RELATIONSHIP BETWEEN MIGRAINE AND CEREBRAL ISCHEMIA

Thesis

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In Neuropsychiatry

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Abstract

Several studies found a relation between migraine and cerebral ischaemia.The main task in our study is to evaluate the relationship between migraine and cerebral ischemia and also to detect migraineurs who are at risk of developing stroke: ٣٠ patients were subjected to clinical neurological examination, laboratory including assessment of plasma serotonin level and ٥-Hydroxy Indole Acetic Acid (٥-HIAA) in urine, evoked studies, Doppler studies, MRA and MRI.. It was found that subjects with migraine who are at higher risk of developing future stroke: are those with periventricular white matter abnormalities in MRI, those with prolonged duration of aura and family history of migraine. Moreover, increased headache frequency is associated with haemodynamic significant stenosis in the carotid and vertrebrobasilar system that leads to cerebrovascular ischemia.
(Key Words: migraine, cerebral ischemia, serotonin)

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بسم الله الرحمن الرحيم

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List of Abbreviations

٥-HIAA: ٥-Hydroxy Indole Acetic Acid.
٥HT: ٥-Hydroxy Tryptamine (serotonin).
٥-HTP: ٥-Hydroxy L-Tryptophan.
ACAT-l: Acyl-coenzyme A: cholesterol acyltransferase-l.
AVM: Arteriovenous malformation.
BOLD: Blood oxygen level dependent imaging.
BPVC: Begnin paroxysmal vertigo of childhood.
CACNA١A: calcium channel A١A.
CAD: Cervical artery dissection.
CADASIL: Cerebral autosomal dominant arteriopathy with subcortical infarcts and leucoencephalopathy.
CGRP: calcitonin gene-related peptide.
CRP: C-reactive protein.
CSD: Cortical spreading depression.
DT-MRI: Diffusion tensor imaging (DT-MRI).
DWMLs: Deep White Matter Lesions.
FHM: Familial hemiplegic migraine.
FLAIR: Fluid-attenuated inversion recovery.
FMRI: functional magnetic resonance imaging.
IHS: International headache society.
IL-١: Interleukin-١.
IL-١٠: Interleukin-١٠.
IL-٦: Interleukin-٦.
IL-٨: Interleukin-٨.
IMT: Intimal medial thickness.
LDL: Low-density lipoprotein.
LTC٤: leukotrine C٤.
MAO: Monoamine oxidase.
MCP-l: monocyte chemoattractant protein-l.
MELAS: Mitochondrial Encephalopathy, Lactic acidosis and Stroke like episodes.
MRA: Magnetic resonance angiography.
MRI: Magnetic resonance imaging.
mRNA: messenger Ribonucleic acid.
MRS: Magnetic resonance spectroscopy.
MS: Multiple Sclerosis.
MTI: Magnetization transfer imaging (MTI).
MTT: Mean transit time.
NMDA: N-methyl D-aspartate.
NO: Nitric oxide.
PAG: periaqueductal gray matter.
PET: Positron emission tomography.
PGI٢: prostaglandin I٢.
PR: Pattern reversal.

PWI: Perfusion weighted imaging.
PWMLs: Periventricular White Matter Lesions.
rCBF: Regional cerebral blood flow.
relCBV: Relative cerebral blood volume.
RF: Repetitive flash.
SCN1A: sodium channel 1A.
SD: Standard Deviation.
SERT: Serotonin transporter.
SF: Single flash.
SPECT: Single photon emission tomography.
TCD: Transcranial Doppler.
TNF-α: tumor necrosis factor-alpha.
TPH: L-Tryptophan-monooxygenase tyrosine hydroxylase.
VBS:Vertebrobasilar system.
VEP: Visual Evoked Potential.
VWF: Von willebrand factor.

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Introduction

Introduction

The association between migraine and stroke is a dilemma for neurologists. Migraine is associated with an increased stroke risk and is considered an independent risk factor for ischemic stroke (Agostoni et al., ٢٠٠٤).

Studies that assessed the association between migraine and risk of ischemic stroke revealed that the average risk for all migraineurs was ٢.١٦ times that of people without migraine (Agostoni et al., ٢٠٠٤).

Migraineurs with aura have a greater stroke risk than those without aura and these strokes are often in the distribution of the posterior circulation (Suchurkova et al., ١٩٩٩).

Many studies raise the possibility that migraine is a risk factor for ischemic stroke in young women under ٤٥ year of age with additional stroke risk factors such as cigarette smoking, which increases stroke risk ten times compared to controls, oral contraceptives pills use and anticardiolipin antibodies (Tzourio et al., ١٩٩٥).

There is a causal relation ship between migraine and stroke at several levels. Possible causes of migraine induced stroke are decreased regional cerebral blood flow and oligaemia in large and small arteries combined with neurogenic inflammation or excessive neuronal activation during migraine attacks could lead to arterial or venous microembolism,thrombosis or ischaemia,platelet hyperactivity and elevation of von willebrand factor (VWF) (Stang et al.,٢٠٠٥).

Several studies reported an increased incidence of white matter lesions (WMLs) detected by MRI in patients with migraine even without concomitant cerebrovascular risk factors (Fazekas, ١٩٩٢).MRA could be used for detection of several intracranial vascular anomalies, which have been described in association of migraine. Such abnormalities include moyamoya disease, CADASIL, arteriovenous malformation (AVM), cavernous angioma and aneurysm (Koen et al., ٢٠٠٥).

Moreover,certain neurophysiological studies are considered in migraine.
Visual evoked potential is used to demonstrate subtle neuronal damage within the visual system of migraine patients reflecting repeated transient ischemia (Kennard et al., ١٩٨٧).
These changes in the form of prolonged pl٠٠ latency in migraine cases especially those with aura (Nofal et al., ٢٠٠٠). Evaluating the efficiency of vascular tree in head and neck by Duplex–Doppler study is considered to support the hypothesis of vascular disease as a primary underlying deficit in migraine (Andreas et al., ١٩٩٠)

Recent evidence has shown that ٥-HT is closely related migraine pathophysiology (Yoshiyuki et al., ٢٠٠٧).
Serotonin, a potent vasoconstrictor in the large cerebral arteries is considered to be involved in the regulation of the cerebral circulation and to be implicated in the etiology of cerebrovascular disorders such as migraine and ischemic brain disease (Yoshiyuki et al., ٢٠٠٧). .

Aim of the Work

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To detect the relationship between classic migraine and cerebrovascular ischemia by different tools.

Identification of migraineurs who are at risk of developing future stroke is another goal of this study