

A Review on Biological Factors and Related Treatments for Prevalent Mental Health Disorders in India

Nysa Adurkar*

Hill Spring International, Mumbai, India

Abstract: This paper explores 4 major types of mental health disorders which are Depression, Phobias, Anxiety Disorder and Attention Deficit Hyperactivity Disorder. With growing research in the field of mental health, this paper elucidates the various factors influencing these mental health disorders and the amiable treatments, both in India and globally.

Keywords: anxiety, ADHD, depression, mental health, mental health disorders, phobias.

1. Introduction

Mental health can be defined as 'a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community'. The instances of mental health disorders have greatly augmented modern society, especially in urban cities. Countries like India have shown alarming statistics regarding the onset of these mental disorders during adolescence and adulthood, with about 15% of Indian adults requiring professional help. Among the multitude of disorders, surveys have shown that depression and anxiety disorder have the highest prevalence rate in Indian citizens. Many have attributed this to lack of mental health care, poor implementation by the government and highly priced treatment facilities. While the exact causes of these disorders have not been identified, one can see a trend in lifestyle factors like genetics, environment, presence of childhood trauma, standards of living etc. The absence or presence of certain neurotransmitters has also shown to have a major influence on the prevalence of these disorders, seen through the effective use of medication that alters a patient's neurochemistry.

This review will talk about 4 main types of mental disorders: Depression, Phobias, Anxiety Disorder and Attention Deficit Hyperactivity Disorder, their causes and treatments, taken from research conducted both internationally and nationally. Growing awareness of mental health has led to abundant sources on all 4 disorders. However, this review will only consider works published in English, from 2010 to 2021.

2. Mental Health Disorders

A. Depression

The most common disorder, depression, is estimated, by the World Health Organization, to affect about 56 million Indians and 264 million people worldwide. There are two main types of depression which are recurrent depressive disorder and bipolar affective disorder according to DSM V. The former results in multiple instances of depression which can include symptoms like depressed demeanor, less energy, lack of appetite, inability to sleep and pay attention. The latter is manifested in the form of 'manic and depressive episodes separated by periods of normal mood'. Deferring from the former, the latter includes irritation, hyperactivity and an increased self-esteem.

1) Causes and Factors

While the cause of depression is not conclusive, there are certain factors that can make one more likely to experience this mental disorder. Firstly, genetics plays a role in the onset of depression. For example, there is a 70% chance that a twin would have depression if the other one did. However, external factors including the environment a person is raised in and the exposure one receives from a young age could also greatly impact one's likelihood of developing depression. Trauma like violence, indifference, poor living conditions etc. can make a person more likely to have this disorder, thus affecting their personality. People who have a lower self-esteem or are more pessimistic are generally more likely to develop depression.

Finally, in terms of neurology, scientists have observed that those with depression usually have a differing biochemical makeup in the brain. Human brains use neurotransmitters to transmit electrical impulses across synapses, which helps the body carry out necessary functions. Only in the presence of these chemicals will electric signals flow and once they have been taken up by the neurons, the channel is closed which prevents the flow of signals. Some of these neurotransmitters include serotonin, norepinephrine and dopamine; an imbalance of these could result in depression.

Firstly, serotonin is essential in controlling behavioural instincts like sleep, hunger, aggressive behaviour and mood. However, in patients with depression, serotonergic neurons are unable to produce adequate amounts of serotonin. This coupled

*Corresponding author: nysaadurkar@gmail.com

with a quicker reuptake of serotonin prevents one from fully experiencing feelings of happiness or pleasure, resulting in loss of excitement and, in some cases, suicidal thoughts.

Moreover, low levels of dopamine have also been observed in people with depression. This could arise from the fact that dopamine motivates one to ask for rewards, induce feelings of happiness and maintain a positive outlook on various aspects of life. Thus inadequate amounts of this neurotransmitter can lead to a lack of pleasure while interacting with others or completing activities that would otherwise incite these feelings.

Recently, scientists from various parts of the world, namely from San Diego, have also identified that acetylcholine, glutamate, and Gamma-aminobutyric acid (GABA) could also lead to depression. However, it is important to note that research in this field is very sparse due to a difficulty in recording amounts of neurotransmitters in the brain and the emotions one is experiencing. The belief that these numerous neurotransmitters play a crucial role in one's mood is that depression is based on the use of antidepressants to alleviate symptoms; they stimulate neurotransmitters and their activity in relation to uptake and binding to receptors.

2) Treatment

Unfortunately, about 76% to 85% of those suffering from depression in developing nations do not receive adequate or proper treatment. There are multiple methods for treatment including 'behavioural activation, cognitive behavioural therapy (CBT) and interpersonal psychotherapy (IPT), or antidepressant medication'. In India, the most common treatment includes psychotherapy and antidepressant medication over extended periods of time. Psychotherapy involves talking to a psychiatrist to help manage symptoms and is recommended for those with relatively milder manifestations. It allows one to develop methods of dealing with their difficulties which increases their confidence and allows them to reduce their daily stresses. When depression manifests in a more severe way, one is advised to take certain medications that could help improve the chemical activity in the brain.

In terms of medication, drugs including Selective Serotonin Reuptake Inhibitors (SSRIs) and Tricyclic antidepressants (TCAs) are prescribed. SSRI is a drug that prevents the absorption of serotonin in a short period of time. This improves overall mood and sleeping patterns as the neurotransmitter is able to transfer signals correctly. If these fail to have an effect on an individual, Monoamine Oxidase (MAO) Inhibitors are suggested which could have varying impacts based on diet and lifestyle.

B. Phobias

Phobias are defined as an 'exaggerated and irrational fear' that one experiences towards a particular object or situation. While most believe that phobias can be easily conquered, there are several types, each having severe implications to one's social and mental well-being. The roots of phobias, also called triggers, usually manifest at a young age (between 4 and 8 years) or during adolescence in the case of agoraphobia and social phobias.

1) Types of Phobias

According to the American Psychiatric Association, phobias can be differentiated into 3 main types. This includes specific phobias, social phobias and agoraphobia. A specific phobia is one that is caused by a particular trigger. Social phobias, on the other hand, result in a fear of 'social gatherings', being focused on and being embarrassed in front of a large group of people. Finally, agoraphobia is the fear of spaces which are difficult to leave. This could be small confined places or a new environment. People with this type of phobia may also present with panic disorders.

2) Symptoms

There are several symptoms of phobias. This includes anxiety that can be described as 'excessive, unreasonable, persistent' due to exposure to a specific trigger such as an object or even an event. These phobias could cause someone to behave in an irrational manner even if they are not in any particular danger. They often are aware of the irrationality of their fears and to avoid reacting in public, distance themselves from any possible triggers. Exposure to their phobia can induce anxiety, the physiological manifestations of which include 'tremors, palpitations, sweating, shortness of breath, dizziness, nausea'.

3) Causes

In most cases, phobias are linked to traumatic or fearful incidents that occur in one's childhood. Some children are also able to pick up on the phobias demonstrated by their parents and mimic them as they grow. If they are exposed to the traumatic incident directly or indirectly, they may develop a phobia based on the fear of being in that situation or facing a particular object. This manifestation of phobias is called conditioning. Human beings have a tendency to link negative memories with the objects or situations that caused them and thus associate them in that manner as a method of self-preservation. This has probably developed from prehistoric eras as the human brain was able to distinguish between those that could harm such as dangerous animals or terrain; these fears are known as prepared fears.

However, in the case of phobias, the fears that develop and stay ingrained in one's mind are not typically harmful or threatening. The mechanism of remembering these fears causes a similar response of anxiety and stress when one is faced with their phobia. The part of the brain associated with these responses is the amygdala. This region of the brain, present behind the pituitary gland, is in control of adrenaline which leads to the symptoms described before as a way of preparing the body for fight or flight.

In the case of social phobias, a memory associated with public humiliation is retrieved by the brain and hence the person develops a low self-esteem and confidence. Thus a negative association is created and the social situation is usually avoided.

A complex phobia's cause is unclear but is said to be due to a combination of several factors such as experience, the working of neurotransmitters and genetic makeup.

4) Treatment

Systematic desensitisation therapy, where one is conditioned to associate the source of fear with a positive thought, and exposure therapy are usually followed by cognitive behavioural

therapy to achieve maximum control over the trigger and its effects. Cognitive behavioural therapy, a form of psychotherapy, forces the patients to slowly face the thing that they fear and apply several relaxation techniques and 'anxiety reducing strategies' such as taking deep breaths. However, this process is done as and when the patient is comfortable and hence could take a longer period of time.

In contrast to this, flooding or implosive therapy is also used for some patients, when feasible. This method involves sudden confrontation with the stimulus that causes anxiety. After several repetitions, one's anxiety reduces by reducing discomfort with the stimulus in a shorter period of time.

For an effective solution in the short run, patients could be prescribed several anti-anxiety medications. These could be antidepressants such as 'mirtazapine (Remeron), venlafaxine (Effexor), clomipramine (Anafranil) and imipramine (Tofranil)' or benzodiazepine drugs such as 'clonazepam (Klonopin), diazepam (Valium) and lorazepam (Ativan)'. Some fall under the category of selective serotonin reuptake inhibitors or SSRIs. As research has found, the low levels of serotonin in the brain could have an impact on the presence of phobias. Being a neurotransmitter, it controls the mood of a person depending on the level secreted in the brain and an excess or inadequate secretion can cause symptoms like depression or anxiety. Thus these SSRIs reduce the re-uptake of the serotonin that is released in the synapses. By remaining in the synapse for a longer period of time, it can continue to perform the correct function and transmit signals in a manner beneficial for mood. While they are considered to be the most effective, they can have severe side effects in adolescents and adults.

In some cases where SSRIs are ineffective, one could be prescribed beta-blockers such as propranolol. These would be helpful for a short term relief from fears such as that of a performance or public spaces. By reducing the symptoms that accompany anxiety but not hampering any other physical or mental abilities, they could be effective in preventing one's phobia.

C. Anxiety Disorder

Anxiety, a feeling of discomfort including fear or worry, is a normal response in every individual, given the length of time it is felt and its physical manifestations. However, when this anxiety extends over long periods of time and leads to anxiety about multiple common scenarios, it can be classified as an anxiety disorder. In this case, anxiety can cause a behaviour in which one tries to avoid fear evoking situations as though they are able to predict them even though they will not occur.

Being one of the most common psychiatric disorders, about 38 million Indians suffer from it as it is 'the 6th leading cause of disability worldwide with 4% of all YLD (years lived with disability)'. According to a meta-analysis conducted in Ganguli, Karnataka, anxiety disorders were more prevalent in those living in an urbanised setting than a rural one. In children, this disorder is more likely to occur in those from the middle and upper classes. Finally, a trend can be seen in the occurrence of anxiety disorders in relation to gender such that girls are more likely to develop this condition as compared to boys, with

an estimated ratio of 2-3:1.

1) Factors

While the exact cause of this disorder is unknown, there are many factors that could lead to the manifestation of anxiety disorders. A high correlation has been seen between the genes passed on from a parent to their children. One is 5 times more likely to develop GAD if a close family member has already developed it or has had multiple experiences with trauma which are similar to events that trigger anxiety attacks. Moreover, if one is exposed to situations that are associated with a negative experience, they are likely to become a source of anxiety. Research has also shown the prevalence of lifelong diseases to cause anxiety disorders.

For children, parental pressure, academic performance, body image, lack of friends, less attention from parents or being compared to siblings can trigger anxiety. This in turn, can make one more susceptible to disorders like depression or substance abuse. It has been found that a teen with anxiety disorders is 8 times more likely to develop depression which can in some cases lead to suicide.

As a biological factor, those with anxiety disorders have an 'imbalance of brain chemicals serotonin and noradrenaline' which are essential in impacting one's mood and emotions. This is caused by over activity in the sections of the brain responsible for these functions and hence can lead to severe anxiety and other physiological symptoms. Higher instances of corticotropin-releasing hormone have also been observed in those suffering from anxiety disorders. This hormone induces stress and activates the hypothalamic-pituitary-adrenocortical (HPA) axis, a key component in the regulation of stress.

2) Symptoms

An individual with GAD would most often try to circumvent situations which would trigger his anxiety or lead to severe symptoms like heart palpitations or sweating. Hence, those with this disorder tend to have problems with social, personal and work life. While anxiety is normal, in anxiety disorders, doctors will observe that this anxiety will be disproportionate with the situation one is in and will prevent one from exiting as a capable part of society. This is because they will be unable to relax and remember the last time they were not anxious about any aspect of their lives. In their work life, they are also seen to be unable to concentrate and hence cannot perform important jobs easily.

Diseases like panic disorder about one's death or depression usually follow those with anxiety disorder. It could also lead to problems with digestion, frequent headaches, inability to sleep and a general weakness. Anxiety disorders also bring about a habit of substance abuse of alcohol or drugs. If these symptoms are left unchecked, it could lead to one committing suicide.

3) Treatment

In the rural parts of India, more importance is given to faith healers due to a lack of awareness about psychiatrists. Several rituals in Hinduism and teachings of religious books like the 'Bhagavad Gita' are specifically designed to 'rid' one of these mental disorders. Moreover, Indians are more likely to visit general physicians than psychiatrists to treat the physiological symptoms they are experiencing. This is due to the stigma associated with mental disorders. However, slowly people are

understanding the importance of mental health, leading to consultation of physiotherapists for anxiety disorders. A distinct difference between the Indian and Western therapy is the use of emotion and 'face-to-face seating arrangements, suggestions, sympathy, and environmental manipulation, and provide more reassurances'. Doctors believe that counselling patients for a short time and focusing only on the major problem is more effective in India.

In addition, cognitive behavioral therapy has shown promising results in reducing anxiety and maintaining a suitable mood for up to 36 weeks of sessions. It serves as a method of talking and explaining the source of anxiety. This in turn helps the individual understand and manage their anxiety. This is particularly helpful in children with anxiety disorders from a young age.

Along with this non pharmacological method, some patients require pharmacological means to cope with their anxiety in the case of severe or chronic GAD or showing no response of CBT. It is important to note that medications only alleviate the condition but cannot fully cure it. Mostly, antidepressants are prescribed that can be taken for a short period of time. India is one of the only countries where alprazolam is readily available. This is relatively dangerous as this drug's effects wear off faster than the drug leaves the bloodstream. Hence, taking it, even 3-4 times, to reduce anxiety could lead to a fatal overdose. SSRIs and beta blockers, as mentioned previously, can also be used to improve the effect of serotonin in patients with this disorder and lessen physical symptoms respectively.

D. Attention Deficit Hyperactivity Disorder

Attention Deficit Hyperactivity Disorder or ADHD is an extremely widespread disorder in the world and in India that is affected by neurodevelopment. Occurring in one's childhood, it is found that almost 11.32% of children in India suffer from this disorder. Though it is mostly observed at ages 9(26.4% of cases) and 10(25% of cases), about 50% of cases continue into one's adulthood. Another trend observed in the distribution of patients is a higher percentage(66.7%) in males in contrast to females at 33.3%. A study conducted found this ratio to be 1.6:1, showing a greater chance of boys developing this disorder. About 16.33% were found in the lower income class while only 6.84% were present in the middle class. In private schools, 1.25% of children were diagnosed with ADHD similar to the 1.37% of students in government schools.

1) Types of ADHD

ADHD is largely divided into 3 main types: Predominantly Inattentive Presentation, Predominantly Hyperactive-Impulsive Presentation and Combined Presentation. According to research conducted in schools in India, 34.1% of children suffering from ADHD were predominantly hyperactive, 9.8% were predominantly inattentive and 56.1% were combined. The symptoms presented in these three types of ADHD vary. In Predominantly Inattentive Presentation, one would not be able to 'organize or finish a task, to pay attention to details, or to follow instructions or conversations'. Disregarding schedules and not paying attention would also be observed in this disorder.

While, in the Predominantly Hyperactive-Impulsive Presentation, symptoms are related to movement. Individuals tend to fidget and not sit in one position for extended periods of time. In children, one would notice their tendency to frequently run and jump over objects due to lack of self control, which could lead to more accidents. In a social setting, one would not be able to wait for others to finish speaking and would tend to talk more or when not required.

The combined presentation leads to both types of symptoms in an individual. However, these symptoms can change as a child develops and hence cause a different presentation of ADHD. Moreover, they could present in a different and sometimes more extreme way as a person ages based on activities performed in their daily lives.

2) Factors

While there is no specific cause for ADHD, scientists have found certain factors that correlate with it. Research has shown that '8.33% of the children with ADHD had a family history of ADHD or other psychiatric condition'. This shows the presence of a genetic factor affecting ADHD. In some, scientists have found many rare anomalies in chromosome replication called copy number variants. Another factor identified is low birth weight. Incorrect proportions of fatty acid can negatively affect brain development. Hence, those with ADHD have a 5% smaller brain than others from the same age group. This size will impact the parts of the brain that control attention span, impulsiveness and responses to the environment. In the brain, neurotransmitters such as norepinephrine and dopamine are released in inadequate or excess quantities leading to this type of behaviour.

The conditions of pregnancy have also been seen to impact ADHD. This could be alcohol or tobacco which when taken before the baby is delivered can cause 'structural anomalies' in different parts of the brain such as the cerebellum. This increases the chances of a child developing ADHD by 2.7 times. By impacting the nicotinic receptors, the child has an imbalance of dopaminergic activity, believed to cause this disorder. Finally, premature delivery and brain injury can also increase the likelihood of this condition.

3) Treatment

In about 19.44% of all cases, it was observed that the children who had never taken external help were 'so disturbed' that a psychiatrist's intervention was mandatory. In India, popular means to reduce the symptoms are psychosocial intervention, body focused, cognitive training and neuro cognitive training. Psychosocial intervention, similar to behaviour therapy, works to reinforce positive behaviours and discourage negative ones. It also helps in teaching the child the correct social and peer skills needed for communication, classroom skills and parent training. This, along with some medication is particularly recommended for children above the age of 6, more focus is given to parent training below the age of 12 and in teenagers.

Next, body-focused involves understanding the body and a more traditional method of changing behaviours like yoga, exercise, sleep, music therapy and thinking mindfully about one's actions. As used in most disorders for effective relief from symptoms, cognitive behavioral therapy would entail

discussing with a therapist and coming to a common understanding about one's problems. In particular, for ADHD, play therapy, where a therapist takes notes while a child plays to pinpoint any problems to work on, is also used.

Finally, neurocognitive training is a method still in its testing phases. Using a computer and EEG biofeedback, it works as an innovative way to help those with ADHD. 'Singapore-based Neeuro Pte Ltd alongside researchers from the Institute of Mental Health (IMH), the medical school Duke-NUS, and Singapore's Agency for Science, Technology and Research (A*STAR)' have started the game CogoLand and are currently testing its usability.

Most parents from the lower sections of society prefer the previously mentioned methods and have shown a dislike for children taking medication. About 83.3% of children stop taking their medicines in the first month of receiving care due to 'side-effects, lack of effectiveness, problems at the hospital, and fear that the child is becoming addicted'. However, these medicines coupled with therapy has proved to be a viable solution for the management of ADHD. Most commonly, stimulants are used due to the quick changes seen in about 70-80% of children once taking this drug. These stimulants help to increase the secretion of dopamine, a neurotransmitter which helps in paying attention and thinking in a controlled manner. Hence a child is able to concentrate better on the task at hand. Stimulants would include 'Amphetamine or Adderall, Amphetamine or Adzenys, Dextroamphetamine or Dexedrine'.

As of 2003, non-stimulants were also approved as an effective method of controlling symptoms of ADHD. Despite taking more time to show any changes, they help a child concentrate, pay attention and control impulsive actions. These improvements in behaviour can last for about 24 hours after taking the drug. Another advantage of non-stimulants is unlike their counterparts, they do not cause as many side effects, making them safer and more comfortable for the child. Examples of these would be atomoxetine which was the first drug of this sort to be accepted by the FDA and can be taken by any age group, Clonidine hydrochloride which is usually used along with a stimulant, and Guanfacine which is taken by children from ages 6 to 17.

A less well known and recommended approach adopted by some is the use of antidepressants. Even though this method for treating ADHD has not been approved by the FDA, adults might take antidepressants to manage symptoms. Having similar properties to stimulants, earlier manufactured antidepressants, or tricyclics, restore the balance of neurotransmitters like norepinephrine and dopamine, making ADHD more controllable.

If complications such as a lack of response of stimulants and non-stimulants, undesirable side effects or other medical problems arise, the doctors might recommend other drugs such as Amitriptyline, Bupropion, Escitalopram, Venlafaxin. However, these changes are made after regularly following up with the patients and carefully observing all changes.

3. Conclusion

Depression, Anxiety Disorder, ADHD and phobias have

been relatively prevalent in Indian society for a long period of time, affecting people of all age groups and socio-economic classes. However, only recently the use of professional therapy and other non-pharmacological methods have been introduced due to their connection to certain biological factors. These practises, along with certain medicines, have been seen to help those diagnosed with these conditions, making them more manageable, as they progress into their adult years.

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