Our actions make each one of us unique. Going a little deeper into what makes an action to occur, it dawns that every single action is preceded by a thought. Deeper still, it seems that thoughts arise due to physical sensations that stimulate the human body. Well, the human mind can also create sensations in the body through what we imagine, which in turn, may generate thoughts. Now what would happen if our mind were haunted by weird thoughts? Surely, our actions would then become weird and unacceptable to the so-called real world.

This is what happens to the victims of a mental disorder, popularly called schizophrenia, who have a seriously disintegrated thought process. Affecting about one percent of the human population, the thought process of the victim manifests itself as spine chilling paranoid or bizarre delusions and fearful auditory hallucinations. Responding to such delusional thoughts, the action outcome is in the form of disorganized speech and absurd behaviour with complete disconnection from the world we live in. Paul Valery has indeed rightly said that, “a man who is ‘of sound mind’ is one who keeps the inner madman under lock and key.”

Derived from the Greek words, skhizein (to split) and phren (mind), the term ‘schizophrenia’ was coined by Eugen Bleuler in 1908. It was first described by Benedict Morel in 1853 as a mental illness affecting teenagers and young adults. The term dementia praecox was used in 1891 by Arnold Pick that means ‘early dementia’. Later in 1893 Emil Kraepelin also described dementia praecox as a disease of the brain, a form of dementia that affected young adults.

Shocking Symptoms
The onset of symptoms, typical of schizophrenia, occurs in young adults, commonly in the age group 16-32 years. Late adolescence and early adulthood are peak years for the onset of schizophrenia, as these are the formative years critical to one’s social and vocational development. Thus, what most parents might mistake as teenage problems could actually be signs of a serious mental disorder, which is why immediate medical help is necessary. Normally, young adults who develop schizophrenia experience non-specific symptoms like social withdrawal and general irritability before the actual symptoms of psychosis begin to show more prominently.

Commonly, schizophrenics experience hallucinations in the form of hearing strange voices. The disordered thought process also gives rise to a host of delusions that have devastating effect on the social lives of schizophrenics. Delusion a fixed wrong belief could be of various types. A bizarre delusion is one that is not only very strange but its occurrence is almost impossible. For example, a schizophrenic person may have a delusion that some parts of his/her body have been removed by strange beings or the world is coming to an end.

A non-bizarre delusion, on the other hand, could be possible but for a normal individual the belief is surely mistaken, like an unfounded belief of being under constant police surveillance. A delusion could also be a reflection of one’s mood like the grim thoughts of rejection by all while being in a state of depression or having strange manic thoughts like being the Prime Minister of the country. A
Some of the common delusions that most schizophrenics experience include the false belief that some external force or an unknown person is controlling their thoughts and feelings. Called the ‘delusion of control’, victims of such a delusion feel helplessly imprisoned and have absolutely no control whatsoever over their bodily movements. Such unfortunate victims are constantly troubled by the false belief that their thoughts are being heard aloud or someone is trying to insert/remove thoughts from their minds. Most schizophrenics also have a very disturbing delusion that other people can know their thoughts.

Another common delusion that schizophrenics, and even most otherwise normal persons, have is the ‘delusion of infidelity’ that makes one strongly believe that one’s spouse or lover is having an affair. On the contrary, some victims may suffer from ‘erotomania’ that makes them believe that another person is in love with him or her.

The victims of this mental disorder may also have a ‘delusion of guilt’, due to which they hold themselves responsible for a crime they have never committed or consider themselves the cause of a natural disaster like earthquake or floods. Similarly, such persons may wrongly believe that an environmental event may have a special message for them. Other delusions that ruin the lives of schizophrenics include the belief of being cheated, harassed or attacked by others. This delusion plunges the victim in a state of constant fear from the unknown ‘other’.

Schizophrenics may also suffer from chronic depression and anxiety disorder, besides some of them being under the grip of substance abuse. Due to their inability to take good care of themselves, many victims suffer from physical health problems and remain unemployed. A disorder in thinking invariably results in social isolation. In some cases however, victims become mute and remain motionless in bizarre postures, which is a clear-cut sign of a condition called ‘catatonia’.

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Diagnosing Schizophrenia
Schizophrenia affects men and women equally. It rarely occurs in children, but awareness of childhood-onset schizophrenia is increasing. The risk is highest for an identical twin of a person with schizophrenia. A young adult having an abnormal behaviour is confirmed to be a case of schizophrenia based on the victim’s self-reported experiences and abnormalities in behaviour reported by family members and friends. Psychiatric assessment basically includes a psychiatric history of the disorder in the family and development of typical symptoms ascertaining the possible factors that might have triggered the disease. No laboratory tests are conducted for substantiating the diagnosis as the observed behaviour itself is quite typical of this mental disorder.

The most widely used standardized criteria for diagnosing schizophrenia is based on the American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders, version DSM-IV-TR, and the World Health Organization’s International Statistical Classification of Diseases and Related Health Problems, the ICD-10. The latter criteria are typically used in European countries, while the DSM criteria are used in the United States and the rest of the world.

The three diagnostic criteria generally accepted for diagnosing schizophrenia are: the presence of at least two characteristic symptoms (delusions, hallucinations, disorganized speech, disorganized behaviour, catatonic behaviour); the presence of social/occupational dysfunction that makes the victim unable to carry out normal work where interaction with family members, friends and colleagues is important, and the presence of above symptoms for at least six months.

The symptoms of schizophrenia are quite typical, although psychotic symptoms are also present in other mental disorders, like bipolar disorder, personality disorder, and drug-induced psychosis, while non-bizarre delusions are present in social anxiety disorder. Similarly, the symptoms of obsessive compulsive disorder are different from the delusions of schizophrenia.
Analysis of brain functioning with Positron Emission Tomography (PET) has shown that a lowered frontal lobe activation of the brain during a working memory task poses the risk of increased activity of a neurotransmitter called ‘dopamine’ in the synaptic junctions where neurons meet. Besides the frontal lobes, functional differences in the brain activity of schizophrenics also occur in the hippocampus and temporal lobes. Similarly, MRI and other brain imaging technologies have today revealed the clear-cut differences in the brain activity of schizophrenics.

The brains of people with schizophrenia also look different than those of healthy people. Thanks to these imaging technologies, differences in the size and structure of certain areas of the brain in schizophrenics are clearly known today. MRI studies have shown that the volume of the whole brain and the hippocampus region are markedly reduced in schizophrenics, while the fluid-filled cavities at the center of the brain, called ventricles, are larger in schizophrenics as compared to healthy individuals.

**Cause Factors**

Besides being genetically inherited, this disorder is also found to be triggered by some traumatic experiences during early adult life. It is now also known that prenatal exposure to infections increases the risk for developing schizophrenia later in life. Besides, childhood experiences of abuse or trauma are also serious risk factors for developing schizophrenia. Unsupportive parenting where children develop strained relationships with parents also contributes to an increased risk of this disorder.

Certainly, there occur discrete biochemical changes in the brain cells/neurons of the victims that result in altered neurochemistry which is the hallmark of disintegrated thought process. The network of neurons that spread all over the human body basically comprises billions of interconnecting neurons that pass on the neural message from one cell to the other in the form of specific neurochemical signals, which are nothing but biochemical molecules called ‘neurotransmitters’. These substances allow brain cells to communicate with each other, and are released in very precise amounts at the junctional points where the dendrites of one neuron intersect with the axon terminals of another neuron. One such neurotransmitter is called ‘dopamine’, which plays a crucial role in brain chemistry. It is the excessive production of dopamine that disturbs the flow of information through the neural wiring, and thus plays havoc in the thought process, typical of schizophrenia.

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Many different genes seem to be involved in the abnormally raised activity of dopamine in the neurons. Certain genes linked to an increased risk of schizophrenia have been found, which produce defective proteins that play a crucial role in altering the neural signalling. Rare deletions or duplications of tiny DNA sequences in
A Rare Accomplishment

It is quite astonishing that a person diagnosed as schizophrenic during college years has the interest to continue his studies, so much so that in later life he is admired for his rare talents in the field of mathematics and is awarded the Nobel Prize for his unique contributions to the field. This man was none other than John Nash, a well-acknowledged US mathematician, a victim of schizophrenia, who won the 1994 Nobel Prize in Economics. His life has even been depicted in a film, A Beautiful Mind.

These genes make them alter their expression, thus causing the production of a defective variant of the normal protein. It is understood today that there is an increased production of dopamine receptor D_2, also known as D2R, which is a protein encoded by the DRD2 gene. This is known to give rise to the positive symptoms of schizophrenia. Therefore, most anti-psychotic drugs cause the D_2 blockage or have dopamine blocking effect. However, newer anti-psychotic drugs also affect the production of another neurotransmitter called serotonin.

Indian scientists have made a mark in unravelling the genetic basis of schizophrenia, thanks to the efforts of Dr Samir K. Brahmachari, Director-General, CSIR and his team comprising scientists at the Institute of Genomics & Integrative Biology (IGIB), New Delhi who in 2003 identified a mutation in a gene named ‘synaptogyrin I’ (SYNGR1 gene), sitting on chromosome 22, which subtly alters the neural signaling pathway and increases individual susceptibility to schizophrenia and bipolar disorder in the Indian populations. The SYNGR1 gene has been found to be associated with presynaptic vesicles in neurons and plays a crucial role in transmitting neural messages. Based on this novel finding, a US patent on ‘Novel Primers for Screening Schizophrenia and a Method Thereof’ was granted in 2004. Similarly, another gene called ‘MLCI’ has also been associated with these mental disorders, which also suggests the likely involvement of a common pathway in the etiology of these disorders.

Glutamate is yet another neurotransmitter. Studies have shown that there is a reduced function of the glutamate receptor in schizophrenics. Abnormally low levels of glutamate receptors are found in postmortem brains of the victims of this disorder. Substantiating this, it has been found that glutamate blocking drugs can mimic symptoms of schizophrenia.

Persons at high-risk of developing this disorder include those having a family history of schizophrenia and undergoing some psychotic experience. Psychological treatments and medication seem to be effective in reducing the chances of such ‘high-risk’ people to develop full-blown schizophrenia.

Traumatic Treatment

First introduced in the 1930s, electroconvulsive therapy (ECT), also called electroshock treatment, has been a common psychiatric treatment in which seizures are electrically induced in anesthetized patients for therapeutic effect. This treatment is, however, rarely used as a first-line treatment for schizophrenia and is only considered after long, unsuccessful treatment with anti-psychotic drugs.

Another shock therapy commonly used in the hospitals during the 1940s and 1950s was ‘insulin coma therapy’. This psychiatric treatment involved the injection of large doses of insulin that induced symptoms of reduced blood sugar (pallor, perspiration, salivation, restlessness) and resulted in coma if the dose of insulin was high. Horrifyingly, patients were subjected to several comas with reducing dose of insulin, before the treatment was stopped. It is no longer practised now.

Psychosurgery or neurosurgery for mental disorders was first introduced in 1930s. It basically involved the operation, under general anaesthesia where a small piece of brain tissue was destroyed or removed by thermo-coagulation, freezing, cutting or using radiation. Another neurosurgical method to treat schizophrenia has been ‘deep brain stimulation’, where specific areas of the brain are stimulated with implanted electrodes. Although patients do show improvement in their symptoms after neurosurgical treatments, these methods are not recommended.

Special class of drugs called as anti-psychotic drugs help in the treatment of schizophrenia, as they work by suppressing dopamine activity inside the neurons. It was in 1950 that the drug chlorpromazine – the first drug developed with anti-psychotic action – was synthesized. This drug indeed brought a revolutionary advance in the treatment of schizophrenia, as hospitalization could be avoided and social rehabilitation of such persons could be done to a great extent. Chlorpromazine works on several receptors on neurons, blocking the activity of neurotransmitters that act by binding to those receptors. The side effects of this drug include sedation, constipation, hypotension and restlessless. Long term or high dose use of the drug can cause involuntary, repetitive body movements or tremors called ‘tardive dyskinesia’, a condition that is reversible. Similarly, another drug group, which blocks dopamine function, is called ‘phenothiazines’, which can reduce psychotic symptoms.

Today, however, there are more effective anti-psychotic drugs available. Clozapine is the first of atypical anti-psychotic drug used in the treatment of schizophrenia first introduced in Europe in 1971. Although a highly effective drug to treat schizophrenia, it unfortunately causes a drastic reduction in the number of white blood cells, a condition called agranulocytosis, which can prove fatal. In 1989, the US FDA approved the use of clozapine for only treatment-resistant schizophrenia, or patients not responding to other anti-psychotic treatments. However, periodic blood testing for patients taking clozapine was made essential to monitor the adverse effects of this drug on the patient.
Psychosis of Schizophrenia

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Risperidone, first released in 1994, is also a common atypical antipsychotic drug used to treat schizophrenia. However, it induces weight gain and sexual dysfunction besides having other side effects common to most antipsychotic drugs. Similarly, another atypical antipsychotic drug, olanzapine is also associated with considerable weight gain and risk of metabolic syndrome.

Studies have shown that a vast majority of schizophrenics use drugs, alcohol or tobacco, which is suggestive of the victim trying to cope with unpleasant states like depression, anxiety, boredom and loneliness. Substance abuse can make treatment for schizophrenia less effective. In fact, research has found increasing evidence of a link between marijuana and schizophrenia symptoms. Similarly, smoking tends to make anti-psychotic drugs less effective.

Above all, vocational and social rehabilitation are very important for making schizophrenics lead a less traumatic life. Public education campaigns also assume great importance for reducing the burden of this disorder on human populations, as information about risk factors and early symptoms of this mental disorder can help in timely treatment and social rehabilitation.

Psychotherapy is personal counselling of the patient, aimed at increasing the sense of their own well being. This involves several relationship-building techniques like friendly communication and dialogue for bringing about behavioural change in the victims. Techniques like cognitive behavioural therapy and cognitive remediation help to treat psychotic symptoms, and improve social rehabilitation of schizophrenics.

Positive Approach

The World Health Organization (WHO) coordinated the International Study of Schizophrenia (ISoS) – a long-term follow-up study of 1633 individuals diagnosed with schizophrenia around the world – and published the findings in 2001. The results shook the prevalent belief that schizophrenia is a chronic mental illness. Of the 75% who were available for follow-up, half had favourable outcome, and 16% had delayed recovery. It clearly came out that early social intervention was essential for improving patient condition. WHO studies have also shown that individuals diagnosed with schizophrenia have much better long-term treatment outcome in developing countries including India, Colombia and Nigeria than in developed countries that include USA, UK, Japan, and Russia. Scientists have learned a lot about schizophrenia, but more research is needed to provide answers to many still unexplained facts. For this, more funding is needed to promote mental health research.

Today, most psychiatrists agree that about one-third of schizophrenia cases are curable. A positive approach for integrating schizophrenics back into the web of society is the ‘family therapy’ where all the family members of an individual diagnosed with schizophrenia are appropriately informed about this mental illness and how a congenial family atmosphere can contribute towards better improvement in patient condition. Such advocacy efforts for educating families to improve patient care at home, through compassionate understanding of this mental disorder, can avoid unnecessary hospital visits and even reduce the drug dose of such patients.

It ultimately rests with the ‘sane’ individuals of the family and society as a whole to remove the stigma associated with schizophrenia and accept their less fortunate brothers and sisters suffering from this disorder as an integral part of family/society, and provide them a supportive and tolerant environment that naturally draws such people back into the social network.

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