Psychosocial Factors, Pro-inflammatory Markers & Serum Lipids among Patients with Suicidal Ideation & Suicidal Attempts

Abstract

Background: Suicide is a worldwide serious problem. It is a leading cause of death, accounting for 1.3% of all deaths worldwide in 2019 and Approximately 703,000 people die by suicide every year. We aimed to study the personal, cognitive, psychosocial, personality traits, psychopathological, pro-inflammatory markers & serum lipids differences between patients with suicidal ideation and patients with suicidal attempts and to assess predictor factors that make suicidal ideation convert to suicidal attempt.

Subjects and methods: This cross-sectional case control study was carried on participant aged 18 – 50 years, both sexes. Suicidal behavior of the study sample was assessed using Beck Scale for Suicidal Ideation (BSSI) & participants were classified into three equal groups according to their score in BSSI and their history of recent suicidal attempt (suicidal ideation group, suicidal attempt group & control group). Participants' sociodemographic data were evaluated by a questionnaire designed by the researcher and reviewed by experts. Psychiatric assessment was done using the Mini-International Neuropsychiatric Interview (MINI). Socioeconomic status & cognitive functions were assessed by the socioeconomic status scale for health research in Egypt & the Montreal Cognitive Assessment (MoCA) test, respectively. Personality was assessed by short form of EPQ-R (Revised Eysenck Personality Questionnaire). Assessment of impulsivity & stress were done by using the Barratt Impulsiveness Scale (BIS-11) & the Hassles and Uplifts Scale (HUS), respectively. Hamilton Depression Rating Scale (HAM-D), Hamilton Anxiety Rating Scale (HAM-A) & the Positive and Negative Syndrome Scale (PANSS) were applied to determine the symptom severity in those diagnosed with depressive, anxiety & psychotic disorders.

Results: Suicidal ideations & attempts were more common among psychiatric patients especially those suffering from depression. Suicidal behavior was associated with increased severity of depressive & anxiety symptoms. The most common method of suicidal attempts among females was drug overdose, while males used self-poisoning as the most popular method in attempting suicide. Risk of suicidal ideation & attempts increased in the following situations: younger age groups especially below 35 years, female gender, substance abuse, low socioeconomic level, past history & family history of suicidal behavior, neuroticism, psychoticism & introversion personality traits, impulsivity, high daily stress levels, increase in the severity of depressive & anxiety disorders, elevated [ESR, Hs-CRP & IL-6], lowered [total cholesterol (TC), high-density lipoprotein (HDL), low-density lipoprotein (LDL) & triglycerides (TG)]. The following factors protected from suicidal behaviors: marriage, work and having jobs, Family and social support, playing sports, having hobbies & higher socioeconomic levels.

Risk factors for transition of participants from suicidal ideation to suicidal attempt included female gender, being unmarried & unemployed, low socioeconomic level, poor social support, past history of suicidal behavior, neuroticism personality traits, impulsivity, high stress levels, depressive disorders, elevated [Hs-CRP & IL-6], and low [TC, LDL & TG]. Protective factors against transition from suicidal ideation to attempt included playing sports & extraversion personality traits.

Conclusion: The problem of suicide is a frequent and a multifaceted problem among the general population**.**

Keywords: Psychosocial Factors, Pro-inflammatory Markers , Serum Lipids ,Suicidal Ideation , Suicidal Attempts

Introduction:

Suicide is a worldwide serious problem. It is a leading cause of death, accounting for 1.3% of all deaths worldwide in 2019 and Approximately 703,000 people die by suicide every year. Suicide is defined as a death from a self-inflicted act. Suicidal ideation is defined as thinking about, considering or planning for suicide. A suicide attempt is defined as a self-inflicted non-fatal act. Suicidality or suicide risk encompasses any or all of the above terms [1]. The prevalence of suicidal behaviors varied by sociodemographic factors, region, and state. During 2015–2019 in the United States, an estimated 4.3% of the adult population reported having had suicidal thoughts in the past year. An estimated 1.3% of the adult population had made suicide plans, and approximately 0.6% of the adult population had attempted suicide in the past year. [2] Globally, the estimates of lifetime prevalence of suicidal ideation, plan and attempt was 9.2%, 3.1% & 2.7%, respectively. [3]

Research shows a direct relation between suicidal ideation/attempts and psychosocial risk factors such as exposure to suicide by family or friend, substance use, physical and sexual abuse, risk-taking behaviors, issues around weight control and body image, risky sexual behaviors and bullying. [4]

Consistently, poor mental health, particularly depression, is connected with the highest risk for suicide thoughts / attempts. Also connected with suicide ideation/attempts include anxiety disorders, posttraumatic stress disorder (PTSD), drug use disorder, obsessive-compulsive disorder (OCD), bipolar disorder, and schizophrenia. [5]

Although mental disorders are highly associated with suicidal attempts, many studies also discover the importance of predisposing factors to suicidal behaviors as the correlation between personality traits and suicide attempts, as well as suicidal ideation. The results revealed that hopelessness, neuroticism, and extroversion were the risk factors for most suicide attempts. Other research posed aggression and impulsivity as considerable reasons for

suicidality. Some personality traits seemed to increase individual vulnerability to suicide and could be considered as good indicators of suicide risk. [6]

Low serum cholesterol and its fractions have been suggested to be peripheral markers in an individual's vulnerability to suicide. [7] Moreover, a recent study found that triglycerides (TG) are decreased in suicide attempters with mood disorders. [8] High levels of C-reactive protein (CRP) are associated with depression and psychological distress. [9]

Suicide can be depicted as a process. Some people having suicidal ideation could progressively move their thoughts into plans. Some of them would take further action and try to commit suicide. For this reason, suicidal ideation is often considered the first and foremost alarm to alert people's awareness for individual's suicidal potential. [10]

The establishment of suicide-prevention programmes and suicide screening to assist people who are at high risk for committing suicide in the general community should be included into suicide prevention and intervention strategies.[11]

We aimed to investigate the personal, cognitive, psychosocial, personality traits, psychopathological, pro-inflammatory markers, and serum lipids differences between patients with suicidal ideation and patients with suicidal attempts, as well as predictor factors that cause suicidal ideation to transform into a suicide attempt.

Patients and Methods:

This cross-sectional case control study was Participant cases aged 18 – 50 years, both sexes at the Neuropsychiatry Department, Psychiatry, Neurology and Neurosurgery Center of Tanta University, the Department of Emergency Medicine & Traumatology, and the Clinical Pathology Department in Tanta University Hospitals after ethical approval. The study started from January 2020 and lasted till December 2021.

Exclusion criteria were History of any disorder that might alter the results of serum lipids and pro-inflammatory markers such as autoimmune diseases& severe inflammatory illness e.g.,

systemic lupus, rheumatoid arthritis. Pregnancy, Severe intellectual disability, Unstable serious medical illness as myocardial infarction, and renal or hepatic failure.

The study included three groups with equal number of participants:

Group (I) was the suicidal ideation group which included 136 cases who had current active suicidal ideation and sought inpatient and outpatient psychiatric help at the Neuropsychiatry Department & the Psychiatry, Neurology and neurosurgery Center in Tanta University Hospitals. All of them had no history of any suicidal attempt.

Group (II) was the suicidal attempt group which also included 136 cases who had history of recent suicidal attempt in the past two weeks and were referred for psychiatric management. They were referred from outpatient psychiatric services and from the department of Emergency medicine & Traumatology in Tanta University Hospitals.

Group (III): the control group which included 136 participants who didn't show any suicidal behavior. All were between 18 and 50 years, included both males and females.

Then they were subjected to

Psychiatric evaluation:

Assessment of suicidality: by using the Arabic version of Beck Scale for Suicidal Ideation **(BSSI)**. [12, 13] The BSSI contains 21 statement groups each assessing various aspects of suicidal ideation. Each statement group consists of three sentences that describe different intensities of suicidal ideation, representing a three-point scale (0 to 2). Participants are instructed to choose the particular statement of each group that is most applicable to them. The total BSSI score can range from 0 to 38, with higher values indicating a greater risk of suicide. Beck & Steer do not distinguish different degrees of suicidal risk; nor do they report a cutoff criterion as even very low total scores can be associated with elevated risks of suicide. [14] This scale was translated into Arabic by. [13] Test for reliability of the Arabic version of Beck Scale for Suicide Ideation (BSSI) was carried out using Cronbach's alpha on

a sample of 150 participants. Cronbach's alpha was 0.91 for the total score. Validity analysis was done using correlation coefficients between items and the total score of the scale. All correlation coefficients were statistically significant (ranged from 0.450 to 0.730), which asserted the validity of the Arabic version of the scale. [13]

The first five items of the BSSI serve as a screening device for suicidal ideation during the last week (including the day of assessment) and are summed up to the BSSI-screen score. Two filter questions (the statement groups four and five) assess the presence of active or passive suicidal thoughts. If participants endorse one of them (i.e., chose a sentence rated 1 or 2), they are to complete the subsequent 14 statement groups which allow for an assessment of the severity of existing suicidal ideation. If participants choose the response option rated "0" for both item 4 and item 5 they skip items 6 to 19 and precede to the last two statement groups. These last two items address frequency and intensity of former suicide attempts and are again to be answered by all participants. They are not part of the total BSSI score. [14]

2.Sociodemographic data: assessed by a questionnaire designed by the researcher and reviewed by experts. it consisted of fourteen items that included a wide range of psychological, social & family factors that might be risk factors for suicide. These factors were:- age in years (from 18 to 24 years / from 25 to 34 years/ from 35 to 44 years / from 45 to 50 years), sex (male / female), marital status (single / divorced / married / widow), residence (urban / rural / suburban), educational level (university / general / illiterate), employment (employed / unemployed), playing sports (yes / no), having hobbies (yes / no), tobacco smoking (yes / no), substance abuse (yes / no), family history of suicide (positive / negative), relationship with family (good / fair / poor), relationship with friends (good / fair / poor) & past history of suicidal behavior (positive / negative).

3.Psychiatric interview of the participants: by Mini International Neuropsychiatric Interview (MINI) To assess the 17 most common psychiatric disorders. [15] The Mini

International Neuropsychiatric Interview (MINI) is a short, structured diagnostic interview developed initially in 1990 by psychiatrists and clinicians in the United States and Europe for DSM-III-R and ICD-10 psychiatric disorders. With an administration time of approximately 15 minutes, the MINI is the structured psychiatric interview of choice for psychiatric evaluation and outcome tracking in clinical psychopharmacology trials and epidemiological studies. The MINI is the most widely used psychiatric structured diagnostic interview instrument in the world, employed by mental health professionals and health organizations in more than 100 countries. The MINI has been translated and linguistically validated in over 70 languages including Arabic language. It has been updated to map to DSM-5 diagnostic criteria (MINI 7.0.2). Our study used the Arabic version of MINI, which was translated and validated by. [16]

4.Assessment of Socioeconomic status: by the socioeconomic status scale for health research in Egypt. [17] It is considered as an update to the Socio-economic status (SES) scale which was originally developed by Fahmy and El Sherbini in 1983 & was designed specifically to assess the socioeconomic state of the family. The original scale consisted of five items including: education of the father, education & work of the mother, the income of the family, crowding index and sanitation. [18]

The socioeconomic status scale for health research in Egypt was developed in Arabic to assess family socio-economic status. The scale was further extended and updated by El-Gilany and El-Wehady to include seven domains in the updated versions: education and cultural domain, occupation domain, family domain, economic domain, family possessions domain, home sanitation domain & health care domain. The scale had a total score of 84 & depending on the quartile of the total score, the scoring of the scale is classified to high, middle, low and very low socio-economic status. This updated scale was demonstrated to be reliable and valid clinically. [17]

5.Cognitive assessment: by **Montreal Cognitive Assessment (MoCA) test**. [19] The Montreal Cognitive Assessment takes approximately 10 minutes to administer and was designed to detect mild cognitive impairment in elders scoring in the normal range on the MMSE (mini-mental state examination). Thirty items assessing multiple cognitive domains are contained in the MoCA: short-term memory (5 points); visuospatial abilities via clock drawing (3 points), a cube copy task (1 point); executive functioning via an adaptation of Trail Making Test Part B (1 point), phonemic fluency (1 point), and verbal abstraction (2 points); attention, concentration, and working memory via target detection (1 point), serial subtraction (3 points), digits forward (1 point), and digits backward (1 point); language via confrontation naming with low-familiarity animals (3 points), and repetition of complex sentences (2 points); and orientation to time and place (6 points).

The MoCA is scored by obtaining an item total and the authors recommend a clinical cutoff score of 26 (a patient with a score of 26 and above was considered to have normal cognitive functions, while a patient with a score less than 26 was considered to have impaired cognitive functions). The measure is available in 27 languages including Arabic language. The MoCA Arabic version was demonstrated to be reliable as regard to internal consistency, and reproducibility & it was demonstrated to be valid clinically. [20].

6.Personality traits assessment: by **the short form of EPQR-S (Revised Eysenck Personality Questionnaire).** Eysenck Personality Questionnaire was originated from the Eysenck's theory of personality of extraversion, neuroticism and psychoticism. Extraversion is characterized by being outgoing, talkative, sociable, dominant, impulsive, sensation-seeking, risk-taking, expressive, active, high on positive affect (feeling good), and in need of external stimulation. Neuroticism or emotionality is characterized by high levels of negative affect such as depression and anxiety, guilt feelings, low self-esteem, being moody, tense, hypochondriac and obsessive. Psychoticism is associated not only with the liability to have a

psychotic episode (or break with reality), but also with aggression. Psychotic behavior is rooted in the characteristics of aggression, assertiveness, egocentrism & manipulativeness. It is also associated with being achievement-oriented, masculine and being tough-minded. [21] EPQR-Short is a self-reported questionnaire. It has 48 items, 12 for each of the traits of neuroticism (N), extraversion (E), and psychoticism (P), and 12 for the lie (L) scale. Each question has a binary response, 'yes' or 'no'. Each dichotomous item was scored 1 or 0, and each scale had a maximum possible score of 12 and minimum of zero.

The subject is being scored high in psychoticism (P) scale if he answers by yes in the items number (10, 14, 22, 31, 39) & no in the items number (2, 6, 18, 26, 28, 35, 43). High score in extraversion (E) scale is associated with a yes answer in items number (3, 7, 11, 15, 19, 23, 32, 36,44, 48) & no answer in items (27, 41). High score in neuroticism (N) scale is associated with a yes answer in items number (1, 5, 9, 13, 17, 21, 25, 30, 34, 38, 42, 46). The subject scores high in the lie (L) scale (which measures social desirability) if he answers yes in items (4, 16, 45) & no in items (8, 12, 20, 24, 29, 33, 37, 40, 47).

The first 3 scales were predicted upon a biologically based theory of personality, the fourth (lie) scale has not been theoretically specified to the same extent, but it was considered to be conceptually strong to the extent that it would demonstrate the same degree of measurement similarity across cultures. Arabic version was used & it was demonstrated to be reliable as regard to internal consistency, and reproducibility & valid clinically. [22]

7.Assessment of Impulsivity: by the Barratt Impulsiveness Scale (BIS-11). The Barratt Impulsiveness Scale (BIS-11) [23] is a questionnaire designed to assess the personality/behavioral construct of impulsiveness. It is the most widely cited instrument for the assessment of impulsiveness and has been used to advance our understanding of this construct and its relationship to other clinical phenomena for 50 years. The current version of the Barratt Impulsiveness Scale is composed of 30 items describing common impulsive or

non-impulsive (for reverse scored items) behaviors and preferences. All items are answered on a 4-point scale (Rarely/Never, Occasionally, Often, Almost Always/ Always). Items are scored 1, 2, 3, 4. Score 4 indicates the most impulsive response. Responses across all items are summed to a total score of 30 to 120 points, with higher scores indicating more impulsiveness. A cutoff score of 72 and higher was suggested to indicate presence of high impulsivity. [24] BIS-11 is available in Arabic version & it reflects good test-retest reliability and internal consistency and is valid clinically. [25]

8.Assessment of everyday life stress: by The Hassles and Uplifts Scale (HUS). The Hassles and Uplifts Scale (HUS) is a 53-item questionnaire that asks individuals to evaluate positive and negative experiences that occur in everyday life. Each item is scored twice, once for hassle and once for uplift, on a scale from 0 to 3 (0 = none or not applicable, 1 = somewhat, 2 = quite a bit, 3 = a great deal). Each item is a daily event & participants are asked to complete the questionnaire individually at the end of their day. The total daily hassles score, and uplifts score are used as an indicator of stress. Participants were considered to suffer from daily stress if their hassles score was far greater than their uplifts score. [26]

9.Hamilton Depression Rating Scale (Ham-D): to determine the patient's level of depression. Subjects who were assessed by (MINI) and judged to have a depressive disorder were further assessed by Hamilton Depression Rating Scale (Ham-D) to determine their level of depression. Hamilton Depression Rating Scale (Ham-D) which also known as (HDRS) is a clinician-rated scale that takes about 20–30 min to assess the severity of depressive symptoms in adults. The HDRS is the most widely assessment tool used in depression. The original version contains 17 items (HDRS-17) related to depressive symptoms present over the past week.

The HDRS was developed originally for hospital inpatients, emphasizing on depression symptoms (melancholic and physical). Scoring of the HDRS-17 is as follows: a score of 0–7

is considered as being normal (no depression); a score of 8–16 suggests mild depression; a score of 17–23 indicates moderate depression; and scores over 24 indicate severe depression, with the maximum score being 52. (Williams, 1988). The scale has been translated into a number of languages including French, German, Italian, Thai, Turkish & Arabic with excellent validity and reliability. This study used the Arabic version translated. [27]

10.Hamilton Anxiety Rating Scale (HAM-A): to determine the patient's level of anxiety in Subjects who were assessed by (MINI) and judged to have anxiety disorder. It is a Clinician-rated scale that takes about 10–15 minutes to assess the severity of symptoms of anxiety in adults, adolescents and children. The (HAM-A) was one of the first rating scales developed to measure the severity of anxiety symptoms and is still widely used today in both clinical and research settings. The scale consists of 14 items, each defined by a series of symptoms, and measures both psychic anxiety (mental agitation and psychological distress) and somatic anxiety (physical complaints related to anxiety). Each item is scored on a scale of 0 (not present) to 4 (severe), with a total score range of 0–56, where <17 indicates mild severity, 18–24 moderate severity and 25–30 severe severity. The scale has been translated into: Cantonese for China, French, Spanish & Arabic with good validity and reliability. This study used the Arabic version translated. [28]

12.The Positive and Negative Syndrome Scale (PANSS): to measure of symptom severity of schizophrenia in Subjects who were assessed by (MINI) and judged to have a psychotic disorder. The Positive and Negative Syndrome Scale **(PANSS)** is a scale used for measuring symptom severity of patients with schizophrenia. It was published in 1987 by Stanley Kay, Lewis Opler, and Abraham Fiszbein. It is widely used in the study of antipsychotic therapy. The scale is known as the "gold standard" that all assessments of psychotic behavioral disorders should follow. To assess a patient using PANSS, an approximately 45-minute clinical interview is conducted. The patient is rated from 1 to 7 on 30 different symptoms

based on the interview as well as reports of family members or primary care hospital workers. Each of the 30 items is accompanied by a specific definition as well as detailed anchoring criteria for all seven rating points. These seven points represent increasing levels of psychopathology, as follows: (1- absent, 2- minimal, 3- mild, 4- moderate, 5- moderate severe, 6- severe & 7- extreme). **PANSS** yields the following scores: The Positive scale includes 7 Items with minimum score = 7 & maximum score = 49 (Delusions, Conceptual disorganization, Hallucinations, Excitement, Grandiosity, Suspiciousness/persecution & Hostility). The Negative scale includes 7 Items with minimum score = 7 & maximum score = 49 (Blunted affect, Emotional withdrawal, Poor rapport, Passive/apathetic social withdrawal, Difficulty in abstract thinking, Lack of spontaneity and flow of conversation, Stereotyped thinking).

The General Psychopathology scale includes 16 Items with a minimum score of 16 & maximum score of 112 (Somatic concern, Anxiety, Guilt feelings, Tension, Mannerisms and posturing, Depression, Motor retardation, Uncooperativeness, Unusual thought content, Disorientation, Poor attention, Lack of judgment and insight, Disturbance of volition, Poor impulse control, Preoccupation, Active social avoidance). PANSS Total score minimum = 30 & maximum = 210. [29]

A Composite Scale is scored by subtracting the negative score from the positive score. This yields a bipolar index that ranges from –42 to +42, which is essentially a difference score reflecting the degree of predominance of one syndrome in relation to the other. [29]

Laboratory investigations: These included serum lipids profile {high density lipoprotein (HDL) cholesterol, low density lipoprotein (LDL) cholesterol, total cholesterol (TC) & triglycerides (TG)} and Pro-inflammatory markers {high sensitivity C-reactive protein (hs-CRP), Erythrocyte sedimentation rate (ESR) & Interleukin 6 (IL-6)}.

Sampling:

1) 2 ml of peripheral venous blood was collected into an empty sterile tube. Fasting blood specimen was required for serum lipids. Certain medications that might affect ESR test results were asked to be stopped before the test. For example, steroids, nonsteroidal anti-inflammatory drugs (NSAIDs) and statins. The sample was allowed to be clotted and serum was separated for measurement of serum lipids, ESR & hs-CRP levels.
2) 0.5 ml of peripheral venous blood was delivered into a lavender top EDTA (Ethylenediaminetetraacetic acid) collection tube for IL-6 levels assay. Immediately after specimen collection, the tube was placed on wet ice, centrifuged at 1000 x g for 15 minutes and aliquoted into plastic vial. Then specimen was frozen within 30 minutes.

Sample size:

The sample size was calculated according to information gathered about lifetime prevalence of suicidal ideation & suicidal attempts in general population which was 9.2% & 2.7%, respectively and by using Epi Info 7 with a confidence level of 95%. According to sample size calculation, the study included 136 patients with suicidal ideation and 136 patients with suicidal attempts. [21]

Statistical analysis:

The collected data were organized, tabulated, and statistically analyzed using SPSS version 19 (Statistical Package for Social Studies) created by IBM, ARMONK, USA. Number and parentage distribution were calculated for categorical variable and differences between subcategories were tested by chi square. When chi square was not appropriate, Monte Carlo exact test was used. The Kolmogorov–Smirnov normality test was conducted on all numerical values and revealed their non-parametric distribution. Median, 25^{th} and 75^{th} percentiles were calculated for these variables, and difference in numerical values between

the three studied groups were tested by Kruskal-Wallis H test, with pairwise post-hoc comparisons. The risk estimate of suicidal attempt was calculated by odds ratio and 95% confidence interval. The level of significance for all of the inferential statistics was adopted at $p<0.05$.

Results:

Both groups of suicidal ideations and suicidal attempts were younger than control group. Post-hoc pairwise comparisons between each of the three groups reveled that only patients with suicidal attempt were statistically younger than the control group ($p = 0.046$). Suicidal ideation & attempts were statistically more common in younger age groups (18-24 years & 25-34 years) than in older age groups (34- 44 years &45-50 years). Both suicidal ideation (61.8%) & attempt (83.1%) were more common among females than among males. Many participants with suicidal ideation (44.9%) & suicidal attempts (59.6%) were currently unmarried (singles, divorced and widows). There was statistically significant difference ($p=0.006$) between the three groups as regard to marital status. Educational level didn't show statistically significant difference between the three groups. Suicidal behavior (ideation & attempt) was statistically more common among participants who had no job (48.5% of suicidal ideation group & 64% of suicidal attempt group weren't working). There was statistically significant difference ($p= 0.001$) between the three groups regarding playing sports (such as running, cycling & brisk walking) & having hobbies (such as reading, painting, playing & listening to music). Suicidal behavior (ideation & attempt) was more common among participants who didn't play sports (59.6% of suicidal ideation group & 73.5% of suicidal attempt group didn't play sports) Suicidal behavior (ideation & attempt) was more common among participants who didn't have hobbies (57.4% of suicidal ideation group & 63.2% of suicidal attempt group didn't have hobbies). There was statistically significant difference ($p=0.021$) between the three groups regarding substance abuse. Suicidal

behavior (ideation & attempt) was more common among participants who abused substances (18.38% of suicidal ideation group & 16.18% of suicidal attempt group abused substances). Tobacco smoking didn't show statistically significant difference between the three groups. There was statistically significant difference (p=0.047) between the three groups regarding their family history of suicidal behavior. Suicidal ideation and attempts were more common among participants who had family history of suicidal behavior (8.8% of suicidal ideation group & 11.8% of suicidal attempt group had family history of suicidal behavior). There was statistically significant difference (p> 0.05) between the three groups regarding their family & social support. Having poor relationships with family & having no social support were more common among suicidal ideation & attempt groups than among control group (11.8% of suicidal ideation group & 15.4% of suicidal attempt had poor relationships with family; 11.0% of suicidal ideation group & 22.8% of suicidal attempt group had no social support).**Table 1**

Table (1): Comparison of the participants' ages, sex, educational level Occupational status, and playing sports, History of smoking & substance abuse and Family history among the studied groups

Variable	Suicidal ideation I (n=136)	Suicidal attempt II (n=136)	Control III (n=136)	H	P
Age in years:				6.713	0.035*
Median (25^{th}-75^{th})	31 (22-39)	30 (21-41)	33.5 (26-43)		
Range	18-50	18-50	18-50		
Pairwise post-hoc comparisons: *III vs I: p = 0.135; III vs II: p = 0.046*; I vs II: p =1.000*					

Variables	Suicidal ideation I (n=136)		Suicidal attempt II (n=136)		Control III (n=136)		X^2	P
	N	%	N	%	N	%		

Age groups:								
18-24	45	33.1	50	36.8	26	19.1		
25-34	38	27.9	40	29.4	44	32.4	13.838	0.031*
35-44	29	21.3	26	19.1	43	31.6		
45-50	24	17.6	20	14.7	23	16.9		
Sex:								
Males	52	38.2	23	16.9	80	58.8	50.710	<0.001*
Females	84	61.8	113	83.1	56	41.2		
Marital status:								
Currently not married	61	44.9	81	59.6	56	41.2	10.300	0.006*
Currently married	75	55.1	55	40.4	80	58.8		
Educational level:								
University	60	44.1	67	49.3	50	36.8	4.644	0.326
Secondary School	53	39.0	50	36.8	59	43.4		
Illiterate	23	16.9	19	14.0	27	19.9		
Occupational status:								
Had a job	70	51.5	49	36.0	108	79.4	53.285	<0.001*
No job	66	48.5	87	64.0	28	20.6		
Playing sports:							15.142	0.001*
Yes	55	40.4	36	26.5	67	49.3		
No	81	59.6	100	73.5	69	50.7		
Having hobbies:							14.284	0.001*
Yes	58	42.6	50	36.8	80	58.8		
No	78	57.4	86	63.2	56	41.2		
Tobacco smoking:							4.362	0.113
Yes	35	25.7	42	30.9	27	19.9		
No	101	74.3	94	69.1	109	80.1		

Substance abuse								
Yes	25	18.38	22	16.18	10	7.35	7.71	0.021*
No	111	81.62	114	83.82	126	92.65		
Family history of suicidal behavior:							6.123	0.047*
Positive	12	8.8	16	11.8	5	3.7		
Negative	124	91.2	120	88.2	131	96.3		
Relationship with family:							10.542	0.032*
Good	120	88.2	115	84.6	128	94.1		
Poor	16	11.8	21	15.4	8	5.9		
Social support:							17.637	0.001*
Had a support	121	89.0	105	77.2	124	91.2		
No support	15	11.0	31	22.8	12	8.8		

By MINI psychiatric interview, persons with suicidal ideation without definite psychiatric disorders were significantly higher than the number of persons without psychiatric diagnosis among patients with suicidal attempts ($p<0.05$). Major depressive disorder was significantly more common among suicide attempter than among suicide ideation group. The difference was statistically significant ($p<0.05$). **Table (2):**

Psychiatric assessment:

Table (2): Distribution of studied participants by their psychiatric diagnosis assessed by Mini International Neuropsychiatric Interview (MINI)

Psychiatric diagnosis	Suicidal ideation I (n=136)		Suicidal attempt II (n=136)	
	n	%	n	%
No diagnosis*	33	24.3	6	4.4
Depressive disorder*	80	58.8	110	80.9

Anxiety disorder	13	9.6	13	9.6
Obsessive Compulsive Disorder	2	1.5	1	0.7
Personality disorder	2	1.5	2	1.5
Eating disorder	2	1.5	1	0.7
Psychotic disorder	2	1.5	2	1.5
PTSD	2	1.5	1	0.7

Suicidal ideations and attempts were statistically more common among participants with very low & low socioeconomic level (p=0.001) than among participants with middle & high socioeconomic level. There was statistically significant difference (p=0.001) between the three groups regarding their past history of suicidal behavior. Suicidal ideation & attempt were more common among participants with past history of suicidal behavior (22.1% of suicidal ideation group & 41.9% of suicidal attempt had past history of suicidal behavior). Table **3**

Table (3): Distribution of socioeconomic level among studied participants assessed by the socioeconomic status scale for health research and by past history of suicidal behavior in Egypt

Variables	Suicidal ideation I (n=136)		Suicidal attempt II (n=136)		Control III (n=136)		X^2	p
	N	%	N	%	N	%		
Socioeconomic level:								
Very Low	32	23.5	43	31.6	20	14.7	28.213	<0.001*
Low	58	42.6	63	46.3	48	35.3		
Middle	40	29.4	28	20.6	55	40.4		
High	6	4.4	2	1.5	13	9.6		
Past history of suicidal behavior:								
Positive	30	22.1	57	41.9	9	6.6	47.322	<0.001*
Negative	106	77.9	79	58.1	127	93.4		

The most common method of suicidal attempts was drug overdose (44.12% of attempters used this method). Drug overdose was more common among females (51.27%) than among males (8.70%). Self-poisoning was the second most common method of suicidal attempt

(25.74%). It was a popular method between both females (25.66%) and males (25.74%).

Table 4

Table (3): **Methods of suicidal behaviour**

Methods of suicidal attempts	Females (n= 113)		Males (n= 23)		Total (n=136)	
	n	%	n	%	n	%
Drug overdose	58	51.27%	2	8.70%	60	44.12%
Self-poisoning	29	25.66%	6	26.9%	35	25.74%
Wrist cutting	24	21.24%	5	21.74%	29	21.32%
Self-burning	1	0.88%	2	8.70%	3	2.21%
Drowning	0	0%	2	8.70%	2	1.47%
Jumping from high places	0	0%	3	13.04%	3	2.21%
Serious self-injury	1	0.88%	3	13.04%	4	2.94%

Results of psychometric evaluations:

Cognitive functions didn't show statistically significant difference between the three groups. There was statistically significant difference ($p< 0.05$) between the three groups regarding their personality traits. Suicidal ideation & attempt were more common among participants who had high score in Neuroticism & Psychoticism traits and low scores in Extraversion traits.

There was statistically significant difference ($p< 0.05$) between the three groups regarding impulsivity scores. Post-hoc pairwise comparisons revealed a statistically significant difference between each group and the others ($p < 0.001$) with higher median impulsivity scores were found in the suicidal attempt group, followed by the suicidal ideation group. The control group had the lowest median impulsivity scores. Daily stress was significantly higher in groups of suicidal ideations (51.5% had high score) and suicidal attempts (69.9% had high score) than the control group. The difference was significant ($p=0.001$) **Table (4)**

Table (4): Cognitive functions among the studied groups assessed by Montreal Cognitive Assessment (MoCA) test, Personality traits of studied participants assessed by the short form of Revised Eysenck Personality Questionnaire (EPQR-S) and assessment of impulsivity among the studied populations (by the Barratt Impulsiveness Scale (BIS-11, Daily stress among the studied groups assessed by Hassles and Uplifts Scale (HUS):

Variables	Suicidal ideation I (n=136)		Suicidal attempt II (n=136)		Control III (n=136)		X^2	P
	n	%	n	%	n	%		
Cognitive functions:								
Normal	127	93.4	126	92.6	130	95.6	1.108	0.575
Impaired	9	6.6	10	7.4	6	4.4		
Variables	Suicidal ideation I (n=136)		Suicidal attempt II (n=136)		Control III (n=136)		X^2	P
	n	%	n	%	n	%		
Neuroticism:								
High	55	40.4	80	58.8	27	19.9	43.183	<0.001*
Low	81	59.6	56	41.2	109	80.1		
Extraversion:								
High	85	62.5	50	36.8	110	80.9	55.680	<0.001*
Low	51	37.5	86	63.2	26	19.1		
Psychoticism:								
High	38	27.9	51	37.5	15	11.0	25.732	<0.001*
Low	98	72.1	85	62.5	121	89.0		
Impulsivity score								
Median	58		69		43		120.484	<0.001*
(25^{th}- 75^{th})	(51-73)		(61-98)		(34-61)			
Range	37-120		43-120		30-92			
Pairwise post-hoc comparisons: *III vs I: p <0.001*; III vs II: p <0.001*; I vs II: p <0.001**								
Daily stress:								
High	70	51.5	95	69.9	27	19.9	69.830	0.001*
Average	66	48.5	41	30.1	109	80.1		

There was statistically significant difference (p< 0.05) between the groups regarding severity of depressive symptoms. Increase in the severity of depressive symptoms (namely moderate & severe forms) was by far more observed among suicidal attempt group than among suicidal ideation group. There was statistically significant difference (p< 0.05) between the groups regarding severity of anxiety symptoms. Increase in the severity of anxiety symptoms (namely moderate & severe forms) was more common among suicidal attempt group than among suicidal ideation group. **Table (5)**

Table (5): Distribution of studied participants by depression level assessed by Hamilton Depression Rating Scale (Ham-D) and Distribution of studied participants by anxiety level assessed by Hamilton Anxiety Rating Scale (HAM-A):

Variables	Suicidal ideation I (n=136)		Suicidal attempt II (n=136)		Control III (n=136)		X^2	P
	n	%	n	%	n	%		
Depression level								
No depression	56		41.2		26	19.1	MCET	0.001*
Mild	0		0.0		0	0.0		
Moderate	20		14.7		25	18.4		
Severe	60		44.1		85	62.5		
Anxiety level								
No anxiety	123		90.4		123	90.4	MCET	<0.001*
Mild	0		0.0		0	0.0		
Moderate	5		3.7		0	0.0		
Severe	8		3.7		13	9.6		

pro-inflammatory markers:

There was statistically significant difference (p< 0.05) between the three groups regarding ESR values. Post-hoc pairwise comparisons of ESR values showed a statistically significant difference only between control group and suicidal attempt group. The median ESR values were higher in Suicidal attempt group followed by suicidal ideation group. The control group had the lowest median ESR value. there was a statistically significant difference (p< 0.05)

between the three groups regarding Hs-CRP values and post-hoc pairwise comparisons of Hs-CRP levels showed a statistically significant difference between each group and the other, where the highest significance level was found on comparing control group with suicidal attempt group. The median Hs-CRP values were higher in Suicidal attempt group & suicidal ideation group. The control group had the lowest median Hs-CRP value. There was a statistically significant difference in levels of IL-6 among the studied groups. Post-hoc pairwise comparisons of IL-6 levels showed a statistically significant difference between each group and the other, where the highest significance level was found on comparing control group with suicidal attempt group. The median IL-6 values were higher in Suicidal attempt group followed by suicidal ideation group. The control group had the lowest median IL-6 value. **Table 5**

Table (21): ESR, Hs-CRP and IL-6 values among the studied groups

Variable	Suicidal ideation I (n=136)	Suicidal attempt II (n=136)	Control III (n=136)	H	p
ESR: Median (25^{th}- 75^{th}) Range	 9.5 (8-11) 7-24	 10 (8-12) 7-26	 9 (8-11) 7-21	7.225	0.027*
Pairwise post-hoc comparisons: *III vs I: p =1.000; III vs II: p=0.026*; I vs II: p=0.203*					
Hs-CRP: Median (25^{th}- 75^{th}) Range	 2 (1-2) 0.5-7	 2 (1-5) 0.5-8	 1 (1-2) 0.5-6	31.264	<0.001*
Pairwise post-hoc comparisons: *III vs I: p=0.040*; III vs II: p <0.001*; I vs II: p =0.006**					
IL-6: Median (25^{th}- 75^{th}) Range	 4.15 (2.1-6.4) 0-20.4	 5.4 (2.625-12.775) 0.1-24.1	 2.9 (1.825-4.775) 0-14.6	35.216	<0.001*
Pairwise post-hoc comparisons: *III vs I: p=0.003*; III vs II: p <0.001*; I vs II: p =0.023**					

Serum lipids:

A statistically significant difference in the levels of total cholesterol (TC) was found among the studied groups ($p < 0.05$). Post-hoc pairwise comparisons of total cholesterol levels showed a statistically significant difference between each group and the other. The median (TC) values were lowest in Suicidal attempt group followed by suicidal ideation group. The control group had the highest median (TC) value. A statistically significant difference in the levels of HDL among the studied groups and post-hoc pairwise comparisons of HDL levels showed only a statistically significant difference between control and suicidal attempt groups. The median HDL values were lowest in Suicidal attempt group followed by suicidal ideation group. The control group had the highest median HDL value.

There was a statistically significant difference in the levels of LDL among the studied groups. Post-hoc pairwise comparisons of the LDL levels showed a statistically significant difference only between control group and each of the suicidal ideation and the suicidal attempt groups. The median LDL values were lowest in Suicidal attempt group followed by suicidal ideation group. The control group had the highest median LDL value. There was a statistically significant difference in the levels of triglycerides among the studied groups. Post-hoc pairwise comparisons of triglycerides levels showed a statistically significant difference only between control group and each of the suicidal ideation and the suicidal attempt groups. The median TG values were lowest in Suicidal attempt group followed by suicidal ideation group. The control group had the highest median TG value. **Table 6**

Table (6): Total cholesterol, ,HDL, LDL and TG among the studied groups

Variable	Suicidal ideation I (n=136)	Suicidal attempt II (n=136)	Control III (n=136)	H	p
Total Cholesterol:					
Median	154.5	146	174	31.064	<0.001*
(25^{th}- 75^{th})	(119-192.75)	(106-178)	(149.25-197)		
Range	93-251	89-251	98-249		
Pairwise post-hoc comparisons:					

III vs I: p =0.008; III vs II: p<0.001*; I vs II: p=0.031**					
HDL: Median (25^{th}- 75^{th}) Range	42 (35-54.75) 28-78	40 (34.25-54.75) 29-76	45 (39-65.75) 29-81	11.217	0.004*
Pairwise post-hoc comparisons: *III vs I: p=0.073; III vs II: p =0.003*; I vs II: p =0.923*					
LDL: Median (25^{th}- 75^{th}) Range	82.5 (46-123.25) 35-181	55 (45-104) 39-160	99.5 (76-131) 38-172	27.177	<0.001*
Pairwise post-hoc comparisons: *III vs I: p=0.005*; III vs II: p <0.001*; I vs II: p =0.124*					
TG: Median (25^{th}- 75^{th}) Range	90.5 (59-148.75) 51-191	83 (55-139.75) 48-189	131.5 (92.5-160) 51-198	26.328	<0.001*
Pairwise post-hoc comparisons: *III vs I: p=0.002*; III vs II: p <0.001*; I vs II: p =0.304*					

Risk estimates for transition from suicidal ideation to attempt:

The female sex (OR = 3.041 & 95% CI = 1.726-5.358), being unmarried (OR = 1.811 & 95% CI = 1.119-2.930) & unemployment (OR = 1.883 & 95% CI = 1.159-3.060) were found to be statistically significant risk factors for transition of participants from suicidal ideation to suicidal attempt. The age, residence & educational level were not found to be significant predictors that affect transition from suicidal ideation to suicidal attempt. Playing sports (OR = 0.530 & 95% CI = 0.318-0.885) was found to be statistically significant protective factor for transition of participants from suicidal ideation to suicidal attempt. Having hobbies, Tobacco smoking & Substance abuse weren't found to be significant predictors that affect transition from suicidal ideation to suicidal attempt. The very low & low socioeconomic level (OR = 1.806 & 95% CI = 1.053-3.096) & having poor social support (OR = 2.382 & 95% CI = 1.219-4.659) were found to be statistically significant risk factors for transition of participants from suicidal ideation to suicidal attempt. Family history of suicide &

Relationship with family were not found to be significant predictors that affect transition of participants from suicidal ideation to suicidal attempt. **Table 7**

Table (7): Risk estimates for transition from suicidal ideation to attempt, regarding sociodemographic factors participants habits & substance abuse, socioeconomic level, family history of suicide and relation with other.

Variables	Suicidal ideation I (n=136)		Suicidal attempt II (n=136)		OR	95% CI
	n	%	n	%		
Age groups:						
<35	83	61.0	90	66.2	1.249	0.762-2.049
≥35	53	39.0	46	33.8		
Sex:						
Females	84	61.8	113	83.1	3.041	1.726-5.358*
Males	52	38.2	23	16.9		
Marital status:						
Currently not married	61	44.9	81	59.6	1.811	1.119-2.930*
Currently married	75	55.1	55	40.4		
Residence:						
Urban	39	28.7	35	25.7	0.862	0.505-1.471
Suburban /rural	97	71.3	101	74.3		
Educational level:						
University	60	44.1	67	49.3	1.230	0.763-1.982
Secondary school /illiterate	76	55.9	69	50.7		
Occupational status:						
No job	66	48.5	87	64.0	1.883	1.159-3.060*
Had a job	70	51.5	49	36.0		
Playing sports:						
Yes	55	40.4	36	26.5	0.530	0.318-0.885*

No	81	59.6	100	73.5		
Having hobbies:						
Yes	58	42.6	50	36.8	0.782	0.481-1.272
No	78	57.4	86	63.2		
Tobacco smoking:						
Yes	35	25.7	42	30.9	1.289	0.759-2.189
No	101	74.3	94	69.1		
Substance abuse						
Yes	25	18.38	22	16.18	1.513	0.881-2.600
No	111	81.62	114	83.82		
Monthly income:						
Very low/low	90	66.2	106	77.9	1.806	1.053-3.096*
Moderate/high	46	33.8	30	22.1		
Family history of suicide:						
Positive	12	8.8	16	11.8	1.378	0.626-3.034
Negative	124	91.2	120	88.2		
Relationship with family:						
Poor	16	11.8	21	15.4	1.370	0.681-2.755
Good	120	88.2	115	84.6		
Social support:						
No support	15	11.0	31	22.8	2.382	1.219-4.659*
Had support	121	89.0	105	77.2		

Past history of suicidal behavior (OR = 2.549 & 95% CI = 1.501-4.329) was found to be statistically significant risk factor for transition of participants from suicidal ideation to suicidal attempt . **Cognitive functions** were not found to be significant predictor that affect transition of participants from suicidal ideation to suicidal attempt. Having **high score in Neuroticism personality traits** (OR = 2.104& 95% CI = 1.297-3.412) was found to be statistically significant risk factor for transition of participants from suicidal ideation to suicidal attempt. Having **high scores in Extraversion personality traits** (OR = 0.349 & 95% CI = 0.213-0.571) was found to be statistically significant protective factor for transition of participants from suicidal ideation to suicidal attempt. **Psychoticism personality traits** were

not found to be significant predictor that affect transition of participants from suicidal ideation to suicidal attempt. Being impulsive (OR = 1.964 & 95% CI = 1.188-3.246), exposure to high levels of daily stress (OR = 2.185 & 95% CI = 1.329-3.592) & being diagnosed with depressive disorder (OR = 2.962 & 95% CI = 1.714-5.118) were found to be statistically significant risk factors for transition of participants from suicidal ideation to suicidal attempt. Being diagnosed with anxiety disorder wasn't found to be significant predictor that affect transition of participants from suicidal ideation to suicidal attempt.

Elevated Hs-CRP (OR = 2.162 & 95% CI = 1.240-3.770) & elevated IL-6 (OR = 2.234 & 95% CI = 1.283-3.890) were found to be statistically significant risk factors for transition of participants from suicidal ideation to suicidal attempt .ESR wasn't found to be significant predictor that affect transition of participants from suicidal ideation to suicidal attempt. High & average serum total cholesterol (TC) (OR = 0.477 & 95% CI = 0.288-0.790), High & average serum LDL (OR = 0.495 & 95% CI = 0.303-0.808) and High & average serum triglycerides (TG) (OR = 0.477 & 95% CI = 0.288-0.790) were found to be statistically significant protective factors for transition of participants from suicidal ideation to suicidal attempt. Low TC, LDL & TG were found to be risk factors for transition from suicidal ideation to attempt. HDL wasn't found to be significant predictor that affect transition of participants from suicidal ideation to suicidal attempt. **Table 8**

Table (8): Different parameters risk estimates for transition from suicidal ideation to attempt

Variables	Suicidal ideation I (n=136)		Suicidal attempt II (n=136)		OR	95% CI
	n	%	n	%		
Past history of suicidal behavior:						
Positive	30	22.1	57	41.9	2.549	1.501-4.329*
Negative	106	77.9	79	58.1		

Cognitive functions:						
Normal	127	93.4	126	92.6	0.893	0.351-2.271
Impaired	9	6.6	10	7.4		
Neuroticism:						
Positive	55	40.4	80	58.8	2.104	1.297-3.412*
Negative	81	59.6	56	41.2		
Extraversion:						
Positive	85	62.5	50	36.8	0.349	0.213-0.571*
Negative	51	37.5	86	63.2		
Psychoticism:						
Positive	38	27.9	51	37.5	1.547	0.929-2.579
Negative	98	72.1	85	62.5		
Variables	Suicidal ideation I (n=136)		Suicidal attempt II (n=136)		OR	95% CI
	n	%	n	%		
Impulsivity						
Impulsive	39	28.7	60	44.1	1.964	1.188-3.246*
Non impulsive	97	71.3	76	55.9		
Daily stress:						
High	70	51.5	95	69.9	2.185	1.329-3.592*
Average	66	48.5	41	30.1		
Depression						
Present	80	58.8	110	80.9	2.962	1.714-5.118*
Absent	56	41.2	26	19.1		
Anxiety						
Present	13	9.6	13	9.6	1.000	0.446-2.244

Absent	123	90.4	123	90.4		
ESR:						
Elevated	20	14.7	31	22.8	1.712	0.920-3.187
Normal	116	85.3	105	77.2		
Hs-CRP						
Elevated	26	19.1	46	33.8	2.162	1.240-3.770*
Normal	110	80.9	90	66.2		
IL-6						
Elevated	26	19.1	47	34.6	2.234	1.283-3.890*
Normal	110	80.9	89	65.4		
Total cholesterol						
High /average	98	72.1	75	55.1	0.477	0.288-0.790*
Low	38	27.9	61	44.9		
HDL						
High /average	113	83.1	102	75.0	0.611	0.337-1.105
Low	23	16.9	34	25.0		
LDL						
High /average	91	66.9	68	50.0	0.495	0.303-0.808*
Low	45	33.1	68	50.0		
Triglycerides:						
High /average	99	72.8	81	59.6	0.477	0.288-0.790*
Low	37	277.2	55	40.4		

Discussion:

There was statistically significant difference between the three groups regarding their socioeconomic level . Suicidal behavior (ideation & attempt) was more common among

participants with very low & low socioeconomic level than among participants with middle & high socioeconomic level

This finding coincides with that of **Näher et al., (2020)** which confirmed that the lower the levels of contemporary socioeconomic status, the higher the suicide rates. Low socioeconomic level does not increase suicide risks per se. On the one hand, there exist links of socioeconomic status and psychopathology. On the other hand, there is an association of mental disorders and suicide. These findings suggest mental-ill health as a possible mechanism that links low socioeconomic levels to increases in suicide risks, allowing for causality in two directions. While poor mental health may be triggered by low socioeconomic status, low socioeconomic status may also represent the consequence of psychopathology.

Contradictory results were reported by **Lukaschek et al., (2014)** who failed to find a significant effect of socioeconomic status on suicides among in-patients in six German psychiatric hospitals. Regarding in-patient samples, it is important to note that these are not necessarily representative of all individuals that die by suicide. The findings might possibly not apply to suicide in general.

This study found that psychiatric disorders were statistically more common among suicidal attempt group than among suicidal ideation group especially with regard to depressive disorders. This finding coincides with that of **Casey et al., [28]** They found that mental health condition diagnoses and moderate/severe symptoms of depression and/or anxiety were strongly associated with suicidality among college students. They also found that poor mental health is a more common finding among suicide attempters than among students with suicidal thoughts.

There was statistically significant difference between the three groups regarding their socioeconomic level. Suicidal behavior (ideation & attempt) was more common among

participants with very low & low socioeconomic level than among participants with middle & high socioeconomic level .

This study found a statistically significant difference between the three groups regarding their past history of suicidal behavior. Suicidal ideation & attempt were more common among participants with past history of suicidal behavior. Our results agree with the results of **Finkelstein et al., [31]** & the results of **Coryell & Young**. [32] They found that a history of previous suicidal attempt was strongly associated with current suicidal ideation & attempts. They also found that the strongest predictor for future suicidal ideation, suicide attempts & suicide was the past history of suicidal behavior.

In this study, Cognitive functions didn't show statistically significant difference between the three groups (suicidal ideation group, suicidal attempt group & control group). This finding coincides with the findings of **An et al., [33]** & **Borges et al., [34]** who found no association or even a lower risk of suicide in those with cognitive impairment (minimal cognitive impairment & dementia). Although cognition may allow patients to plan and implement a suicide attempt, functioning may decline with the progression of minimal cognitive impairment (MCI) to dementia. In fact, a prior diagnosis of dementia, representing the most severe cognitive and functional decline, may protect an individual from death by suicide.

There was statistically significant difference between the three groups regarding their personality traits. Suicidal ideation & attempt were more common among participants who had high score in Neuroticism & Psychoticism traits and low scores in Extraversion traits. These findings coincide with the findings of Na et al., [35], Stefa-Missagli et al., [36] & Bi et al., [37]. They found that a subset of personality traits has been identified as relevant characteristics potentially conferring suicide risk, including impulsivity, aggression, neuroticism, psychoticism, introversion, anxiety & anger.

In this study, impulsivity was significantly associated with suicidal ideation and attempts. This finding agrees with that of Bi et al., [37] . They found that Suicide risk was mediated by personality factors such as impulsivity and neuroticism. They also found that impulsivity was a suicide attempt risk factor for people with and without psychiatric disorders.

Our study shows that increase in severity of anxiety symptoms was statistically more associated with suicidal attempts than with suicidal ideation. These findings agree with that of Kanwar et al., [38] . This meta-analysis provided evidence that the rates of suicides are higher in patients with any type of anxiety disorder.

This study shows that the prevalence of depressive disorders was statistically more common among suicidal attempt group than among suicidal ideation group. The more severe forms of depressive symptomatology were more associated with suicide attempters

This finding is in accordance with that of **Brådvik (2018)** & **Bachmann (2018)**. According to these studies, depression is strongly related to both suicidal ideation and attempt with the severity of depressive symptoms was positively correlated with intensity of suicidal behavior. The increased suicidality in major depressive disorder (MDD) could be due to several reasons. Symptoms in MDD, such as feelings of hopelessness, worthlessness, delusional depressive thoughts, anxiety & sleep disturbances, directly and indirectly increase the risk of suicidal attempt. In addition, psychosocial factors associated with MDD (such as disruption of marital and family connections) might also increase the risk of suicidality. **(Cai et al., 2021)**

Our study shows that increase in severity of anxiety symptoms was statistically more associated with suicidal attempts than with suicidal ideation.

These findings agree with that of **Kanwar et al., (2013)**. This meta-analysis provided evidence that the rates of suicides are higher in patients with any type of anxiety disorder.

Sareen et al., (2005) also found positive relationship between anxiety disorders and suicidal behavior.

This finding differs from that of **Angst et al., (2005)** which has not demonstrated any relationship between anxiety disorders and suicidality. These mixed findings may be due to methodological limitations of the study, lack of power (small sample size), or due to heterogeneity in how the study was conducted or how the outcomes (suicide) or exposure (anxiety) were defined and measured.

Our research shows that there was statistically significant difference between suicidal ideation group, suicidal attempt group & control group regarding Erythrocyte Sedimentation Rate (ESR). Elevated ESR was significantly more common among suicidal ideation & attempt participants. This finding coincides with that of Vasupanrajit et al., [39] , Chang et al., [40] & Maes & Carvalho,. [40] These studies found higher values of Erythrocyte Sedimentation Rate (ESR) in the suicidal groups than in the non-suicidal groups.

There was statistically significant difference between the three groups regarding High sensitivity-C-Reactive Protein (Hs-CRP). Elevated Hs-CRP was more common among participants with Suicidal ideation & attempt than among control participants. Courtet et al., [41] concluded that CRP might be a trait marker for suicidal vulnerability.

Our study found a statistically significant difference between the three groups (suicidal ideation group, suicidal attempt group & control group) regarding Interleukin -6 (IL-6).Elevated (IL-6) was more common among participants with Suicidal ideation & attempt than among control participants. Several studies recently postulated the existence of abnormally elevated levels of inflammatory cytokines in subjects at risk for suicide or those who die by suicide. González-Castro et al., [42] ; Enache et al., [43] & Marini et al., [44] supported the existence of abnormally elevated IL-6 levels among participants who had recently exhibited suicidal behavior.

Suicidal ideation & attempt were more common among participants who had low total cholesterol (TC). The research linking lipid profiles with an increased risk of suicide remains inconsistent and conflictual. The study of Li et al., [45] found that major depressive disorder (MDD) patients who attempted suicide had significantly lower serum total cholesterol (TC).

Suicidal ideation & attempt were more common among participants who had low high-density lipoprotein (HDL). This finding is in accordance with that of De Melo et al., [46] & Zhou et al., [47]. These studies have found a link between suicidal behavior and lowered serum levels of high-density lipoprotein (HDL).

Suicidal ideation & attempt were more common among participants who had low low-density lipoprotein (LDL). This finding coincides with the finding of Li et al., [45] & Baek et al., [48]. The results of these studies suggested that major depressive disorder (MDD) patients who attempted suicide had significantly lower serum low-density lipoprotein (LDL) concentrations than those who did not.

Low serum Triglycerides (TG) was more represented among participants with suicidal ideation & attempt. This finding coincides with that of Aguglia et al., [49]& Wu et al., [50]

Our study concluded that the female sex (OR = 3.041 & 95% CI = 1.726-5.358), being unmarried (OR = 1.811 & 95% CI = 1.119-2.930) & unemployment (OR = 1.883 & 95% CI = 1.159-3.060) were found to be statistically significant risk factors for transition of participants from suicidal ideation to suicidal attempt. Age, residence & educational level were not found to be significant predictors that affect transition from suicidal ideation to suicidal attempt.

Berkelmans et al., [51] found that previously discovered risk factors for suicide attempts (middle-age & unemployment) remained elevated even when corrected for a wide array of socio-demographic characteristics.

Our research concluded that Playing sports (OR = 0.530 & 95% CI = 0.318-0.885) was found to be statistically significant protective factor for transition of participants from suicidal ideation to suicidal attempt. Having hobbies, Tobacco smoking & Substance abuse weren't found to be significant predictors that affect transition from suicidal ideation to suicidal attempt. Research demonstrates clear links between youth engagement in structured physical activities and factors that predict suicide attempt risk.

This study found that very low & low socioeconomic level (OR = 1.806 & 95% CI = 1.053-3.096) & having poor social support (OR = 2.382 & 95% CI = 1.219-4.659) were found to be statistically significant risk factors for transition of participants from suicidal ideation to suicidal attempt .Family history of suicide & Relationships with family were not found to be significant predictors that affect transition of participants from suicidal ideation to suicidal attempt. Burón et al [52] found that interpersonal conflict was common risk factor for most patients attempting suicide. They also found that low socioeconomic level & financial difficulties were risk factor for most patients attempting suicide.

In this study, having high score in Neuroticism personality traits (OR = 2.104& 95% CI = 1.297-3.412) was found to be statistically significant risk factor for transition of participants from suicidal ideation to suicidal attempt. Having high scores in Extraversion personality traits (OR = 0.349 & 95% CI = 0.213-0.571) was found to be statistically significant protective factor for transition of participants from suicidal ideation to suicidal attempt. Psychoticism personality traits were not found to be significant predictor that affect transition of participants from suicidal ideation to suicidal attempt

The studies of Rappaport et al., [53] & Draper et al., [54] found that individuals with high neuroticism and low extraversion have been considered more vulnerable to attempt and/or commit suicide.

Our study showed that being impulsive (OR = 1.964 & 95% CI = 1.188-3.246), exposure to high levels of daily stress (OR = 2.185 & 95% CI = 1.329-3.592) & being diagnosed with depressive disorder (OR = 2.962 & 95% CI = 1.714-5.118) were found to be statistically significant risk factors for transition of participants from suicidal ideation to suicidal attempt. Impulsivity/aggression has been demonstrated as an important suicide risk factor and is also typically present in patients with conduct disorder, personality disorders, substance use disorders & bipolar disorders.

Furthermore, dysfunction in the stress response system (i.e., the hypothalamic–pituitary–adrenal axis) has been identified as a biomarker for suicide risk. While the evidence linking stressful life events to suicidal attempts is well-documented, less information is known about the mechanisms through which such events may increase the risk. [54] Ullah et al., [55] found that anxiety & depression scale scores of those who had attempted suicide were found to be significantly higher than the scores of those who had not attempted suicide. Analysis of the data revealed that increase the severity of anxiety & depression may be predictors of suicide attempt.

Shoib and Kim [56] stated that mental illnesses were the primary risk factors that underlie most of the suicide mortality and morbidity. Apart from mental illnesses, other life events (e.g., death of a loved one) and sociocultural factors, such as being isolated or feeling unacceptable to others or unable to adjust to others, also play a role.

Our research concluded that elevated Hs-CRP (OR = 2.162 & 95% CI = 1.240-3.770) & elevated IL-6 (OR = 2.234 & 95% CI = 1.283-3.890) were found to be statistically significant risk factors for transition of participants from suicidal ideation to suicidal attempt. ESR wasn't found to be significant predictor that affect transition of participants from suicidal ideation to suicidal attempt.

Vasupanrajit et al., [39] found higher values of Erythrocyte Sedimentation Rate (ESR) in the suicidal groups than in the non-suicidal groups. This study found that suicide attempts were associated with activated immune-inflammatory response and that elevated Hs-CRP & IL-6 were elevated among suicide attempt patients. Hs-CRP & IL-6 might be potential biomarkers in assessing the risk of attempting suicide in vulnerable patients.

Low TC, LDL, and TG were identified as risk variables for the shift from suicidal thoughts to suicide attempt in our research. HDL was not identified as a significant predictor of individuals' shift from suicidal thoughts to suicide attempt.

Recent study indicates that lipids may be a potentially useful suicide risk indicator.[57] For instance, cholesterol reductions, which has an impact on 5-HIAA levels, may lead to a serotonergic imbalance that could be linked to mood dysregulation and suicide risk. [57]

Conclusions : Suicide ideas and attempts are more prevalent among mental patients, particularly those with depression. Suicidal behavior is associated with increased severity of depressive & anxiety symptoms, The most common method of suicidal attempts among females was drug overdose followed by self-poisoning & wrist cutting. Self-poisoning is the most common technique for male suicide attempts, followed by wrist cutting. Suicide thoughts and attempts are more likely under the following circumstances: Younger age groups, particularly those under 35, Female gender, Substance mistreatment Low socioeconomic level, a history of suicidal tendencies, a history of suicidal conduct in the family, Neuroticism, psychoticism, and introversion are qualities of personality. Impulsivity, High daily amounts of stress, Intensification of depression and anxiety disorders, Erythrocyte sedimentation rate elevation (ESR), Elevated high sensitivity C-reactive protein (Hs-CRP),Elevated interleukin 6 (IL-6), Low serum total cholesterol (TC), Low high-density lipoprotein (HDL), Lower low-density lipoprotein (LDL), Low serum triglycerides (TG).

These variables safeguard against suicidal behaviour: Marriage, Work and employment, Family and social support, participation in sports and hobbies, Increased socioeconomic status.

Among the risk factors for the progression from suicidal thoughts to attempt are: Female gender, being unmarried, Unemployment, Low socioeconomic status, Poor social support, a record of suicidal conduct in the past, Neuroticism character attributes, Impulsivity, High levels of stress, Having received a diagnosis of depressive disorders, High sensitivity C-reactive protein levels (Hs-CRP)

Increased interleukin 6 (IL-6), decreased total cholesterol (TC), decreased low-density lipoprotein (LDL), and decreased triglycerides (TG)

Among the protective factors against the passage from suicidal thoughts to suicide attempt Sport participation and Extraversion personality qualities

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References:

1. Allen J, Mohatt GV, Fok CC, Henry D, Burkett R. A protective factors model for alcohol abuse and suicide prevention among Alaska Native youth. Am J Community Psychol. 2014;54:125-39.

2. Ivey-Stephenson AZ, Crosby AE, Hoenig JM, Gyawali S, Park-Lee E, Hedden SL. Suicidal Thoughts and Behaviors Among Adults Aged ≥18 Years - United States, 2015-2019. MMWR Surveill Summ. 2022;71:1-19.

3. Nock MK, Borges G, Bromet EJ, Alonso J, Angermeyer M, Beautrais A, et al. Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. Br J Psychiatry. 2008;192:98-105.

4. Manzo K, Tiesman H, Stewart J, Hobbs GR, Knox SS. A comparison of risk factors associated with suicide ideation/attempts in American Indian and White youth in Montana. Arch Suicide Res. 2015;19:89-102.

5. Tucker RP, Judah MR, O'Keefe VM, Mills AC, Lechner WV, Davidson CL, et al. Humor styles impact the relationship between symptoms of social anxiety and depression. Personality and individual differences. 2013;55:823-7.

6. McGirr A, Renaud J, Bureau A, Seguin M, Lesage A, Turecki G. Impulsive-aggressive behaviours and completed suicide across the life cycle: a predisposition for younger age of suicide. Psychol Med. 2008;38:407-17.

7. Troisi A. Cholesterol in coronary heart disease and psychiatric disorders: same or opposite effects on morbidity risk? Neurosci Biobehav Rev. 2009;33:125-32.

8. da Graça Cantarelli M, Nardin P, Buffon A, Eidt MC, Antônio Godoy L, Fernandes BS, et al. Serum triglycerides, but not cholesterol or leptin, are decreased in suicide attempters with mood disorders. J Affect Disord. 2015;172:403-9.

9. Wium-Andersen MK, Orsted DD, Nordestgaard BG. Elevated C-reactive protein, depression, somatic diseases, and all-cause mortality: a mendelian randomization study. Biol Psychiatry. 2014;76:249-57.

10. Harrison R, Munafò MR, Davey Smith G, Wootton RE. Examining the effect of smoking on suicidal ideation and attempts: triangulation of epidemiological approaches. Br J Psychiatry. 2020;217:701-7.

11. Han J, Batterham PJ, Calear AL, Randall R. Factors Influencing Professional Help-Seeking for Suicidality. Crisis. 2018;39:175-96.

12. Beck AT, Kovacs M, Weissman A. Assessment of suicidal intention: the Scale for Suicide Ideation. J Consult Clin Psychol. 1979;47:343-52.

13. Ftouh M, Gad ES, Seleem MA, Saada S, Mubarak AA. Suicidal Ideation in an Egyptian Sample of Hospitalized Patients with Acute Psychosis. Clin Schizophr Relat Psychoses. 2017.

14. Beck AT, Steer RA, Ranieri WF. Scale for Suicide Ideation: psychometric properties of a self-report version. J Clin Psychol. 1988;44:499-505.

15. Sheehan DV, Lecrubier Y, Sheehan KH, Amorim P, Janavs J, Weiller E, et al. The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. J Clin Psychiatry. 1998;59 Suppl 20:22-33;quiz 4-57.

16. Karnouk C, Böge K, Lindheimer N, Churbaji D, Abdelmagid S, Mohamad S, et al. Development of a culturally sensitive Arabic version of the Mini International Neuropsychiatric Interview (M.I.N.I.-AR) and validation of the depression module. Int J Ment Health Syst. 2021;15:24.

17. El-Gilany A, El-Wehady A, El-Wasify M. Updating and validation of the socioeconomic status scale for health research in Egypt. East Mediterr Health J. 2012;18:962-8.

18. Fahmy S. Determining simple parameters for social classifications for health research. Bull High Inst Public Health. 1983;13:95-108.

19. Nasreddine ZS, Phillips NA, Bédirian V, Charbonneau S, Whitehead V, Collin I, et al. The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. J Am Geriatr Soc. 2005;53:695-9.

20. Rahman TT, El Gaafary MM. Montreal Cognitive Assessment Arabic version: reliability and validity prevalence of mild cognitive impairment among elderly attending geriatric clubs in Cairo. Geriatr Gerontol Int. 2009;9:54-61.

21. Eysenck SB, Eysenck HJ, Barrett P. A revised version of the psychoticism scale. Personality and individual differences. 1985;6:21-9.

22. Abdel-Khalek AM. The relationship between fatigue and personality in a student population. Social Behavior and Personality: an international journal. 2009;37:1357-68.

23. Patton JH, Stanford MS, Barratt ES. Factor structure of the Barratt impulsiveness scale. J Clin Psychol. 1995;51:768-74.

24. Stanford MS, Mathias CW, Dougherty DM, Lake SL, Anderson NE, Patton JH. Fifty years of the Barratt Impulsiveness Scale: An update and review. Personality and individual differences. 2009;47:385-95.

25. Ellouze F, Ghaffari O, Zouari O, Zouari B, M'Rad M F. [Validation of the dialectal Arabic version of Barratt's impulsivity scale, the BIS-11]. Encephale. 2013;39:13-8.

26. DeLongis A, Folkman S, Lazarus RS. The impact of daily stress on health and mood: psychological and social resources as mediators. J Pers Soc Psychol. 1988;54:486-95.

27. Abouhendy W, Youssef UM, El-Deen GMS. Bipolar disorder among patients with obsessive–compulsive disorder at Zagazig University Hospitals. Egyptian Journal of Psychiatry. 2018;39:5.

28. Borkovec TD, Costello E. Efficacy of applied relaxation and cognitive-behavioral therapy in the treatment of generalized anxiety disorder. J Consult Clin Psychol. 1993;61:611-9.

29. Kay SR, Fiszbein A, Opler LA. The positive and negative syndrome scale (PANSS) for schizophrenia. Schizophr Bull. 1987;13:261-76.

30. Näher AF, Rummel-Kluge C, Hegerl U. Associations of Suicide Rates With Socioeconomic Status and Social Isolation: Findings From Longitudinal Register and Census Data. Front Psychiatry. 2019;10:898.

31. Finkelstein Y, Macdonald EM, Hollands S, Sivilotti ML, Hutson JR, Mamdani MM, et al. Risk of Suicide Following Deliberate Self-poisoning. JAMA Psychiatry. 2015;72:570-5.

32. Coryell W, Young EA. Clinical predictors of suicide in primary major depressive disorder. J Clin Psychiatry. 2005;66:412-7.

33. An JH, Lee KE, Jeon HJ, Son SJ, Kim SY, Hong JP. Risk of suicide and accidental deaths among elderly patients with cognitive impairment. Alzheimers Res Ther. 2019;11:32.
34. Borges G, Acosta I, Sosa AL. Suicide ideation, dementia and mental disorders among a community sample of older people in Mexico. Int J Geriatr Psychiatry. 2015;30:247-55.
35. Na KS, Cho SE, Hong JP, Lee JY, Chang SM, Jeon HJ, et al. Association between personality traits and suicidality by age groups in a nationally representative Korean sample. Medicine (Baltimore). 2020;99:e19161.
36. Stefa-Missagli S, Unterrainer HF, Giupponi G, Holasek SJ, Kapfhammer HP, Conca A, et al. Suicide and Personality Traits: A Multicenter Study of Austrian and Italian Psychiatric Patients and Students. Suicide Life Threat Behav. 2020;50:220-32.
37. Bi B, Liu W, Zhou D, Fu X, Qin X, Wu J. Personality traits and suicide attempts with and without psychiatric disorders: analysis of impulsivity and neuroticism. BMC Psychiatry. 2017;17:294.
38. Kanwar A, Malik S, Prokop LJ, Sim LA, Feldstein D, Wang Z, et al. The association between anxiety disorders and suicidal behaviors: a systematic review and meta-analysis. Depress Anxiety. 2013;30:917-29.
39. Vasupanrajit A, Jirakran K, Tunvirachaisakul C, Maes M. Suicide attempts are associated with activated immune-inflammatory, nitro-oxidative, and neurotoxic pathways: A systematic review and meta-analysis. J Affect Disord. 2021;295:80-92.
40. Chang CC, Tzeng NS, Kao YC, Yeh CB, Chang HA. The relationships of current suicidal ideation with inflammatory markers and heart rate variability in unmedicated patients with major depressive disorder. Psychiatry Res. 2017;258:449-56.
41. Courtet P, Jaussent I, Genty C, Dupuy AM, Guillaume S, Ducasse D, et al. Increased CRP levels may be a trait marker of suicidal attempt. Eur Neuropsychopharmacol. 2015;25:1824-31.

42. González-Castro TB, Tovilla-Zárate CA, López-Narváez ML, Genis-Mendoza AD, Juárez-Rojop IE. Interleukin-6 Levels in Serum, Plasma, and Cerebral Spinal Fluid in Individuals with Suicide Behavior: Systematic Review and Meta-Analysis with Meta-Regression. J Interferon Cytokine Res. 2021;41:258-67.

43. Enache D, Pariante CM, Mondelli V. Markers of central inflammation in major depressive disorder: A systematic review and meta-analysis of studies examining cerebrospinal fluid, positron emission tomography and post-mortem brain tissue. Brain Behav Immun. 2019;81:24-40.

44. Marini S, Vellante F, Matarazzo I, De Berardis D, Serroni N, Gianfelice D, et al. Inflammatory markers and suicidal attempts in depressed patients: A review. Int J Immunopathol Pharmacol. 2016;29:583-94.

45. Li H, Zhang X, Sun Q, Zou R, Li Z, Liu S. Association between serum lipid concentrations and attempted suicide in patients with major depressive disorder: A meta-analysis. PLoS One. 2020;15:e0243847.

46. de Melo LGP, Nunes SOV, Anderson G, Vargas HO, Barbosa DS, Galecki P, et al. Shared metabolic and immune-inflammatory, oxidative and nitrosative stress pathways in the metabolic syndrome and mood disorders. Prog Neuropsychopharmacol Biol Psychiatry. 2017;78:34-50.

47. Zhou S, Zhao K, Shi X, Sun H, Du S, Miao X, et al. Serum Lipid Levels and Suicide Attempts Within 2 Weeks in Patients With Major Depressive Disorder: Is There a Relationship? Front Psychiatry. 2021;12:676040.

48. Baek JH, Kang ES, Fava M, Mischoulon D, Nierenberg AA, Yu BH, et al. Serum lipids, recent suicide attempt and recent suicide status in patients with major depressive disorder. Prog Neuropsychopharmacol Biol Psychiatry. 2014;51:113-8.

49. Aguglia A, Solano P, Giacomini G, Caprino M, Conigliaro C, Romano M, et al. The Association Between Dyslipidemia and Lethality of Suicide Attempts: A Case-Control Study. Front Psychiatry. 2019;10:70.

50. Wu S, Ding Y, Wu F, Xie G, Hou J, Mao P. Serum lipid levels and suicidality: a meta-analysis of 65 epidemiological studies. J Psychiatry Neurosci. 2016;41:56-69.

51. Berkelmans G, van der Mei R, Bhulai S, Gilissen R. Identifying socio-demographic risk factors for suicide using data on an individual level. BMC Public Health. 2021;21:1702.

52. Burón P, Jimenez-Trevino L, Saiz PA, García-Portilla MP, Corcoran P, Carli V, et al. Reasons for Attempted Suicide in Europe: Prevalence, Associated Factors, and Risk of Repetition. Arch Suicide Res. 2016;20:45-58.

53. Rappaport LM, Flint J, Kendler KS. Clarifying the role of neuroticism in suicidal ideation and suicide attempt among women with major depressive disorder. Psychol Med. 2017;47:2334-44.

54. Draper B, Kõlves K, De Leo D, Snowdon J. A controlled study of suicide in middle-aged and older people: personality traits, age, and psychiatric disorders. Suicide Life Threat Behav. 2014;44:130-8.

55. Ullah I, Tauqir N, Shoib S, Parmar A. Predicting Suicide Attempt: Is It Always Possible? Indian J Psychol Med. 2022;44:89-90.

56. Shoib S, Kim YK. The Frontiers of Suicide. Adv Exp Med Biol. 2019;1192:503-17.

57. Sublette ME. Lipids and Suicide Risk. Curr Top Behav Neurosci. 2020;46:155-77.