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The Biology of Suicide

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Abstract

Suicide is a major and growing public health issue that leads to health care expenditures, loss of productivity, morbidity and premature death. The thought of attempting suicide itself is an indication that the mental health of the individual is threatened and suicide also affects the wellbeing of the individuals who share a close emotional bond with those who commit suicide. As per WHO, every year around 7 lakhs people commit suicide worldwide and the number of suicide attempts decreases substantially after the age of 26 years. As per the National Crime Records Bureau report (2020), 153052 people died by committing suicide in India. Loss of life due to suicide is a loss to the Nation in terms of economic output, innovations, social changes and reforms. Suicide can be prevented. Understanding the causes and consequences of suicide from multiple perspectives is important. Suicide from the bio-neurological perspective will be helpful in preparing measures to prevent suicide among people by looking at the internal biological alterations and thereby interfering within the internal environment of people to help them not to choose suicide as the ultimate option. Prevention of suicide by ensuring the mental health of people is a joint responsibility of the individuals associated with the persons attempting suicide and as well as of the state. Considering the increase in suicide particularly among youths as well as in people from all the generations in recent years, the present paper entitled "The Biology of Suicide" emphasizes on a comprehensive understanding of suicide by analysing and describing the problem from biological perspectives and understanding the preventive measures of suicide by applying a public health approach to suicide prevention.

Keywords: Suicide; Mental Health Concern; Biological; Multidisciplinary Perspectives; Comprehensive Understanding

Abbreviations: FDA: Food and Drug Administration; TPH: Tryptophan Hydroxylase; SSRIs: Selective Serotonin Reuptake Inhibitors; SNRIs: Serotonin-Norepinephrine Reuptake Inhibitors; MAOIs: Monoamine Oxidase Inhibitors; MHGAP: Mental Health Gap Action Programme.

Introduction

Terminologically suicide is understood as the deliberate actions including self-harm, undertaking of painful measures or conduction of lethal procedures finish one's own life. The new world in one hand has given lots of opportunities to all us but reversely puts lots of pressures on the human beings. Technology no doubt has made the world a global village but it has made the blood descendants more like unknown to each other's. Surprisingly, WHO reported that around 7 lakhs people commit suicide all over the world and attempts of suicide decreases substantially around 30 years. As per the National Crime Records Bureau report (2020), around 153052 people died because of committing suicide in India.

There can be a lot more to be countered as risk factors for the reason suicide is becoming so common around the globe. Attempts are being made at different levels to understand the underpinning factors responsible for suicide and there are various explanations of Suicide from Individual, Psychological, Social, Political, and Regional and Cultural point of views. The basic biological explanations of suicide are underrated and it needs to be taken care of for taking steps in proper ways of managing and preventing suicide. The current paper looks for the biological factors within the individual that lead the elevated numbers of suicide attempts and committing of suicide [1].

Let's now look at the biological abnormalities in structures and functions that are correlated in cases of persons attempted or died due to suicide.

Structural Alteration in Brain

The examinations of brain structures of people who died by committing suicide revealed that the frontal lobe of those people was not like other normal people rather it was altered or different. The prefrontal cortex was in altered structural condition in many of these cases too. Both frontal and prefrontal cortex is involved in the making of important decisions and executive functions. So, it was assumed that the decisions of committing suicide might be due to the altered structural conditions of frontal and prefrontal cortex [2].

Synaptic Plasticity and Neurogenesis in Structural and Functional Adaptation to Environmental Demands

A number of research cases give shocking revelation that neural plasticity and cellular changes brought by stress and depression. In suicidal cases where depression and stress are the primary reason the neurological adoption occurs in response to the stress and depression and the cellular alterations accompanied in structure is also noticed.

Altered Level of Cytokines in Less Depressed Subjects

Cytokines are different from the hormones and neurotransmitters but it acts in the body in response to immediate environmental needs. cytokines act like hormones by being released in to the blood to act on other organs in response to depression and schizophrenia related disorders. So, it is speculated to contribute to suicidal thoughts also [3].

Low Omega-3 Acid Levels are Correlated with Suicide Attempts or Predicted Future Attempts Suggesting Involvement in Suicide Risk

Studies indicates that Omega-3 Fatty acid may act like having a protective effect against suicide and lower level of Omega-3 might contribute to attempts of suicide. Well versed research on this acidic substance and suicide is not clear and it's still being speculated for further research and development.

Lower Serum Concentrations of Omega-3 DHA as a Percentage of Total Fatty Acids

Lower level of serum concentration of Omega-3 DHA to the total fatty acid pose a risk of suicide and again it is under further research to determine its actual effect on suicide attempt or commencing of suicide.

Role of Opioid

The consumption of opioid can be very toxic and people who are addicted to opioids are more prone or at high risk of committing suicide. In American society a number of suicidal cases are attributed to large number of opioids consumption and addiction. So, its presumed to have a relationship between opioids and suicide but there is no such casual explanation as such to prove a casual explanation between opioids and suicide.

Tryptophan Hydroxylase and Serotonin Synthesis in Suicide

Tryptophan hydroxylase (TPH) is an enzyme for the synthesis of serotonin. Tryptophan hydroxylase TPH gene is a susceptibility factor for suicidal behaviour.

Dopamine

Dopamine is considered as the pleasure hormone and the release of dopamine helps one to relax and have pleasure in daily life events. So, the deficiency in dopamine may lead to feelings of depression and may also this depression lead to suicidal thoughts. People who died because of committing suicide are found to have lower level of dopamine in their body. Studies also indicate the impact of serotonin in suicidal attempts and commitment of suicide. Understand the biological factors contribute to the management and prevention of suicidal attempts and thereby reducing the suicide in numbers. These factors also help to develop the measures that can be implemented to reduce suicide by making a change in the biological spheres of human life. Let's now look at the measures to intervene in the biological sphere of human life for a better and corrective plan to bring some positive changes [4].

Clozapine

Clozapine is considered as not a very well-known drug that is applied for the cause of suicide. It is considered as an atypical antipsychotic medication which is given to treat patients with schizophrenia when the other types of

medicines don't bring any improvement in making situations better for schizophrenic patients. Clozapine can act on different neurotransmitters like dopamine, acetylcholine, serotonin, histamine, epinephrine/norepinephrine, gamma aminobutyric acid, and glutamate. This potentiality of influencing multiple neurotransmitters can really have bad side of it as clozapine may induce a large numbers of side effects as well. However, clozapine is one of the reasons as being used as a medication to prevent suicide attempts in people as the U.S. Food and Drug Administration (FDA) indication for "reducing the recurrent suicidal attempts and behaviour related to suicide" particularly in people who are having schizophrenia or people who are noticed of trying out ways of attempting suicide [5].

Lithium

Lithium is the mostly tried out drugs to be helpful in the treatment of bipolar related mood disorders. The research evidence though doesn't ascertain a direct and potential connection between lithium and suicide prevention still it is used as a conventional thing to try on bipolar disorder in which both depressive and maniac symptoms are present in the person concerned. There is found a lot of evidences to support its use as an addition to the traditional antidepressants for treating the cases of unipolar depression. Lithium's role in preventing suicide in patients with affect related disorders is not as well established, but a significant body of evidence for this claim is noticed. It is assumed that rather than decreasing suicidal ideation, lithium mitigates suicide by diminishing impulsivity in many people who attempt suicide.

Antidepressants Drugs

The widely used antidepressants are actually drugs that are administered to elevate mood and it also leads to the feeling of pleasure in patients. It is very much helpful in relieving the symptoms of depression and anxiety. Though there are a variety of anti-depressants but repeatedly used antidepressants includes selective serotonin reuptake inhibitors (SSRIs), such as fluoxetine (Prozac), and serotonin-norepinephrine reuptake inhibitors (SNRIs), such as duloxetine (Cymbalta).

Monoamine Oxidase Inhibitors (MAOIs)

This drug has a lot of side effects for which it is less administered for the treatment of depression. Doctors avoids prescribing these drugs as a first-line treatment option for depression. These medicines are given in cases where patients have treatment-resistant depression and the other ways of treating depression fails. Few of the MAOIs are phenelzine (Nardil), tranylcypromine (Parnate), isocarboxazid (Marplan), and selegiline (Emsam, Eldepryl). In many cases it's the sole responsibility of the psychiatrists or doctors as on how to prevent the recurrent and persistent suicidal thoughts and helping in prevention of suicide. It's really a tough task as the persons at risk might always be searching for various means to kill him or her. It's very important to take care of the whole picture of the patient's world while making prescriptions and detailed body check-up and routine check-up must be done before prescription of any psychoactive drugs as the psychoactive drugs can bring about irreversible damage to human beings through the side effects and it can never be undone once it is administered. Let's now look at the different fatal side effects of administration of psychoactive drugs to patients at risk of committing suicide [6].

Suicidal Thoughts

Though it is a very rare occurrence still young adults and children can have a higher risk of suicidal thoughts if these people having the experience of using these medicines or these antidepressants drugs first time in their life. The side effects can be very unpleasant for the person concerned and it may induce suicidal thoughts and in such cases the patients should immediately meet the doctors for immediate help [7-12].

Withdrawal Symptoms

Few people who are prescribed to take SSRIs and SNRIs experience some withdrawal symptoms if they abruptly stop taking the medicine. The withdrawal symptoms are very painful and it can also last for a week or two. The common side effects of withdrawal include heightened anxiety, feeling weak and unstable, fearful dreams, electric shock-like sensations in the body, flu-like symptoms, and severe abdominal pain [13-19]. These symptoms of withdrawal must be dealt with care as the person may not fall for the trap of drug addiction. Doctors focus on patients to stop taking antidepressants gradually which are called as tapering. If a person learns to slowly reduce the dosage of medication intake over time until they completely stop taking it that leads one not to fall for the trap of withdrawal symptoms. The time that it takes to taper off antidepressants may depend on the drug and how long a person has been taking it. Only certified doctors can provide the best advice on this process and the best way to implement it [20-26].

Conclusion

Suicide is now considered as a concern for the globe and for mental health of people for which every year on 10th September it's observed as the world suicide prevention day. The theme of the event is to create awareness and hope through actions of suicide prevention. Circumstances related to suicide and risks of committing suicide are given

attention by the WHO Mental Health Gap Action Programme (mhGAP). This programme commenced in the year 2008. This programme was planned to provide technical guidance based on evidence to provide care in various countries for neurological, psychological and disorders related to substance use. In the WHO Mental Health Action Plan 2013-2030, WHO Member are trying hard to lessen the suicidal cases around the global in all the countries by one third by 2030. In addition, the suicide mortality rate can be used as an indicator of the Sustainable Development Goals periodically, to reduce by one third premature mortality from being taking place through suicide and by promoting psychological peace and mental health well-being of individuals through various programmes and actions.

At individual levels also we as human being must look for the signals where we can create hope in people who feel hopeless and helpless. In cases where we ignore a cry for help, such situations can be replaced by a hearing ear. That part of responsibility lies within us and a patience listening sometimes makes the problem half solved. In our family, neighbourhood or in our relatives we can be a powerful force by being non-judgemental accepting people's thoughts and deeds and providing a psychological first-aid by few supportive words and few words of assurance. We are the torch bearers can help understand each other by being open minded and having an empathetic understanding of the situation and person. Spreading positive thoughts and inspiring people to go beyond set back and keep on doing their best in adverse circumstances is the wholesome idea to counter all negativity and self-defeating thoughts. Meditation and yoga are now a days gaining attention in restoration of inner peace and contributing huge to the human being in having a balance and wellbeing of individuals. So, its imperative to let child learn basic life skills to face the real-world hurdles and parental support and care is a must for the growing child if she/he ever encounters any.

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