Contribution of Arabs in the field of Neuroscience

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Abstract: Arabian medical literature has played an important part in the history of the healing art. The Arabs' lasting contributions were in various branches of medical science like anatomy, physiology, pharmacology, medicine, surgery and most importantly, paving the way of the emergence of neurology. The Arab physicians made major contributions to the body of knowledge about neuroscience and developed major philosophical concepts of human understanding. Arabs were the first who contributed in the field of neurology they described extensively nervous system and neurological disorders with management.

Hunayn bin ishaq (d. 873 AD) described the structure of the brain was similar to that of the nerves. He has also remarked that all cerebral sensations are movements in real sense. Abu l-faraj has remarked that in the nerves, there are canals through which the impulse of sensation and movement pass along the body. Seminal contributions were made by the Arabs on mental and nervous disorders. Ibn Imran wrote and excellent treatise on "Melancholia". Ibn al-Haytham wrote on the "Effect of music on man and on animal". In "Firdaws'l Hikmat" Ali bin Rabban Tabri wrote a complete chapter on brain disorders. Hibal Allaha ibn Jami, a Jewish physician of Cairo was the first to practice psychotherapy (Al-Haj-al-Ruhani-Al-Nafsi), his book was entitled Al-irshad li Masalin as -Anfus wal-asjad. Abu Qasim al-Zaharawi (d.1013) has observed in his book kitab l Taseref that spinal paralysis was caused by injury within medulla or spinal cord.

Ibn-e-sina wrote an excellent description of hemiplagia and gave a clear distinction between facial paralysis of central origin and local origin. The methods of diagnosis of nervous disorders were depicted clearly by Ibn-e-sina and searched the condition of brain from the action of the five senses, such as memory, thought, imagination and the motor function of the different organs by means of the muscles. The Arabs were the first to treat paralysis by "cooling" (mubarrid)remedies instead of "heating" (harr)remedies. There is a long list of drugs used in nervous disorders, they classified the drugs effect on central nervous system by their action, like CNS stimulant (moharrak-e-asab), CNS depressant (mazaaef-e-asab), Tranquilizer (nafsyaati advia mazaeefa) and Anaesthetic (mukhadirrat) etc.

This paper attempts an exhaustive review and innovations of Arabic literature to crystallize the Arab's contribution in the field of neuroscience.

Introduction
Human body is a complex phenomenon of nature and its non-material aspect, that is, innate tendencies and related behaviour, is still more complex. A mental and behavioural reaction towards the environment is as important as the physiological aspects of the body and both are prove to affect each other. Today we are living in a developing age of industrial upheavals and the so-called advanced civilized and mechanized society, which leaves behind crops of social and behavioral problems. It is difficult for modern man to get adjusted to the new change in the environmental set up whether at home or at place of work. The obvious results are stress and strains leading to nervous disorders. In earliest time the physicians treated various factors including the neurological complexities. Indeed, neurological relation in the development of abnormal state of mind and body has been an accepted fact and the Arab physicians had quite a clear conception of this and they have ample knowledge to treat nerve disorders. Arabs were the first who contributed in the field of neuroscience; they described extensively the nervous system and its disorders with management. The present paper reviews the contribution of Arabs in the field of neurology.

Seminal Contribution of Arabs in Neurology
The Arab physicians have contributed a monumental work on mental and nerve ailments. Almost all the Arabic writer in their treatises describes the ailments of the head. Headache, Melancholia, Hysteria, Insanity, Mania and Chorea have been discussed along with Paralysis, Facial Paralysis, Apoplexy, Epilepsy, Nightmares, Amnesia, vertigo, Migraine, Somnolence, with all nervous and mental disorders and disease and their remedies. While describing the nature, cause and symptoms of the above mentioned diseases, medical and psychological treatment have been prescribed. Nervous disease like Melancholia, Epilepsy, Paralysis, Chorea etc. has been more elaborately discussed.

Ibn Sina was the chief satellite of Arabic medicine; a prodigy with a wonderfully developed memory:
undoubtedly the Leonardo da vinci of the Arabic period. His chief medical work was “Al-Qanun Fi Al-Tibb”. This undoubtedly is the best heritage of Arabic medicine. His brilliance is shown in classifying and arranging all the medical knowledge of this time and in presenting it in a logical form. Ibn Sina wrote an excellent description of hemiplegia and gave a clear distinction between facial paralysis of central origin and of local origin. As a differential diagnosis Avicenna states that in central type, sensibility is disturbed or the eyelid droops, while the skin becomes deviated to the healthy side, likewise the tongue. In the peripheral type there is on the contrary, no disturbance of the sensibility but the skin of the forehead on the affected side is tense, the wrinkles disappear and there is a decrease of the secretion of saliva. Ibn Sina was the first to describe accurately acute meningitis and differentiate it from other acute infections and from secondary meningitis and meningismus. The following is his description of acute meningitis to which we cannot add much even today:

Acute meningitis is a swelling (inflammation) of the envelops of the brain – the dura and the pia matter but not of the brain substance. The signs which are common to true meningitis are a continuous dry fever and delirium. The extremities are cold, pulse is hard and pain in the back of the neck with rigidity. In true meningitis the signs precede the disease while in secondary meningitis the signs of the disease of the other organs precede meningitis signs.

The methods of diagnosis of nervous diseases were depicted clearly by Ibn Sina. The principles which he follow to obtain knowledge of the conditions of the brain are derived from the action of the five senses, the mental functions such as memory, thought, imagination and the motor functions of the different organs by means of the muscles. They also depend wakefulness, on the condition of the hair, neck, tonsils and teeth. They also depend on he powers and actions of the organs that have relation to the brain, such as the womb, the stomach and bladder. Ibn Sina was a careful observer and a keen diagnostician. He was very fond of experimenting and he had written down several of his experiments, to his Qanun. One of these experiments shows the use of and improvised ice bag. One day Ibn Sina had a bad headache with swelling in the head and he imagined that matter he forming. So he ordered plenty of ice, had it well pounde3d in a piece of cloth and covered his head with it. He thus strengthened the place and got well.
In part –IV Discourse –11
Chap-1: On the number of nerve
In part-II Discourse-1
Chapter-9: on the involuntary and voluntary movement, and on brain, heart, nerve and vein
In Part-II Discourse-3
Chapter2: On the sign of the complexion of the brain
Chapter-9: On intelligence and dullness, and memory and forgetfulness and their physiological causes.

Contribution in the field of psychiatry and Psychology
The first psychiatric hospitals and insane asylums were built in the Islamic world as early as the 8th century. The first psychiatric hospitals were also built by Arab Muslims in Baghdad in 705, in the early 8th century, and Cairo in 800. Other famous psychiatric hospitals were built in Damascus and Aleppo in 1270. Arabs physician works on clinical psychiatry and observed clinical on mentally ill patients. They made significant advances to psychiatry and were the first to provide psychotherapy and moral treatment for mentally ill patients, in addition to other new forms of treatment such as baths, drug medication, music therapy and occupational therapy.

The concepts of mental health and "mental hygiene" were introduced by the arabs physician Ahmed ibn Sahh al-Balkhi In his Masalih al-Abdan wa al-Anfas (Sustenance for Body and Soul), he was the first to successfully discuss diseases related to both the body and the mind, and argued that "if the nafs [psyche] gets sick, the body may also find no joy in life and may eventually develop a physical illness." Al-Balkhi was also a pioneer of psychotherapy, psychophysiology and psychosomatic medicine. He recognized that the body and the soul can be healthy or sick, or "balanced or imbalanced", and that mental illness can have both psychological and/or physiological causes. He wrote that imbalance of the body can result in fever, headaches and other physical illnesses, while imbalance of the soul can result in anger, anxiety, sadness and other mental symptoms. He recognized two types of depression: one caused by known reasons such as loss or failure, which can be treated psychologically; and the other caused by unknown reasons possibly caused by physiological reasons, which can be treated through physical medicine.

Najab ud-din Muhammad (10th century) described a number of mental diseases in detail. He made many careful observations of mentally ill patients and compiled them in a book which "made up the most complete classification of mental diseases theretofore known." The mental illnesses first described by Najab include agitated depression, neurosis, priapism and sexual impotence (Nafkhae Malikholia), psychosis (Kutrib), and mania (da-ul-Kulb). Symptoms resembling schizophrenia were also reported in later Arabic medical literature.

Muhammad ibn Zakariya Razi (Razes) and al-Balkhi were the first known physicians to study psychotherapy. Razi in particular made significant advances in psychiatry in his landmark texts Al-Mansuri and Al-Hawi –fi-tib in the 10th century, which presented definitions, symptoms and treatments for problems related to mental health and mental illness. He also ran the psychiatric ward of a Baghdad hospital. Such institutions could not exist in Europe at the time because of fear of demonic possessions.

In Andalus, Abu al-Qasim (Abulcasis), the father of modern surgery, developed material and technical designs which are still used in neurosurgery. Ibn Zuhr (Avenzoar) gave the first accurate descriptions on neurological disorders, including meningitis, intracranial thrombophlebitis, and mediastinal germ cell tumors, and made contributions to modern neuropharmacology. Averroes suggested the existence of Parkinson's disease and attributed photoreceptor properties to the retina. He wrote about neuropsychiatric disorders and described rabies and belladonna intoxication. Ibn al-Haytham is considered by some to be the founder of experimental psychology and psychophysics. (although these claims are disputed for his pioneering work on the psychology of visual perception in the Book of Optics. In Book III of the Book of Optics, Ibn al-Haytham was the first scientist to argue that vision occurs in the brain, rather than the eyes. He pointed out that personal experience has an effect on what people see and how they see, and that vision and perception are subjective. Along with al-Kindi and Ibn al-Haytham, al-Biruni was also a pioneer of experimental psychology, as he was the first to empirically describe the concept of reaction time. Avicenna was a pioneer of psychophysiology and psychosomatic medicine. He recognized 'physiological psychology' in the treatment of illnesses involving emotions, and developed a system for associating changes in the pulse rate with inner feelings. Avicenna was also a pioneer of neuropsychiatry. He first described numerous neuropsychiatric conditions, including hallucination, insomnia, mania, nightmare, melancholia, dementia, epilepsy, paralysis, stroke, vertigo and tremor.

Anecdote
Ibn Sina was a fine Neurologist as well as a supreme physician. Many anecdotes are related to illustrate his pre-eminence as a psychotherapeutist. Of these one or two are chosen for reproduction here which give a attractive, interesting and
accurate picture of the character of the great man and his royal patrons.

Anecdote-I

A young woman suffered from paralysis of the arms and her physician. Ibn Sina, asked her to stand in the presence of the assembled court. Without warning he removed her veil, causing her to blush deeply and she added to the indignity by suddenly raising her cloths over her head, the young lady instinctively lifted her arms to pull down her garments and was cured.

Anecdote-II

There is yet another case recorded in the medical books. A prince of the Bowaid family fell a victim to melancholia and was possessed by the thought that he was a cow. Wherever he went he mimicked a cow and asked people to slaughter him and prepare dishes of his meat. He abandoned food and drink. Physicians were at their wits end and, as he responded to no treatment, at last Ibn Sina, who was Prime Minister of Alau al-Daula, was requested to treat him. Ibn Sina, in spite of his pre-occupations, political, social and literary, took upon himself the responsibility of curing him of the phobia. He, at the very outset, informed the patient that the butcher is ready to slaughter him. On the receipt of the news he was very happy. The Shaikh then took a sharp knife and entered into the room with the patient. He asked, “Where is the cow? I want to slaughter him.” The patient began to make loud noises like a cow to show its presence. Ibn Sina tied his hands and legs and threw him on the ground. Then he began to grope with his body and declared that the cow was very lean and that it must first be fed well so that it became fat; only then would he slaughter it. The patients ate well in the hope that he would soon be slaughtered. As a result, he was fully restored to health and all obsession on his mind vanished.

Some clinical cases related to nervine disorder with full clinical details are mentioned by Al-Razi in his well known treatise Al-hawi and other physicians were surprised. Ibn Butlan wrote books on: Treatment of disease that used to be treated by warming drugs, by cooling drug, and epilepsy. Al-Kindi wrote, “Kitab Kafiyat al Dimagh”. Ibn-al-imran has written a very important treatise on melancholia. HIBUTullah Ibn Jami, a Jewish physician of Cairo is the first man who wrote book on Psychotherapy (Al-Ilaj-Al-Nafsani) entitled, “Al-Isrhad li Masalih al Anfus w al-Ajsad”.

Several books were written by the Arabs on mental and nervous disease, but unfortunately very few of them come down to us and needs to be listed here; as under:

- Ibn-al-imran has written a very important treatise on melancholia.
- Al-Kindi wrote, “Kitab Kafiyat al Dimagh”.
- Hunayn Ibn Ishaq books on migraine and epilepsy.
- Al-barraz in Darbu’l-Nafi came to me; he was thin and suffered from epilepsy from his childhood. I conjectured that his disease could not be due to the phlegm and prescribed for him emetics frequently. Afterwards I gave him such syrup as might evacuate the black bile strongly. This he recovered in three month.

Drugs used by Arabs in Neurological Disorder

Arabs physician were the first who treat neurological disorder very well. They have full knowledge of tranquilizers, narcotics; CNS stimulant, CNS depressant drugs and their effects on nervous system are classified by their action, like: Moharrak-e-Asab (CNS stimulant), Muzaiief-e-Asab (CNS depressant), Nafsiyate Advia Muzaieefa (Tranquilizer), Mukhadirrat (Anesthetic), Mussakia (Sedative), Munavvim (Hypnotic)

Conclusion
In the back drop of above discussion it may emphatically be argued that Arabs contribution in field of neurology is worth important be taken into cognizance and further researched. There is a long list of seminal works, treatises and compendiums that not only outlines of intricate pattern of nervous system but also crystallize the modalities and complexities inherent in dealing with neurological disorders. The notables among these are Al-Rabban Tabri, Al-Razi, Ibne Sina, Al-Zahrwai and many mores. Arab physicians, for what he prescribed centuries ago for treating neurological disorders is still valid and intact, respective of sea-changes in medical science and technology. It may not be out of context and proportions to argue that we have still not fully explored and exploited the heaps of researchable treasures in the Arabs literature.

References

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