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Suicidality with Time Distribution and Serum Cholesterol Estimation

Sneha S[1], D.Ganesh Rajahan[2], P SampathKumar[3], Santhi Silambanan[4], L Shalini[5]

[1]Senior Resident/ Research Assistant, [2]Demonstrator, [3]Professor and Head, Department of Forensic Medicine & Toxicology, [4]Professor and Head, [5]Demonstrator, Department of Biochemistry, Sri Ramachandra Medical College & Research Institute, Porur, Chennai

Abstract

The act of taking one's own life intentionally is called Suicide. Widely prevalent, the suicide rates vary from place to place and there is no nation that has an escape from it. Every year all over the world, according to the WHO, one million people attempt to commit suicide. In the entire world, every year about eight lakh people commit suicide. With 17.5 percent of world population, 1,35,000, i.e, 17 percent are those who reside in India. Ministry of health has estimated that every year in the country around 1, 20,000 people kill themselves by committing suicide. Of these 40% of them are less than 35 years of age. Variations in pattern of seasons seem to influence the timing of suicide. Alterations in length of the day and temperature variations also affect when maximum suicides take place. A rise in the suicide behavior can also be due to abnormal biology as suggested in several studies. Some markers like Cholesterol and brain-derived neurotrophic factor (BDNF) are measured in the plasma or blood serum. These low serum biomarkers levels are seen implicated with impaired resilience of the brain among individuals having suicidal tendencies.

Keywords: *Suicide, Age groups, Serum Cholesterol level, South Indian Population.*

Introduction

The act of taking one's own life, intentionally is called Suicide. [1]The meaning of the word is "the killing of oneself", which is itself derived from the Latin suicidium, [2]

Suicide studies have illustrated that though this human action is personal to an individual, it also implicates an interaction with other people in the society. This means that the individual cannot be secluded from his social matrix. Widely prevalent, the suicide rates vary from place to place and there is no nation that has an escape from it.

Corresponding Author:
D.Ganesh Rajahan
Demonstrator, Department of Forensic Medicine & Toxicology, Sri Ramachandra Medical College & Research Institute, Porur, Chennai-600 116.
Email: drganesh2908@gmail.com

Over the past few years, the number of unnatural deaths have been on the increase. The unnatural deaths can be further classified as intentional and unintentional. Accidents are the most common type of unintentional deaths, while intentional deaths are mainly homicides and suicides. Suicide is a form of unnatural death. They are the leading killer of today's world especially among the adolescent and middle age groups. The causes of deaths have changed from infections towards social etiologies in the last few decades.

Every year all over the world, according to the WHO, one million people attempt to commit suicide. Each year, about 12 per 100,000 persons i.e., 0.5% to 1.4% of people die by suicide.[3,4] Every 40 seconds, one person dies as a result of suicide, according to a new WHO report released in 2014.[4] The developing world is plagued with suicide rates amounting to three quarters of the global suicide rates.[5] Amidst the causes of death, Suicide leads as the tenth cause of death.[6] It is observed that more than 20 million disability adjusted life years are lost because of suicide worldwide.[7]

Alteration in the time pattern of suicide has been associated directly to geophysical effects as well as to the social and psychological factors. Variations in pattern of seasons seem to influence the timing of suicide. Alterations in length of the day and temperature variations also affect when maximum suicides take place.[8]

In the entire world, every year about eight lakh people commit suicide. With 17.5 percent of world population, 1, 35,000, i.e., 17 percent are those who reside in India. India's Ministry of health has estimated that every year in the country around 1, 20,000 people kill themselves by committing suicide. Of these 40% of them are less than 35 years of age. In 2014 as many as 1,31,666 people committed suicide. As per the NCRB statistics, fifteen suicides takes place every hour in India.[9]

Kerala and Tamil Nadu were estimated to have had the highest suicide rates per 100,000 people by a survey done in 2012. Compared to the suicide rates in the northern states where the rate is less than 3,these southern states had a suicide rate of more than 15.[9]

A rise in the suicide behavior can also be due to abnormal biology as suggested in several studies. Therefore a combination of biological factor with psychosocial factor might be a method, more reliable to predict the suicide behaviour.

Some markers like Cholesterol and brain-derived neurotrophic factor (BDNF) are measured in the plasma or blood serum. These low serum biomarkers are seen implicated with impaired resilience of the brain among individuals having suicidal tendencies.[10]

In the past, research had examined biological markers that could be potential predictors of suicide behaviour, especially in the connection with mood disorders. It is evident that they have used the brain or CSF as samples to study the neurological biomarkers related to the Serotonin system. However not in all cases can these be easily accessed. Hence it is important to develop biomarkers for predicting suicide behaviour that not only reflect the psychopathology of suicidal behaviour, but it should be one that is easily measurable in a non-invasive manner.

Hence this study is undertaken to identify a potential biomarker, i.e. Serum Cholesterol level which could be used to predict suicide behaviour and can be measured without using invasive procedure.

Materials & Method

The study was carried on in Forensic Medicine & Toxicology and Biochemistry departments of Sri Ramachandra Institute of Higher Education and Research, Porur, Chennai. The control group consisted of healthy volunteers (n=40) willing to give an informed consent for participation in the study who have never attempted suicide with no history of metabolic disorders, psychiatric illness and treatment with drug therapy (SSRI) and cases (n=40) consisted of individuals brought for post-mortem to the Department of Forensic Medicine, who have died due to suicide.

Blood samples were collected from the cases and control group, which was then analysed for Serum Cholesterol levels.

Approval was obtained from the IEC of Sri Ramachandra Institute of Higher Education and Research, Porur, Chennai, and was performed in accordance with its recommendations.

Samples which met the following criteria were included.

Inclusion Criteria

Suicide Completers (cases):

1. Age group 15-65 years
2. Sex- both males and females
3. First time suicide attempt
4. No past history of major psychiatric disorder
5. No past history of psychiatric treatment
6. Consent from the legal heirs of the deceased

Controls:

1. Age group 15-65 years
2. Sex- both males and females
3. No past or present history of major psychiatric disorder
4. No past history of psychiatric treatment
5. Willing to consent for the study

To rule out the presence of the major psychiatric disorders, the MINI International Neuropsychiatric interview, DSM,IV English Version 5.0.0 was administered both for the cases and controls with the help of a Psychiatrist.

In every case the age and time of suicide were collected using a proforma framed for this purpose. Psychological autopsy was used to obtain data regarding the deceased from the relatives, friends of the deceased, investigating officer and the inquest report. The controls were directly interviewed after getting informed consent from them.

Additionally, based on the time of incidence, data obtained was analysed to understand which part of the day, the rates of suicide was higher by dividing 24 hours of the day into periods of 6 hours each as follows:

12.01 AM to 6.00AM - Morning

6.01 AM to 12.00 Noon - Afternoon

12.01 PM to 6.00PM - Evening

6.01PM to 12 midnight - Night

Collection of Blood Sample

Cases: After obtaining informed consent from the relatives/Legal heirs in the presence of a witness, it was proceeded to collect blood from the deceased. Five cc of blood was collected at the mortuary, from a peripheral vein from the dead body brought for autopsy and it was immediately transferred to a sterile serum separator tubes.

Controls: Five cc of blood was collected from the healthy volunteers after taking their consent from either the right or left the cubital veins by a phlebotomist and it was immediately transferred to a sterile serum separator tubes.

All the blood samples collected were centrifuged to extract the serum by being spun at a speed of 3000 rpm for 15minutes. The samples were transferred to ependoff and they were frozen at -80 degree Celsius for subsequent processing.

Estimation of Serum Cholesterol

Serum cholesterol was estimated in both cases and controls using BECKMAN COULTER AU 680 automated machine.

Results and Discussion

A case control study consisting of 40 cases and 40 controls were collected during the period from March 2016 to March 2017.

Table 1: Distribution of cases based on time when suicide was commited

TIME	NO. OF CASES (n = 40)	PERCENTAGE (%)
12.01 AM- 6.00 AM	12	30
6.01 AM – 12.00 noon	7	17.5
12.01 PM – 6.00 PM	11	27.5
6.01 PM – 12.00 midnight	9	22.5
Not known	1	2.5

The time of incidence was maximum in the morning with 12 cases out of the 40(30%) committing suicide between 12.01AM – 6.00AM.

This is followed by 9 cases (22.5%) committing suicide in the evening between 12.01PM to 6.00PM.

In one case the exact time of committing suicide could not be ascertained neither from the circumstantial evidence nor from the post mortem findings.

High rates during the morning could be due to the fact that the most of them would be asleep and hence it would be easier to commit suicide without anyone's attention. This was similar to the study conducted by Aadamali et al[18], where it was observed that late evening of 4-8 pm was the time period more than a third of the group of people committed suicide while late night and early morning hours were the time period, one third committed suicide.

But VikramPalimar[19] contradicted that in his study and observed that 6 am - 6 pm was the time period when the maximum rate of suicides took place. A rise in stress levels as the day progressed with maximum stress levels in the evening was attributed as a probable cause for the increased rate of suicide during the latter half of the day.

Table 2: Serum Cholesterol Levels in Controls and Cases

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
Serum Cholesterol level **mg/dl**	**CONTROL**	40	158.70	37.018	5.853
	CASES	40	132.73	30.840	4.876

The mean Cholesterol levels in the cases were 132.73 mg/dl and control group was 158.70 mg/dl. There was significant difference in their level with p=0.001.

To understand the association between Serum Cholesterol and suicide was the basic aim of the study. This study has shown that there is significant difference in the Serum cholesterol levels (p=0.001) between the case and controls and it is significantly reduced in cases as compared to the controls.

Sullivan et al.[20] who conducted a study in a sample of 90 men and women, to understand that if there was an association between Total Cholesterol levels and suicide behavior found that the risk of suicide increased with lower cholesterol levels.

These findings were confirmed by Kunugi et al[21] who similarly observed a relationship between suicide attempts and low serum cholesterol. Papassotiropoulos et al[22] who reported that the risk of acute suicidality decreased with increasing Total Cholesterol levels irrespective of age, sex and state of nutrition.

Conclusion

Article 21 of the Constitution of India, states: "No person shall be deprived of his life or personal liberty except according to a procedure established by law."

The physical act of breathing is not the meaning of "Life". Right to live with dignity, right to livelihood and right to healthy life, etc., conveys the fundamental purpose of Life. [23]

Individuals with suicidal thought should be identified as early as possible and counseling should be started at grass root level. Curbing the menace of suicide requires an approach that is multidisciplinary in nature with active participation from teachers, doctors, social activists, the legal authorities and judiciary system.

Further studies with larger sample size and involving patients who survive a suicide attempt can be undertaken. Research to study the genetic polymorphisms with respect to the specific type of Cholesterol that is associated with suicide can be undertaken.

Thus in conclusion, from the above observations it is evident that suicide is a multi-factorial behavior that requires multidimensional approach to prevent it.

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Ethical Clearance: Ethical clearance was obtained from the Institutional Ethics Committee.

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