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WHAT HAPPENS IN THE BRAIN OF A PERSON WITH DISORDER

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Abstract: We can all be "sad" or "depressed" at times in our lives. We've all seen movies about the crazy and the crazy things they do, like crime sprees, with the underlying cause of mental illness. Sometimes we even make jokes about people being crazy, even though we know we must not. We've all had some exposure to mental illness, but do we really understand or know what it is? Many of our concepts are unfounded, generating prejudices. A mental illness can be defined as a health condition that changes a person's (or all three) thinking, feelings or behavior and causes the person distress and difficulty functioning. As with many illnesses, mental illness is severe in some cases and mild in others. Individuals with mental illness do not necessarily appear to be ill, especially if it is a mild psychopathology. Other individuals may experience more overt symptoms such as confusion, agitation, or withdrawal, making their lives dysfunctional. There are many different mental illnesses, including depression, schizophrenia, attention deficit hyperactivity disorder (ADHD), autism, and obsessive-compulsive disorder. Each disease alters a specific person's thoughts, feelings and/or behaviors in different ways. This way, we seek in this article to understand what happens in the brain of a person with a mental disorder.

Keywords: Disorders. Neurosciences. Neurological Bases.

INTRODUCTION

Understanding the formation processes of mental disorders is a challenge that has been present since the foundation of the psychiatric field (Freitas-Silva; Ortega, 2016). Different areas of science work to unravel the behaviors and emotions of the human mind, seeking a relationship with intrinsic (biological) or extrinsic (environmental and psychosocial) factors. Terms previously used by the psychiatric sciences, which dealt with disorders of organic, psychoreactive and endogenous origin, have now fallen into disuse, giving way to terminologies with a more precise definition for clinical practice, such as predisposition or biological vulnerability. These issues have been attributed to the biological factor (genetic or acquired), an essential element for the development of mental disorders, triggered or not by stressful social factors (Scippa, 2000).

In addition to this information, Freitas-Silva and Ortega (2016) assess that until the 1980s, approximately, psychological and environmental explanations about the formation of disorders predominated in the psychiatric field, with little or no reference to biological determinants. And that from the rise of the first neuroscientific theories, the paradigm of elaboration of medical-psychiatric knowledge changed. Thus, we can understand that the change in nomenclatures actually indicates a change in direction in the way of thinking about these sciences.

Advances in neuroscience research have been accompanied by a proportional evolution in the understanding of the neurobiology of psychiatric disorders. Evidence from the last 30 years corroborates information that psychiatric disorders are a consequence of changes during the individual's neurodevelopment (Jackowski; Zugman, 2020).

The rise of neuroscientific knowledge in

psychiatric science was not limited to the field of mental health, but was disseminated to explain various human phenomena and behaviors, to substantiate political arguments and serve as support for personal narratives (Freitas-Silva; Ortega, 2016). One of the bottlenecks in the study of psychiatry is that a range of psychopathologies can present similar clinical manifestations, while different individuals with the same pathology can present different symptoms (Mello-Carpes, 2020).

However, knowledge about the etiopathogenesis of psychiatric disorders still has many gaps to be filled by science. And clarification of its etiology would greatly assist in the development of more effective diagnostic, therapeutic and preventive practices (Freitas-Silva; Ortega, 2016).

Thus, the need for studies related to neurobiological findings in the pathophysiology of mental disorders is evident. In view of this reality, the objective of the present study was to carry out broad bibliographic research about the neurological bases of psychiatric disorders with a comprehensive approach to neuroscience, but following the bias of psychiatry as a medical science.

LITERATURE REVIEW

Kandel (1998) pointed out that, due to the powerful influence of psychoanalysis, psychiatry (and also clinical psychology) remained an empirical science for a long time, lacking a scientific basis. The authors called for more research at the time to try to use the neurobiological basis to understand psychopathology. The first big question that arises when choosing this direction of research is, exactly what is the biological basis of psychopathology? One way to answer this question is to try to find biological markers that vary according to the nature and severity of the psychopathology.

In general terms, psychopathology can be defined as the body of knowledge related to human mental illness. It is a type of knowledge that strives to be demystifying, systematic and enlightening. As knowledge for scientific purposes, it does not include values, nor does it accept a priori dogmas or truths. Psychopathology does not morally judge its subjects, it only seeks to observe, identify and understand the various elements of mental illness. Furthermore, it rejects any form of dogma, whether religious, philosophical, psychological or biological; the knowledge that is sought will always be criticized, revised and reformulated (Dalgalarrondo, 2008).

The field of psychopathology encompasses a wide range of specific human phenomena that have historically been referred to as mental illness. They are experiences, behavior patterns and mental states that, in one aspect, have a psychological specificity (the experience of the person affected by a psychopathology has its own real dimension, it is not a hyperbole of reality). In another, it has a complex connection with normal psychology, and mental illness is not totally alien to the world of "normal" mental experience (Dalgalarrondo, 2008). Psychopathology has its roots in much of the medical tradition through the work and work of history's great clinicians, who have provided meticulous, long-term observations of a large number of psychopathologies over the past two centuries.

As a field of knowledge, one of the main characteristics of psychopathology is the diversity of methods and references and it has absorbed many theorists in the last 200 years. This diversity is seen by some as a "weakness" of science, evidence of its immaturity. Psychopathologists have been criticized for their diversity of "interpretations" and theories because of their mixed aspects of epistemology. It has been said that when you

really know something, you have only one theory that completely explains the facts; when the reality under study is unknown, hundreds of conflicting theories are built. Psychopathology is essentially and historically a field of knowledge, there needs to be a permanent debate, as suggested by Bleuler (1995).

Here, the conflict of ideas is not a weakness, but a necessity. Psychopathology cannot advance by denying and eliminating conceptual and theoretical differences; rather, it develops struggling to clarify and deepen these differences in open, unmasked, and honest discussions. Then, for strictly pedagogical reasons, some of the main streams of psychopathology are arbitrarily arranged in opposing pairs. For descriptive psychiatry, what basically matters is a variation in the form, psychological condition, structure of symptoms, and describing the pathological experience as more or less typical symptoms (Dalgalorrando, 2008).

For dynamic psychiatry, what matters is the intrinsic content of the experience, such as the inner movement of emotions, desires and personal fears, not being able to use their personal experiences in fact, as being classified as a symptom. Good mental health practices mean an intelligent combination of a balanced approach to the descriptive approach, objective methods and diagnoses, considering the personal and subjective dynamics of the patient and his illness (Bleuler, 1995).

The medical naturalist's point of view is a valid concept centered on the human body and common biocentered, thus, mental illness is seen as a dysfunction of the brain, a part of the "biological instrument". From an existentialist perspective, the patient is seen mainly as a "strange being" thrown into the natural and biological dimensions and are fundamental. It exists through the particular experience of each subject, in their relationship with other subjects, in an open construction for each destination, in this perspective, mental illness is not so much a biological or psychological dysfunction, but a special way of being, a miserable way. of being in the world, a way of building a destiny, a particularly painful way of living with others.

In the behavioral view, a person is seen as a set of observable and verifiable behaviors that are regulated by specific and general stimuli, by certain laws and determinants of learning. Related to this view, the cognitivist view focuses attention on the conscious cognitive representation of each individual. Conscious representation will be seen as essential to normal and pathological mental functioning. Symptoms arise from dysfunctional behavioral and cognitive representations, learned and reinforced through sociofamilial experiences. In contrast, in the psychoanalytic view, man is seen as a "determined" being, governed by unconscious forces, desires and conflicts. Psychoanalysis attaches great importance to emotions, according to which they dominate the mind, within this context, the rational and self-controlled man, master of himself and his desires, was a great fantasy from the point of view of psychoanalysis. In a psychoanalytic view, psychiatric symptoms and syndromes are considered forms of expressions of conflict, mainly unconscious conflict and desires that do not exist achievable, of fear to which individuals do not have access. Symptoms are in this case considered a "commitment form", some arrangement in unconscious desires, norms and Cultural license and Possibilities the actual fulfillment of this desire. Because of this entangled force, this Unconscious "conflict plot", what is it? Recognized as psychopathological symptoms.

Although it benefits from neurological, psychological, and philosophical traditions, psychopathology must not be confused with the so-called neurology of higher cortical

function and, therefore, is not limited to the natural science of phenomena related to the associated regions of the injured brain, nor to the hypothetical psychology of the brain. abnormal mental functioning (Dalgalarrondo, 2008). Thus, psychopathology is an autonomous science, not just an extension of neurology or psychology. The science of psychopathology, therefore, is seen as a possible, but not the only, approach to the treatment of mental disorders.

The hypothesis that psychiatric disorders are the result of changes in neurodevelopment has been increasingly in focus over the past 30 years, and there is new evidence to support this theory. The discovery of cognitive, brain and motor changes in the initial phase of the disease, even before the onset of symptoms, helps to strengthen this hypothesis. It is shown by cross-sectional studies in mental health that most patients develop early symptoms during childhood and before adolescence (Jackowski and Zugman, 2020). Thus, it is imperative to understand the neurological structures to study the possible impact of neurodevelopmental biases on the pathophysiology of mental disorders.

The frontal lobe is related to executive functions such as decision making, problem solving, reasoning and planning. Also with cognition, autonomous motor control, motivation, attention, intelligence, language processing and expression, among others. Schizophrenia, bipolar disorder, and ADHD (attention deficit/hyperactivity disorder) are related to frontal lobe dysfunctions (Jackowski and Zugman, 2020).

However, the two main subregions of the prefrontal cortex, ventromedial and dorsolateral, showed differential involvement especially due to their connectivity patterns. The dorsolateral prefrontal cortex is associated with "executive" functions, those involved in learning, memory and performing activities, as denoted above, while the ventromedial prefrontal cortex is associated with affect or emotion functions, i.e., activities elicit and controlling emotions. On the other hand, there is evidence that in psychiatric disorders such as depression and schizophrenia, symptoms are present in both cognitive and behavioral domains, suggesting an interaction between these two domains (Mello-Carpes, 2020).

The temporal lobe is involved in hearing, processing, and perceiving sound information as well as memory, recognizing faces and objects, high-level visual processing, understanding language, and regulating emotional responses. It is composed of the amygdala, the primary auditory cortex, the Wernicke's area and the temporal gyrus as substructures. Damage to the temporal lobe can lead to agnosia, memory impairment and language comprehension. Medial temporal lobe atrophy is predominant in Alzheimer's disease, starting in the entorhinal cortex, hippocampus, and amygdala. Temporal lobe dysfunction has been reported in schizophrenia, even in healthy family members of those with the disorder. (Mello-Carpes, 2020).

The parietal lobe is involved in recording and integrating somatosensory information from touch, such as touch, temperature, pressure, and pain, into spatial processing of vision, such as attention, spatial orientation, and numerical representation. Its substructures are the sensory cortex, the superior and inferior parietal lobes, and the precuneus. Damage to the parietal lobes leads to difficulty in discerning sensory information, disorientation and lack of coordination, and loss of ability to locate and recognize objects and body parts (hemianopia). (Mello-Carpes, 2020).

Occipital lobes are the only lobes to which specific functions are assigned. They are color vision, movement, depth and

distance. Damage to the occipital lobe can lead to hallucinations, inability to see colors, blindness, and synesthesia. (Mello-Carpes, 2020).

The insular lobe plays an important role in the sense of taste, participates in the limbic system and, according to recent neuroimaging studies in patients with psychiatric disorders, observed changes in the insula confirming its involvement in emotional processes, it is involved in the coordination of emotions. Changes in the insula can lead to loss of taste. (Mello-Carpes, 2020).

The limbic system is composed of a series of structures that are involved in the processing and regulation of emotions, memory and sexuality. It constitutes an important site of action of psychotropic drugs, as it has synapses of several neuronal circuits involved in psychiatric disorders such as noradrenergic, serotonergic, dopaminergic, etc. Changes in the limbic system are verified in most structural and functional neuroimaging studies in patients with psychiatric disorders. The main structures of the limbic system are the amygdala, hippocampus, cingulate gyrus, and hypothalamus. (Mello-Carpes, 2020).

The amygdala is involved in processing fear and fight-or-flight responses, emotion, learning, and reward. Damage to the amygdala can lead to difficulty recognizing emotions, aggression, irritability, loss of emotional control, short-term memory deficits. Its dysfunction has been observed in a variety of disorders such as depression, bipolar disorder, PTSD (post-traumatic stress disorder), dementia, autism and borderline personality *disorder*. (Mello-Carpes, 2020).

The hippocampus is essentially a curved band of primitive cortex located in the medial portion of the temporal lobe. The term "hippocampus" is often used to describe two interrelated regions: the dentate gyrus and the de facto hippocampus. Each of these areas maintains an organized pattern of connections. The main function of the hippocampus is the storage of recent memory, the formation of long-term memory and spatial orientation. Damage to this structure can lead to memory impairment and disorientation. It is one of the first structures affected in Alzheimer's dementia and the reduction in its size is one of the first markers of cognitive decline. (Mello-Carpes, 2020).

The cingulate gyrus is associated with pain, emotional processing, memory and self-regulation. Injury to the cingulate gyrus can lead to emotional inadequacy, lack of fear, impaired pain perception, and learning difficulties. Bipolar disorder, autism, depression, OCD (obsessive-compulsive disorder), PTSD and schizophrenia are related to dysfunction of this structure. (Mello-Carpes, 2020).

The hypothalamus regulates organisms' physiology and behavior. It controls many autonomic functions such as hunger, thirst, temperature, blood pressure, heart rate and sexual activity. It is also responsible for the integration of information from different structures that respond to different stimuli, for example, the circadian cycle that is regulated by light. Symptoms of hypothalamic damage are associated with aggression, stress, hypothermia, lethargy, self-mutilation, mass gain or loss, and increased or decreased libido. Its dysfunction has been linked to depression, bipolar disorder, schizophrenia and post-traumatic stress disorder. It is a structure of the so-called hypothalamic-pituitary-adrenal (HPA) axis and is currently extensively studied due to the correlation between psychiatric symptoms and endocrine dysfunction. (Mello-Carpes, 2020).

An essential diagnostic problem in psychiatry is that the complex classification systems that exist today are based solely on subjective descriptions of symptoms.

This detailed phenomenology includes descriptions of several clinical subtypes, but no biological features that differentiate one subtype from another. A variety of diseases can have similar clinical symptoms, and the same disease can show different manifestations in different people. Therefore, research methods that describe reliable neurobiological findings based on psychopathological syndromes will be more consistent than non-causal classification systems. A future system of diagnostic criteria, in which etiology and pathophysiology are fundamental in making diagnostic decisions, will bring psychiatry closer to other medical specialties. (Mello-Carpes, 2020).

The relationship between stress and illness is a powerful example of an area of research that is best understood from an integrative perspective: the potential of an integrative approach to contribute to improvement. This approach makes it very clear that there is no doubt that the cause, development and prognosis of the disease depend on the interaction of psychological, social and cultural factors with biochemistry and physiology (Juruena, 2020).

The system is based on current research that reports that the brain and its cognitive processes work abnormally synchronously. So, knowing that all three systems - the nervous system, the endocrine system and the immune system - have receptors on key cells, it is now possible to accept the brain-body complex. Information can be received from any other system (via messenger molecules). The fourth system, The mind (our thoughts and feelings and our beliefs and hopes) is part of the functioning of the brain, integrating the paradigm of psychoneuroimmunoendocrinology. Mind-body interaction is a well-defined function of the brain that is critical to maintaining homeostasis and well-being. Today, it is widely believed that psychological stress can alter an individual's internal homeostasis. During acute stress, adaptive physiological responses occur, including increased secretion of adrenal corticosteroids, especially cortisol. Whenever this balance is disrupted, disease can arise (Juruena, 2020).

The social and physical environment has a huge impact on an individual's physiology and behavior, it affects the process of adaptation or "balance". At the same time, the experience changes the brain, that is, they change the neurobiology. This brain movement is the body's first line of defense against disease, aging, and is good for health and well-being. Genes, early stress, adulthood experience, lifestyle and stressful events all contribute to how the body adapts to the changing environment, which helps determine the body's cost - or "allostatic load". Interactions between behavioral, neurobiological and endocrine systems that can lead to immunosuppression is the most interesting discovery in current medicine, and its significance has important implications for the prevention and treatment of somatic diseases (Juruena, 2020).

These functions and systems are linked to the hypothalamic-pituitary-adrenal (HPA) axis. Adrenal hypertrophy has been found in depressed patients. The observed adrenal hypertrophy in depressed patients may explain why the cortisol response to corticotropin-releasing hormone (CHR) is similar in depressed and control subjects, as the enlarged adrenal glands compensate for the decreased adrenocorticotropic hormone (ACTH) response to HLC, commonly seen in patients with depression. In depressed patients, an increase in pituitary volume is observed, which can be considered a marker of hyperactivation of the HPA axis (Juruena, 2020).

In general, changes in the HPA axis are seen in patients with chronic depression and

serious depressive episodes. Furthermore, these changes appear to be state-dependent and tend to resolve with regression of depression. Findings from different areas of research provide evidence that, during depression, dysfunction of limbic structures, including the hypothalamus and hippocampus, leads to hypersecretion of HLC and vasopressin (AVP), which in turn induces pituitary-adrenal. In addition, the concentration of HLC is increased in unmedicated depressed patients. Among suicide victims, fewer HLC receptors were found in the frontal cortex. Several studies have shown that HLC may play a role in the behavioral signs and symptoms of depression. (Juruena, 2020).

RESULTS AND DISCUSSION

There is no lack of evidence of significant change at the biochemical level by psychological intervention. A study of 40 female adolescent volunteers with an average age of 16 years, who complete diagnostic criteria for mild depression, received a dance and exercise therapy intervention, where a significant increase in the plasma concentration of serotonin and dopamine drops, which are indicators associated with depression, according to Joeng et al (2005). There is also Symptom Checklist 90 (Derrogatis, 1977) measuring levels of interference and psychological changes in the same proportion as biometrics in the field of depression (Koch, Kell, Hinze-Selch, & Aldenhoff, 2002).

Bipolar mood disorder (BD) is a serious, incurable condition that affects approximately 1.5% of men and women worldwide. This disorder is a condition that presents several clinical conditions and several neurobiological models that aim to explain its complexity and its possible forms of manifestation. Since the 1970s, biochemical, genetic and neuroendocrine studies have provided new references for the pathogenesis of THB, it must be taken into account that there are still few representative findings that demonstrate that these findings are relevant to the disease. Research with genetic, neuroanatomical, neurochemical and neuroimaging models in BHT brings important theoretical and conceptual frameworks for a better understanding of how certain biological mechanisms influence the clinical manifestations, course and pharmacological response of the disease. The use of animal models has also brought new insights into the neurobiology of THB (Machado-Vieira et al., 2004).

Intracellular and intercellular neurobiological factors implicated in the pathophysiology of THB include alterations in neurotransmission systems, second messengers, signaling pathways and regulation of gene expression. Despite the number and variety of studies evaluating the biology of the disease, little is known about the true association between the neurobiological findings of BHT and the behavioral and autonomic changes observed in these patients. The main neurobiological findings related to THB are described below, divided according to the type of model used.

The study describes neurochemical alterations of THB, through the evaluation of several hormones, neurotransmitters and their metabolites, second messengers, neurotrophic factors and genetic factors in plasma, cerebrospinal fluid, platelets and brain slices. Except for the thyroid and adrenal axes, there are very limited data related to the neuroendocrinology of BHT, especially with regard to acute mania. Regarding the alterations in the neurotransmission system associated with the disease, studies have described alterations in the regulation of biogenic amines in the brain, as suggested by Young et al (1994).

These studies demonstrate changes in the regulation of noradrenergic, serotonergic, dopaminergic and cholinergic systems. These biogenic amines are widely distributed in the limbic system and are involved in the regulation of sleep-wakefulness, appetite, endocrine function, and behavioral states such as restlessness and fear. It has also been suggested that changes associated with these monoaminergic neurotransmitters may occur in THB due to changes in its receptor sensitivity.

The most consistent and representative neurobiological findings of THB are changes in glial cells. Studies have shown that glia in THB are significantly reduced in number and density (not in size). Another study also described the decrease in oligodendrocyte (glial cell type) density in the same region. This alteration must not be considered as the main neuropathological finding of BHT, but some neuronal alterations (especially in non-pyramidal GABAergic neurons). As a basis for this argument, it was observed that only one study showed decreased glial density in patients with bipolar disorder without the use of mood stabilizers.

All these advances described in the neurobiological studies of THB must be interpreted with caution and cannot be generalized. In some individuals, larger and less heterogeneous samples must be used to replicate and make some findings. Lack of adequately valid animal models of disease, including cycles of mania and depression

The predictive and constructive extrapolation of the findings to humans is one of the factors that limit the generation of new knowledge about the biological basis of THB. The most promising prospects for basic research in bipolar biology seem to be related to studies of genetics, molecular biology and functional neuroimaging in vectors. These research directions provide recent discoveries and may still make important contributions to the pathogenesis of THB.

FINAL CONSIDERATIONS

There are different approaches that seek to understand the functioning of psychiatric disorders. From the medical naturalist point of view, mental illness and psychiatric disorders are seen as a dysfunction of the brain.

While under the behavioral view, individuals are observed as a set of behaviors regulated by specific stimuli, which together with the cognitivist view, observes the conscious cognitive representation that each individual has, being essential to understand pathological mental functioning and normal mental functioning, and symptoms and disorders arise from behavioral and cognitive dysfunctions originated and reinforced by socio-familial experiences.

From the psychoanalyst point of view, there is a great importance for emotions, and man is seen as a being governed by unconscious forces, by his desires and by his conflicts, in this view, psychiatric disorders and syndromes are defined by the forms of expression of these conflicts, fears and desires.

In the etiology of psychiatric disorders there are three fundamental elements, which consist of genetic inheritance, brain functioning and environment. This knowledge generates important consequences for the definitions of disease, its inherited or acquired psychopathological origins and for greater efficiency in the diagnosis, treatment and prevention of mental disorders.

Based on the results obtained by carrying out the literature review in this study, we can infer that although there are numerous studies whose results prove neurochemical alterations in different mental pathologies, the recognition of the biological complexity of the pathologies presented here, and which are present in the scientific literature,

demonstrates a important change in the main theses on the biological determination of mental disorders, bringing to the fore that biology must not assume a deterministic role or a linear interpretation within the study of mental disorders.

Bipolar mood disorder, specifically, is a serious and incurable condition. There are numerous neurobiological findings for this psychiatric disorder, however, the relationship of clinical and behavioral manifestations with these findings has not yet been well elucidated by the scientific community. Finally, within this context, further studies involving areas such as genetics, molecular biology and functional neuroimaging in vectors are promising lines of research for a better understanding of the manifestations of THB.

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