Alterations in brain states or possessed by the spirit? : Case report from Oman.

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Abstract
View that spirits may impersonate human beings is found in 90% of the world's population including Arab/Islamic societies. Despite that possessive state mimic various neurological and psychiatry disorders, to our knowledge, available literature have yet to correlate possessive state with functional brain imaging, Single photon emission computed tomography (SPECT). Within the background of an Oman patient who presented to us with altered state of consciousness that his caregiver attributed to possession, this paper attempts to correlate the patient’s mental state with neuro-imaging data. Patient’s distress was invariably associated with specific perfusion in left temporal lobe and structural abnormality in left basal ganglia. The observed case is discussed within the context that possession is culturally sanctioned odium of distress and important of studying cross-cultural presentation of psychiatric disorder within neurobehavioral paradigm.

Keywords: Possessive state; case study, Omani, Single photon emission computed tomography, temporal lobe abnormality, basal ganglia infarct
Introduction

From phrenology to modern neuroscience, there is interest to decipher a complex relationship between human behavior and brain function. The ultimate quest of such endeavor is to understand the underlying biological mechanisms of the development of psychiatric disorders so that evidence-based knowledge on prevention and management of abnormal behavior can been consolidated [1]. In many areas of clinical medicine, within the central tenet of biomedical model, linking signs and symptoms to underlying biological processes is *sine qua non* of the practice. Such privilege has yet to prevail in mental health fraternity despite Emil Kraepelin idealization that psychological disorders are ‘housed’ in brain [2]. In the instance of altered state of consciousness or abnormal mental states, biomedical model would not to be fruitful approach since it is commonly held that psychiatric disorders are amorphous entity and sometime simply represent exaggeration of normal psychological processes [3]. It is within these constraints that modern quest for psychopathology still dwells descriptive phenomenology as exemplified by both *Diagnostic and Statistical Manual of Mental Disorders* and *International Statistical Classification of Diseases*.

In traditional society, altered state of consciousness, which would be deemed as manifestation of ‘disease’ state in psychiatric parlance, is attributed to possessed state in which a person's behavior is thought to be controlled by an anthropomorphic being that has entered his or her body [4]. The observed personality changes and accompanying altered state of consciousness tend to vary according to the character of the spirit seeking incarnations [5-7]. View that spirits may impersonate human beings is found in 90% of the world's population [8]. In various countries of Asia and Africa the possessing spirits have special names: such as 'amok' in Malaysia, 'voodoo' in Haiti, 'zar', 'kibuki', 'bori', 'popobawa' 'kitimbiri' in the Middle East and Africa. The phenomenon akin to possession have often described as 'mystical affliction', 'satanic dance', 'trance ceremony', 'superstitious tradition', 'healing cult', 'cathartic dance' or 'demonic attack' [4]. These spirits that possess people are often held responsible for many diseases, both physical and mental [9].

To our knowledge, none of the reported studies have attempted to link possessive state to indices of cerebral blood flow perfusion. Within the background of an Oman
patient who presented to us with altered state of consciousness and which, according to Omani odium of distress, possessed by anthropomorphic being, this paper attempts to correlate the patient’s dissociative state with functional abnormality in specific brain regions. The observed case is discussed with the view from anthropological report on possessive state and present current trend of linking abnormal behavior and behavioral disorder to abnormality of the brain.

**Case report**

M was 22 years old right-handed Omani male when he first presented to us in 2002. He was brought by his family with four years history of change in behavior, abnormal visual and auditory experiences. According to the patient's family, he started to become isolated, with poor interaction with others, disinterest and withdrawn.

His attention and concentration were also affected resulting in academic deterioration. Prior to his presentation to our department, he started to complain of abnormal auditory experiences when he is alone. According to the patient these voices neither speak about or against him. He also complained that the appearance of his father changes suddenly into that of a 'devil'. His meals were also shared by jinn (genies) which he attributed to 'makes the food's taste nasty'. He had poor sleep with unremitting restlessness. He did not exhibit any aggressive behavior except once, which was directed towards his mother but when he was taken to Umra (optional Muslim pilgrimage to Mecca). In Mecca, he became agitated and violent. His personality change was attributed to various causal agent including supernatural forces such Jinn, contemptuous envy (Hassad), the envy-related 'eye' ('Ain) and sorcery (Sihr). He sought traditional treatment for his condition. The consultation in traditional healing practice failed to return him to his premorbid self.

The patient had a positive family history since one of his uncles has a psychiatric illness. He has a history of head trauma more than 7 years ago but there was no associated loss of consciousness or seizures. Immediately after the accident, he immediately regains his premorbid self.

All his investigations (CBC, Blood biochemistry, immunological work up and ECG were normal. He was seen in two different psychiatric hospitals and received
electroconvulsive therapy (ECT) in one of them but his condition remained the impervious to the treatment offered. He sought consult with ophthalmologist for the double vision. He was duly diagnosed as having retinitis pigmentosa. In 1999 he was seen by a neurologist for vertigo, double vision, headache and abnormal movements. He was diagnosed as a case of migraine. CT scan done at that time showed a encephalomalacia on the left basal ganglia. Electroencephalography (EEG) was suggestive of temporal lobe epilepsy (bilateral with no generalization). There were no other findings

Approximately two years ago, the he was referred to our tertiary care. During preliminary consultation, he was noted that although there were no indication of respective and expressive language impairment, his marked disturbance in generation suggestive of aphonia and pronunciation of word indicative of dysarthria. He was disinterested in maintaining a prosocial behavior and never initiated conversation with others. He remained motionless, unless prompted, which is apathetic behavior. He sensorium compromised and he often everyone he sees as his persecutor who had changed his appearance to the current person. In formal cognitive test, Folstein Mini-Mental State Exam, his score were in the clinical range. He showed strong presence of auditory hallucinations. Indices of physical examination were unremarkable. Normal CBC and blood biochemistry including thyroid functions and lipids. The brain perfusion Single Photon Emission Tomography (SPECT) was performed after 45 minutes of injecting a dose of 740 MBq Tc-99m-ethyl cysteinate dimer (Tc-99m-ECD) (Bristol-Myers Squibb Medical Imaging) through an existing intravenous line. The image acquisition parameters were 360 degrees of rotation, 64 images, 20 seconds per image with a matrix of 128 x 128 pixels [10]. The Brain Perfusion SPECT was analyzed by iterative reconstruction method. During acute exacerbation of the symptoms, the indices of tomographic imaging are shown in Figure 1 which clearly indicates low perfusion at the left temporal lobe.

Insert Figure 1 about here: Brain perfusion SPECT before the treatment showing low perfusion at the left Temporal lobe.
The patient was started on Risperidone (2 mg HS) and later on Lamotrigine (50mg BD) was added. Three weeks later he was showing a marked improvement on his mood, cognitive functioning, and social behavior. His perceptual disorders gradually receded. He was sent out on pass twice for 3 days during which he was not compliant to the medications. He relapsed and, on clinical ground he was given depot medication (Risperdal Consta) which is given every two weeks. He remained on this treatment protocol for 4 months. On subsequent follow-ups, he was noted to have returned to his premorbid self. He was well oriented to time and place and cooperative. All indicative of psychotic features have fully receded. His quality of life also improved and he resumed his studies. Corollary to this, repeated brain perfusion study (Figure 2) showed perfusion improvement at the left temporal lobe.

Discussion

The reported case is a patient who sought psychiatric consultation from tertiary care. Following protracted neurological, psychiatric and medical observation, the patient’s dissociative state was critically associated with specific functional changes in the temporal lobe and structural abnormality, encephalomelacia, on the left basal ganglia. The patient's distress eventually receded. This coincided with pharmacological intervention and objective changes in blood perfusion in temporal region of the brain. It is not clear how instituted pharmacological agents mitigated the patient's distress. It is possible that the treatment coincided with the spontaneous recovery via yet to be established mechanisms. Alternatively, the treatment may have kick-started the recovery either by directly attenuating pathological mechanisms or by facilitating neuroplasticity or other compensatory mechanism [11,12].

To our knowledge, this is the first case report that associating neurobehavioral impairment, neuro-imaging data and one of the most common local odium of distress in Oman, spirit possession [13]. To the traditional Omani society, abrupt personality changes or altered state of consciousness are attributed to spirit possession [14]. The
belief in possession is testified in social-cultural teaching where invisible spirit are
d deemed to inhabit the earth and influence mankind by appearing in the form of
anthropomorphic being [15]. In anthropological literature [16], possession is classified as
either symbiotic type where spirit and human being have 'plutonic' type of relationship
with the human being. The second type of possession is partial possession that is akin to
disassociate identity disorder in psychiatric parlance [17,18]. The final type which is
similar to the present case is total possession where a person's behavior is totally
controlled by a spirit. Psychiatric interest in possession owes its origin to the writing of
Jean Etienne Esquirol who detailed the phenomenology of spirit possessions as ‘disease’
[19]. Despite similarity between neurological and psychiatric induced disorder and
behavior that is deemed to be triggered by possession [20], there is no report linking
possession to brain abnormality. Indeed, there is very little empirical evidence to show
that some of the most commonly psychological disorders are marked with identifiable
structural or functional changes in the brain [21]. Some critiques have urged that even if
biological abnormality is apparent in psychological disorders, establishing whether such
defects are part of the pathology or a compensatory adaptation to that distress state
appears to be insurmountable quest [22].

From biomedical perspective, the condition of the patient would suggest symptom
of chronic schizophrenia supported by strong family history and periodicity of acute
exacerbations. However, a closer observation, within the background that the patient
sustained traumatic brain injury, the presence of intransigent and persistent cognitive and
behavioral dysfunction, abnormal EEG, and poor response to ECT would point to organic
pathology. In consonant with this view, functional (SPECT) and structural neuro-imaging
data indicated abnormalities in left temporal lobe and left basal ganglia, a region that has
been shown to accentuate spectrum of cognitive, emotional and motor disorder as
shown the by present case [23-25].

To our knowledge, there are few studies that have documented the
neurobiological underpinning of spirit possession. Shedding light on the correlate of spirit
possession would bridge the gap between cultural phenomenon and psychiatry. In coming
to grip with this complex issue, in order to explain variant of mental illness, Kiev [26] has
suggested that the 'hardware' or pathology of mental illness can be traced back to the
abnormality in the brain. On the other hand, phonotypical presentation of the observed ‘abnormal behavior’ constitute as 'software'. On this basis, one could classify myriad of psychological distresses within biomedical model. Although sometime phenomenon is considered to be benign folk concepts of distress, as present case evidently illustrate, the afflicted individual is likely to have compromised quality of life. As the present case illustrated, ‘possessed’ individual tend to marked with severe emotional and cognitive impairment.

Competing interests
The authors declare that they have no competing interests.

Consent
Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Authors’ contributions
AAG, AH and YAO were the physicians responsible for the care of the patient, SH and FA were involved in executing and analyzing neuro-imaging data and SA reviewed the relevant literature and provide neuropsychological underpinning of the case. All the authors contributed to writing of the paper and editing the final manuscript prior to submission.

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**Figure 1:** Brain perfusion SPECT before the treatment showing low perfusion at the left Temporal lobe.
Figure 2: Brain perfusion SPECT after the treatment showing perfusion improvement at the left Temporal lobe.