dissection, spontaneous or traumatic. There are other less common condition as fibromusculardyplasia, myoamoya disease sickle cell disease polycythemia vera, thrombothic thrombocytopenic purpera, hypercoagluable state, paroxysmal nocturnal hemoglobinuria, drugs as (cocaine, amphetamine, hormone replacement therap, tamoxifen, heroin and LSD), leukaemia homocystinuria, migraine, endocarditis, meningitis vasulitis, polyarteritis nodosaand ***(Claudia, 2012).***