Neurobiology of Auditory Hallucinations

A Review of Literature
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In Neuropsychiatry

By:

Hosam El-Din Mahmoud Afify
M. B. B. Ch.,
Faculty of Medicine-Ain Shams University

Under Supervision of

Prof. Dr. Ahmed Saad Mohamed
Professor of Neuropsychiatry
Faculty of Medicine
Ain Shams University

Assist. Prof. Dr. Nahla Elsayed Nagy
Assistant Professor of Neuropsychiatry
Faculty of Medicine
Ain Shams University

Dr. Mohamed Fekri A. Aziz
Lecturer of Neuropsychiatry
Faculty of Medicine
Ain Shams University

Faculty of Medicine
Ain Shams University
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الطبيب/حسام الدين محمود عفيفي
بكالوريوس الطب والجراحة ــ جامعة عين شمس

تحت إشراف

الأستاذ الدكتور/ أحمد سعد محمد
أستاذ الأمراض النفسية والعصبية
كلية الطب ـ جامعة عين شمس

الأستاذ الدكتور/ نهلة السيد ناجي
أستاذ مساعد الأمراض النفسية والعصبية
كلية الطب ــ جامعة عين شمس

الدكتور/ محمد فكري عبدالعزيز
مدرس الأمراض النفسية والعصبية
كلية الطب ــ جامعة عين شمس

كليـــة الطـــب- جامعةعين شمس
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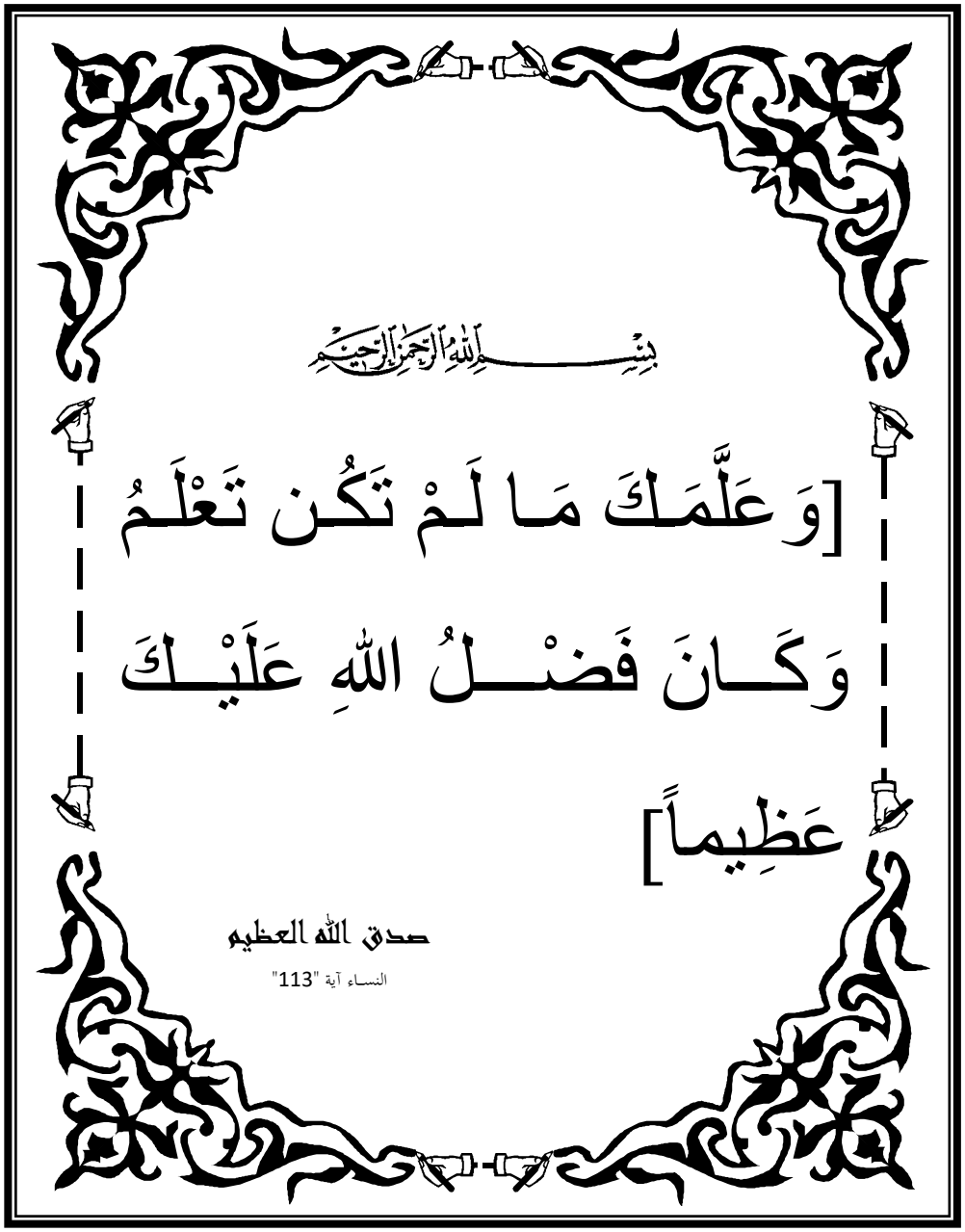
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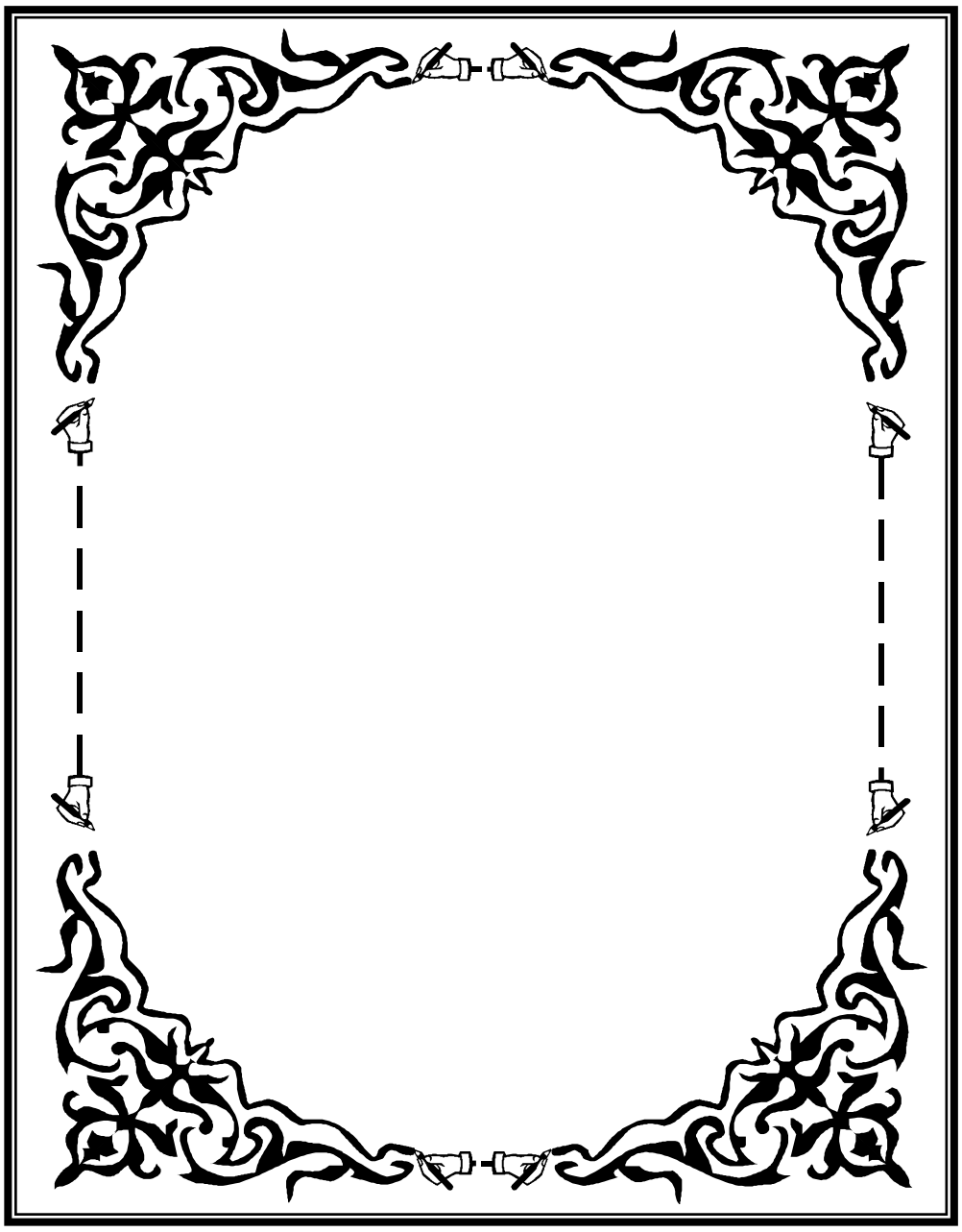

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List of Abbreviations

AH	:	Auditory hallucination
AVH	:	Auditory verbal hallucination
C.T.	:	Computerized tomography
CANS	:	Central auditory nervous system
CBT	:	Cognitive behavioral therapy
CT	:	Coping training
CTCH	:	Cognitive therapy for command hallucinations
DBM	:	Deformation based morphometry
ECT	:	Electro convulsive therapy
fMRI	:	Functional magnetic resonance imaging
FT	:	Family therapy
GABA	:	Gamma amino butyric acid
H I T	:	Hallucination focused integrative treatment
HG	:	Heschl gyrus
IC	:	Inferior colliculus
MGB	:	Medial geniculate body
MRI	:	Magnetic resonance imaging
NMDA	:	N-Methyl D-Aspartate

P50	:	Auditory evoked potential
PAC	:	Primary auditory cortex
PD	:	Parkinson disease
PET	:	Positron emission tomography
rCBF	:	Regional cerebral blood flow
RCT	:	Randomized controlled trial
SPECT	:	Single photon emission computerized tomography
SSRI	:	Selective serotonin reuptake inhibitor
rTMS	:	Repetitive Transcranial magnetic stimulation

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INTRODUCTION

The historical account emphasizes the continuing growth of biological psychiatry over two and half millennia and there has been a continued progress in understanding anatomical and chemical bases of psychiatric illness. Syndromes and symptoms previously thought as functional are even more open to explanation in terms of brain dysfunction **(Micheal 1996)**.

Auditory hallucination is false perception of sound, usually voices but also other noises such as music and it is the most common hallucination in psychiatric disorders e.g. auditory hallucination is reported by 50-70% of patients with schizophrenia, and it occurs in wide range of circumstances, for example, **Brasic (1998)** lists more than 40 medical and psychiatric conditions in which auditory hallucination may occur.

Auditory hallucination in psychiatric disorders represents an important clinical problem, an interesting neuropsychological phenomenon and a significant challenge for neuroscientific research to know the neurobiological bases underlying its generation, which are

still unknown inspite of in depth phenomenological description **(Font et al., 2003)**.

The advances in functional neuroimaging techniques has allowed the in vivo, systems-level study of brain dysfunction underlying this important symptom and the study of the anatomical and chemical brain systems in which abnormalities are implicated in auditory hallucination **(Font et al., 2003)**.

Recent researches are ongoing for advances in treatment of this distressing symptom e.g. studies about the effect of low frequency transcranial magnetic stimulation and it may have the potential to improve auditory hallucination without having adverse effects on cognitive functions **(Hoffman et al., 2000)**.

It is clear from the above that it is important to study such common psychiatric symptom as regards its neurobiological bases and recent lines in its management.

AIM OF THE WORK

This work considers the neurobiological perspective of auditory hallucination. So, this study will aim at:

1. To review neurobiological bases of auditory hallucination.
2. To highlight the cultural aspects in the content of auditory hallucination.
3. To provide an update of recent advances in management of auditory hallucination.

Auditory hallucinations
Definition, Causes and Phenomenology

Historical background:

While hallucinations have been described since antiquity, they were recognized as components of mental illness only during the past two centuries. Prior to their recent medicalization, humankind has been familiar with hallucinatory experiences for even longer, at least since biblical times **(Berrios, 1996)**.

Hallucinations were thought to be either sources of divine inspiration or evidence of demonic possession, depending on prevailing cultural views. Where do hallucinations come from? In non–western cultures, the answer usually is: from gods and ghosts. This is also the case for ancient Greece literature, such as Illias **(Al-Issa, 1995)**.

(1) DEFINITION

The term 'hallucination' has been defined as a sensory perception without external stimulation of the relevant sensory organ. In order to distinguish this from mental imagery and dreaming, it is instructive to add to this definition that hallucinations are not under voluntary control of the individual (contrary to mental imagery), and occur in a wakeful state (contrary to dreaming) **(Aleman and De Hann, 1998)**.

Hallucinations are complex and varied, and can affect each of the five senses, but most research has been devoted to auditory hallucinations.

Auditory hallucination: false perception of sound, usually voices but also other noises, such as music **(Aleman and De Hann, 1998)**.

(2) EPIDEMIOLOGY

Incidence:

Hallucinations, a common experience, exhibited an incidence of 4-5% in the general population in an epidemiologic catchment area study **(Nayani and David, 1996)**. Data from the national institute of mental health (NIMH) in epidemiological catchment area program in the USA showed that life time prevalence for hallucinations in