



Neuro-Biochemical Dysregulation – The Silent Suicidal Agent

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Abstract

Suicide has become a social and global menace. It has turned out among the leading causes of mortality worldwide. Though numerous issues have been implicated with its occasion and prevention, neuro-biochemical concern has been less pronounced. This article is the neuro-biochemical cross-talk with suicide.

Keywords: Central Nervous System; Neuroendocrine; Neuro-Inflammation; Neurotransmitter; Neuro-Genetics

Introduction

Suicide, a global burning issue, encompass multiple facets of causative and affective factors [1]. Personal, social, mental, economical and career-based issues of different sorts have been linked with suicidal trends and practices [2]. Little concern has been focused on the neuro-biochemical hallmarks of suicide, attempts to suicide and associated preventive measures. Thus, the present article has been aimed at delving out the neuro-biochemical implications of suicide followed by preventive recommendations.

Involvement of central nervous system in suicidal attempt

Thirty-seven years long studies on the Danish suicide victims reveal that the people suffering from neurological disorders are at 75% increased risk of committing suicide than their healthy counterparts [3]. Neurological disorders like Alzheimer's disease (AD), dementia, Parkinson's disease (PD), stroke, epilepsy, head injury pose grave threat towards development of suicidal tendency [3]. Besides, anxiety and depression are two alarming risk factors of suicide [3].

Serotonin and serotonergic brain circuit

Serotonergic brain circuits have directly been implicated in depression and suicide [4].

Decreased level of serotonin (5-hydroxy tryptamine, 5-HT) in the brain is among the most notorious causes of anxiety and depression [5]. Level of serotonin metabolite 5-hydroxy indole acetic acid (5-HIAA) in the cerebrospinal fluid (CSF) also affects serotonergic activity [6]. Diminished serotonergic activity leads towards increased aggressive and impulsive behaviour as well as murderous and suicidal tendencies [7].

Norepinephrine

Role of norepinephrine (NE) has been found to be opposite of that of the serotonin i.e. increased NE levels tends towards aggressive and suicidal attempts and vice versa [8].

Dopamine

Level of dopamine have been positively correlated with aggression and suicidal attempt [9].

Hypothalamic-Pituitary-Adrenal Axis

The neuroendocrine system, hypothalamic-pituitary-adrenal (HPA) axis regulates the body's response to stress [10]. It maintains the interactions among brain serotonergic, noradrenergic, and dopaminergic systems [11]. Stress induces the

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release of the corticotrophin releasing hormone (CRH) that activates the HPA axis through release of adrenocorticotropin (ACTH) from the pituitary [12]. Consequently, corticosteroids are released from the adrenal glands that result in behavioural alterations [12]. Hyperactivity of the HPA axis has been linked with the suicidal behaviour [13].

Neuro-genetics

Increased expression of the 5-HT_{2A} receptor in the pre-frontal cortex of the suicide victims indicate the possible neuro-genetics link [14]. Also, differential expression of the serotonin transporter (5-HTT) gene has been observed in the brain autopsies of the suicide victims [15]. Similar anomalies have been implicated in the genes of monoamine oxidase (MAO) and catechol-o-methyl transferase (COMT) [16].

Neuro-inflammation

Neuro-inflammation is another hallmark of suicidal brain [17]. Abnormal level of neuro-pro-inflammatory factors have been observed in the brains of the suicide victims [18]. Besides, altered activities of the neuroglial cells, especially of the astrocytes, have been observed [19]. Abnormal morphology of the astrocytes such as increased cell body warrant attention [20].

Conclusion

Rate of suicide has been soaring worldwide. Time is up for focusing on neuro-biochemical phenomena with a view to maintaining sound physico-psycho state of the individuals. In this aspect, care should be taken to let the neurobiochemical activities at their balanced and healthy state. Let the health-care professionals, policy makers and care givers of the neurologically ill persons be concerned and take necessary steps for the stated concern.

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