

Original Research Article

Otoacoustic Emissions of Fifty Patients With Mental Illness in a Nigerian Teaching Hospital

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Abstract: Many studies among people with hearing loss revealed a strong link with mental health although there's a dearth of published studies specifically on hearing loss among psychiatric patients. Proposed synergistic effect of mental illness and hearing loss predisposing to other forms of mental illness such as depression. The objective of this study is to determine the prevalence and predominant mental illnesses linked to hearing loss in this region. Descriptive survey design incorporating measurement of Otoacoustic emissions(OAE) of each of fifty consecutive patients with mental illness attending mental health clinic from January to June 2017. Behavioural responses were not considered. The results were used to determine: (a) The type of mental illness predominant among the study group; and (b) The prevalence of hearing loss among patients with mental illness. Paranoid Schizophrenia was the predominant type of mental illness with 23(46%) having the disorder. Prevalence of hearing loss per se was 32(64%) though 18(36%) referred to the right ear, while 16(32%) referred to the left ears. Although small study sample, relatively high number of patients with mental illness were determined through otoacoustic emissions to have sensorineural hearing loss. There is need for prompt specialist evaluation and treatment of mental illness; hearing screening of all patients diagnosed with mental illness; and future researchers are implored to replicate this study with large sample size.

Keywords: Otoacoustic emission, mental illness, hearing loss, refer, pass.

INTRODUCTION

The association between hearing loss and mental illness in a psychiatric population makes intuitive sense since many studies among people with hearing loss revealed a strong link between these two variables [1-3]. Several studies had been published on the relationship between mental illness and hearing loss specifically among people with deafness or hearing loss [1-5], whereas, there is a dearth of published studies on hearing loss among psychiatric patients.

Early studies on psychiatric patients suggested hearing impairment as an important cause of paranoid illness, but more recent studies of wider populations have failed to confirm this association. Hearing impairment is unrelated to intellect when controlled for

age, but it is an important differential diagnosis of dementia in the elderly [6].

According to Mental Health and Social Exclusion [7], the link between mental ill health and deafness in children suggest a prevalence of mental health problems of 40% in Deaf children compared to 25% in their hearing counterparts. In adults, a number of studies from different countries have indicated a significantly higher level of mental ill health. Sensory impairments including visual or hearing loss or distortion, have been reported in schizophrenia and mood disorders, especially among older patients and patients with a late onset of their psychiatric illness [8].

Types of mental illness

Paranoid Schizophrenia is the commonest type of schizophrenia in most parts of the world. The clinical picture is dominated by relatively stable, often paranoid, delusions, usually accompanied by hallucinations, particularly of the auditory variety, and perceptual disturbances. Disturbances of affect, volition, and speech, and catatonic symptoms, are not prominent [9]. Paranoid Schizophrenia is dominated by relatively stable and often persecutory delusions that are usually accompanied by hallucinations, particularly of the auditory variety (hearing voices), and perceptual disturbances. These symptoms can have a huge effect on functioning and can negatively affect quality of life. Paranoid schizophrenia is a lifelong disease, but with proper treatment, a person with the illness can attain a higher quality of life [10]. Residual schizophrenia is one of the five types of schizophrenia that is characterized by a long-term history of negative symptoms (i.e. psychomotor slowing), with very infrequent or rare occurrences of positive symptoms. A chronic stage in the development of a schizophrenic disorder in which there has been a clear progression from an early stage (comprising one or more episodes with psychotic symptoms meeting the general criteria for schizophrenia described above) to a later stage characterized by long-term, though not necessarily irreversible, "negative" symptoms [9].

A manic episode is a mood state characterized by period of at least one week where an elevated, expansive or unusually irritable mood exists. A person experiencing a manic episode is usually engaged in significant goal-directed activity beyond their normal activities. The symptoms of mania include: elevated mood, inflated self-esteem, decreased need for sleep, racing thoughts, difficulty maintaining attention, increase in goal-directed activity, and excessive involvement in pleasurable activities. These manic symptoms significantly impact a person's daily living [9]. Delusional or hallucinatory disorders that do not justify a diagnosis of schizophrenia persistent delusional disorders, acute and transient psychotic disorders psychotic types of manic episode or severe depressive episode [9]. These psychotic states occur in a variety of socio-cultural settings and have several important features in common; acute onset usually precipitated by stressful events, a florid and rather variable clinical picture, short duration and marked tendency to recover with or without treatment. It appears that such psychotic states occurring in

geographically and culturally different parts of the world like Africa [11]. Delusional disorder is a mental illness in which the patient presents with delusions but with no accompanying prominent hallucinations, thought disorder, mood disorder, or significant flattening of affect [12,13].

Major depressive disorder (MDD), also known simply as depression, is a mental disorder characterized by at least two weeks of low mood that is present across most situations [14]. It is often accompanied by low self-esteem, loss of interest in normally enjoyable activities, low energy, and pain without a clear cause. People may also occasionally have false beliefs or see or hear things that others cannot [15].

An organic mental disorder (OMD), also known as organic brain syndrome or chronic organic brain syndrome, is a form of decreased mental function due to a medical or physical disease, rather than a psychiatric illness [16]. In other words, it is a psychological or behavioural abnormality associated with transient dysfunction of the brain [17]. Recurrent depressive disorder describes the tendency of an individual to suffer recurrent episodes of depressed mood [9].

Organic psychotic disorder is a state characterized by clouded consciousness, confusion, disorientation, illusions and often vivid hallucinations. They are usually due to some intra or extra cerebral toxic, infectious, metabolic or other systemic disturbance [9]. Severe depressive disorder with psychotic symptoms occurs in the context of bipolar disorder or major depressive disorder, psychotic depression requires that the psychotic features occur only during episodes of major depression [12,18].

The synergistic effect of mental illness and hearing loss on the sufferers may exacerbate the problems that they experience, for example, a patient that is being treated primarily for schizophrenia but with an undiagnosed moderate sensorineural hearing loss may predispose to other forms of mental illness such as depression. However, family members or close relatives may still conclude that his illogical response to conversation is due to his mental state thereby accept him like that, whereas he is suffering from a moderate sensorineural hearing loss which has not been detected or diagnosed by experts in the field of hearing.

Our literature search did not reveal any article on prevalence of hearing loss among patients with mental illness. This study therefore seeks to determine the prevalence of hearing loss and the predominant type of mental illness among this special population.

MATERIALS AND METHODS

Research Design

This study adopted the descriptive survey design. Since the variables of interest have already occurred, they were studied *expost-facto*. Thus, the variables were not manipulated in any way in the course of this study.

Sample and Sampling Technique

Our literature search did not reveal any article on prevalence of hearing loss among patients with mental illness, thus, the fifty consecutive patients between January – June, 2017 at psychiatry department, LAUTECH Teaching Hospital, Osogbo, who met the inclusion criteria were enrolled.

Inclusion Criteria

Patients with mental illness who have not been attending otology clinic for treatment were included in the study.

Exclusion Criteria

Patients with craniofacial abnormalities, middle ear pathologies, those with history of head injury, noise exposure and patients who are acutely ill were excluded in the study.

Instrument Used for Data Collection

Otoacoustic Emission (OAE) machine was used to screen for hearing loss among the participants.

Patient Preparation

Otoscopy was performed on the participants in order to rule out middle ear pathologies, all the participants as at the time of the screening were having intact and shining tympanic membranes. After this, each patient was instructed to be calm and relax. The OAE machine introduced to each participant as a portable, painless and non-invasive device to screen them for hearing loss which would only last few minutes.

Description of the Instrument/Procedure

The primary purpose of otoacoustic emission is to determine cochlea status which is, specifically hair cell function. Otoacoustic emission machine is a portable machine used to determine the presence or absence of cochlea function. The normal cochlea does not just receive sound; it also produces low-intensity sounds called otoacoustic emissions (OAEs). These sounds are produced specifically by the cochlea and mostly by the outer hair cells as they expand and contract.

The test is performed by placing a small probe that contains microphone and speaker into the patient's ear. Sounds generated in the probe and responses that come back from the cochlea are recorded. Once the cochlea processes the sound, an electrical stimulus is sent to the brainstem. In addition, there is a second and separate sound that does not travel up the nerve, but comes back out into the ear canal. This "byproduct" is the otoacoustic emission. The emission is then recorded with the microphone probe and represented pictorially on a liquid crystal display (LCD) or a computer monitor with the test result shown as either "pass" or "refer".

Procedure

A probe is inserted with a soft flexible tip into the ear canal to obtain a seal. There are different probes for different ages; the probes are calibrated differently because of the significant difference in ear canal volume. Multiple responses are averaged. All OAEs are analyzed relative to noise floor; therefore, reduction of physiologic and acoustic ambient noise is critical for good recordings. Because no behavioral response is required, OAEs can be obtained even from patients who are comatose. For a quiet and cooperative patient, recordings usually require less a few minutes per ear. For an uncooperative or patient with noisy breathing, recordings may take significantly longer or may be impossible to obtain, thus the patient has to be re-scheduled and if he is still uncooperative, some sedatives may be used.

Data Analysis

The data collected were analyzed using descriptive statistics of simple percentage, frequency count and standard deviation (SPSS v16).

RESULTS

Table-1: Age Distribution of the Studied Patients (In Years)

Minimum	Maximum	Mean	Std. Deviation
21	62	37.92	10.73

Table-2: Gender of the Studied Patients

Gender	Frequency	Percent
Male	23	46
Female	27	54
Total	50	100

Table-3: Diagnostic Profile of Mental Illness

Diagnosis	Frequency	Percent
Paranoid schizophrenia	23	46.0
Severe depressive disorder with psychotic syndrome	3	6.0
Bipolar mood disorder (Manic episode)	10	20.0
Acute non-organic psychotic disorder (Unspecified)	2	4.0
Delusional disorder (R/o Paranoid Schizophrenia)	1	2.0
Organic mental disorder 2 ^o to high grade fever	3	6.0
Recurrent depressive disorder with psychotic syndrome	2	4.0
Mental and behavioral disorder 2 ^o to cannabinoid	2	4.0
Non-organic insomnia	1	2.0
Residual schizophrenia	1	2.0
Unspecified non-organic psychosis with underlying intellectual disability	1	2.0
Generalized anxiety disorder	1	2.0
Total	50	100

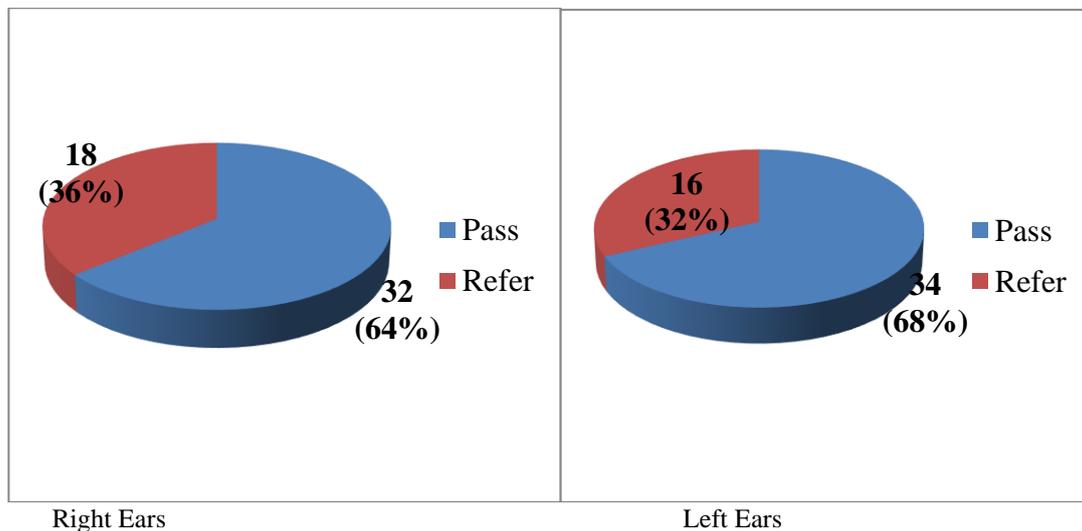


Fig-1: Prevalence of Hearing Loss among patients with mental illness

Figure one shows prevalence of hearing loss among the studied group on both right and left ears. Out

of 50 patients studied, 32 (64%) patients passed while 18 (36%) patients referred on the right ears. On the left

ears, 34 (68%) passed while the remaining 16 (32%) referred.

DISCUSSION

Table 3 shows that paranoid schizophrenia was the predominant type of mental illness with 23 (46%) having the disorder. It was distantly followed by bipolar mood disorder (manic episode) with 10 patients, that is, 20% of the participants. The frequency of other types as seen in this study is shown in table 3 above.

Mental disorders have been found to be common, with over a third of people in most countries reporting sufficient criteria to be diagnosed at some point in their life [19]. The World Health Organization (WHO) reported in 2001 that about 450 million people worldwide suffer from some form of mental disorder or brain condition, and that one in four people meet criteria at some point in their life [20].

Estimates of the prevalence of common mental health disorders vary considerably depending on where and when surveys are carried out, and the period over which prevalence is measured. The 2007 Office for National Statistics (ONS) household survey of adult psychiatric morbidity in England found that 16.2% of adults aged 16 to 64 years met the diagnostic criteria for at least one disorder in the week prior to interview [21]. In the three ONS surveys carried out so far, the proportion of adults meeting the criteria for at least one disorder increased between 1993 and 2000 but did not change between 2000 and 2007 (15.5% in 1993, 17.5% in 2000 and 17.6% in 2007). The largest increase in the rate of disorders found between 1993 and 2007 was in women aged 45 to 64 years, among whom the rate went up by about one fifth [21].

The World Health Organization has published worldwide incidence and prevalence estimates of individual disorders. Obsessive-compulsive disorder is two to three times as common in Latin America, Africa, and Europe as in Asia and Oceania. Schizophrenia appears to be most common in Japan, Oceania, and Southeastern Europe and least common in Africa. Bipolar disorder and panic disorder have very similar rates around the world [22].

However, these are widely believed to be underestimates, due to poor diagnosis (especially in countries without affordable access to mental health services) and low reporting rates, in part because of the

predominant use of self-report data, rather than semi-structured instruments such as the Structured Clinical Interview for DSM-IV (SCID); actual lifetime prevalence rates for mental disorders are estimated to be between 65% and 85% [22].

A 2005 review of prior surveys in 46 countries on the prevalence of schizophrenic disorders, including a prior 10-country WHO survey, found an average (median) figure of 0.4% for lifetime prevalence up to the point of assessment and 0.3% in the 12-month period prior to assessment. A related figure not given in other studies (known as lifetime morbid risk), reported to be an accurate statement of how many people would theoretically develop schizophrenia at any point in life regardless of time of assessment, was found to be "about seven to eight individuals per 1,000" (0.7/0.8%). The prevalence of schizophrenia was consistently lower in poorer countries than in richer countries (though not the incidence), but the prevalence did not differ between urban/rural areas or men/women [23].

Figure 1 shows the prevalence of hearing loss among the studied group in which, out of the 50 patients studied, 32 (64%) patients passed while 18 (36%) patients referred on the right ears. On the left ears, 34 (68%) passed while the remaining 16 (32%) referred. Otoacoustic emission "pass" could only be obtained in an unobstructed outer ear canal, absence of significant middle ear pathology and functioning cochlear outer hair cells. The elements in the pathway for the OAE include the sound source, the ear drum, ossicular chain, inner ear and outer hair cells. The same structures transmit sound coming out of the outer hair cells. OAEs can be affected by anything in the chain, if sound does not go in or out, there will be no OAE²⁴, thus give a "refer" result. So, OAEs reflect a combination of inner ear and external/middle ear function. The clinical significance of OAEs is that they only occur in a normal cochlea with normal or near normal hearing. If there is damage to the outer hair cells producing mild hearing loss, then OAEs are not evoked. A rule of thumb is that OAEs are present if hearing is 35dB or better.

CONCLUSION

Although, the present study sample may be small, yet a higher number of patients with mental illness had been detected of having hearing loss (cochlear pathology) through otoacoustic emission.

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Recommendations

- Accessibility to mental health specialists and prompt treatment of patients with mental illness.
- Hearing screening all patients suffering from one mental illness or the other.
- Researches should not be limited to studies on mental illness among people with hearing loss but should be extended to studies on hearing loss in the population of people with psychiatric illnesses.
- Future researchers are encouraged to replicate this study with a large sample size in Nigeria and Africa at large.

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