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Factors associated with suicidal ideation in medical students, a literature review

Factores asociados a la ideación suicida en estudiantes de medicina, una revisión bibliográfica

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Abstract:

Suicidal ideation in medical students is a behavior that has a direct impact on the academic performance and well-being of university students. Therefore, it is imperative to identify risk and protective factors that can have a positive influence on the regulation of such behavior, with the purpose of reducing suicide rates. The purpose of the present narrative review is to identify risk factors associated with suicidal ideation in medical students, as well as to describe their potential to modify the turnaround between suicidal behaviors. A literature review of descriptive studies conducted in medical students of basic cycles, clinical fields and medical internships at a global level was carried out. The factors associated with the generation of suicidal behaviors are presented grouped under the scheme proposed in the Volitional Motivational Model in three phases: the pre-motivational phase, the motivational phase and the volitional phase. It was found that approximately 25% of medical students had reported suicidal ideation, the most associated factors being academic dissatisfaction and depressive symptoms. Therefore, it is imperative to develop positive coping strategies among future health professionals.

Keywords:

Suicidal ideation, Suicidal behaviour, Medicine, Students, University

Resumen:

La ideación suicida en estudiantes de medicina constituye una conducta que incide de manera directa en el rendimiento académico y el bienestar de los estudiantes universitarios. Por consiguiente, resulta imperativo identificar los factores de riesgo y de protección que pueden ejercer una influencia positiva en la regulación de dicha conducta, con el propósito de reducir los índices de suicidio. El propósito de la presente revisión narrativa es identificar los factores de riesgo asociados a la ideación suicida en estudiantes de medicina, así como describir su potencial de modificar el viraje entre las conductas suicidas. Se llevó a cabo una revisión bibliográfica de estudios descriptivos realizados en estudiantes de medicina de ciclos básicos, campos clínicos e internado médico a nivel global. Los factores asociados a la generación de los comportamientos suicidas se presentan agrupados bajo el esquema propuesto en el Modelo Motivacional Volitivo en tres fases: la fase premotivacional, la fase motivacional y la fase volitiva. Se encontró que aproximadamente el 25 % de los estudiantes de medicina habían reportado ideación suicida, siendo los factores más asociados la insatisfacción académica y los síntomas depresivos. Por lo tanto, resulta imperativo desarrollar estrategias de afrontamiento positivas entre los futuros profesionales de la salud.

***Palabras Clave**:*

Ideación suicida, Conducta suicida, Medicina, Estudiantes, Universidad

INTRODUCTION

Suicidal behavior is a spectrum of self-harming and intentional behaviors that aim to end one's own life. The Volitional Motivational Model (VMM) is a theoretical model that explains

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the evolution of suicidal behavior and considers four constructs: Suicidal Ideation (SI) is the generation of thoughts or desires to die; Suicidal Plan (SP) is the phase of organizing SI without carrying out a suicidal act; Suicidal Attempt is where the SP is executed without resulting in a fatal act; and Suicide is death.[1] It is important to note that no operational definitions have been established for these behaviors, which poses a challenge when conducting a quantitative assessment of each behaviors[2], in the third section of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) "Conditions requiring further study," suicidal behavior disorder only considers suicide attempt, described as the sequence of behaviors initiated by the individual themselves with the intentional goal of ending their life, and which explicitly excludes SI and SP[3], in its diagnostic criteria. Meanwhile, in the section on "Symptoms, signs, or clinical findings related to the mind and behavior" of the International Classification of Diseases (ICD-11), SI is described as the presence of thoughts, ideas, or reflections about the possibility of ending one's own life, ranging from thinking that one would be better off dead to formulating detailed plans to commit suicide, and Suicide Attempt as the specific episode of self-destructive behavior undertaken with the conscious intention of ending one's life.[4]

Globally, suicide was the third leading cause of death in the 15-29 age group in 2021[5], with a 38.9% increase in the mortality rate in Latin America from 1990 to 2021, according to the Global Burden of Disease Study, Injuries and Risk Factors (GDB) 2021.[6] Suicidal ideation (SI) is an important predictor of suicide, which is why there is particular interest in assessing risk and protective factors in order to positively modulate suicidal behavior.[7] Among medical students, this behavior is prevalent, with an incidence ranging from 4% to 70% among university students[8,9], making it important to identify and characterize potentially modifiable variables that form the basis for developing predictive models of these behaviors and reducing suicide mortality. However, social stigma has limited the possibility of obtaining reliable data.[10] The predisposing factors that are strongly associated with being enrolled in university are: having a diagnosed neuropsychiatric condition, living in environments with high levels of violence or facing economic difficulties and difficulties accessing basic resources; and, when enrolled in higher levels, facing academic demands represents a challenge in terms of completing academic activities, managing time and personal chronotype, interacting with peers and teachers, and knowing how to deal with frustration, just to mention some factors.

In the aim of identifying risk factors associated with suicidal ideation in medical students, a bibliographic analysis was conducted of descriptive studies carried out on medical students in basic cycles, clinical fields, and medical internships on a global scale. Based on this analysis, it was possible to identify the risk factors involved in suicidal behaviour and describe the characteristics that give it the potential to modulate the dynamics of suicidal behaviour. The results obtained are presented grouped into the three phases proposed by the MMV, providing possible evidence that behavioural modifications can precipitate or prevent some suicidal behaviours.

EPIDEMIOLOGY OF SUICIDAL BEHAVIOR AMONG MEDICAL STUDENTS

Suicidal behavior in school settings has a considerable degree of importance because statistical records in the United States show that suicide is the second leading cause of death in the 14-18 age group, between 2003 and 2023 the rate of SI and attempted suicide increased from 16.9% to 20.4% and from 8.5% to 9.5%, respectively, and about 1 in 10 high school students reported a suicide attempt in the previous 12 months. The most frequently associated risk factors are female gender, being in the first grade of school, expressing a non-heterosexual orientation, and being part of a historically excluded racial group.[11,12] Worldwide until the year 2024, it was found that in the group of university students the prevalence rates of suicidal ideation, planning and attempts were 15.9%, 7.7% and 4.9%, respectively, in addition to showing greater diversification of risk factors such as non-heterosexual orientation that predisposes 3 times greater risk of committing suicide, economic difficulties that cause stress and uncertainty and academic difficulties such as an overloaded academic program and increased pressure to perform well.[13]

Suicidal behavior presents a greater tendency of higher prevalence of ideation, followed by planning, suicide attempt and suicide respectively. With respect to medical students, it has been identified in two studies conducted in China, where the number of suicide attempts doubled the reported values of suicidal planning, although none of these behaviors exceeded the prevalence of SI, it is important to consider that this unusual pattern could be evidence that the transition from planning to attempt or suicide could override the predictive capacity.[14,15]

The prevalence rate of SI in medical students is 15% globally[16], however, there are contrasting variations between geopolitical regions, such as in the Middle East where the prevalence of SI is estimated to be the highest at 40%[17,18] however, when evaluating 505 medical students in Tehran, 355 reported having experienced SI at some point in their lives.[9] The second country that showed high figures was Brazil, whose estimate was 27.7%; in Asian countries such as India, Thailand and China, suicidal thinking rates of 16.3%, 15.8% and 14.1%, respectively, were reported, and finally, in the United States, it was found that an average of 14.4% of medical students have presented this behavior during their lifetime. There is an important gap in the prevalence of SI between genders, which is evident when looking at the proportion of students who express suicidal thoughts, since for every 10 women only one of their male classmates presents SI[19], however

this is not a rule, since a homogeneous prevalence was found in two studies, in the first one it was indicated that while 138 men had presented SI, 136 of their female classmates had presented suicidal thoughts, and in a smaller group it was found that 26 men had SI compared to 29 of their female peers, so it is important to analyze this trend with a gender perspective, since traditional norms of masculinity have emphasized independence, emotional stoicism and resistance to pain.[20-22]

SUICIDE IDEATION AS A PREDICTOR OF SUICIDE

Suicide is a global health problem for which we need to develop foresight in order to avoid fatal outcomes. The Volitional Motivational Model (VMM) is a work whose object of study is the evolution of suicidal behavior and the factors involved in each of its 3 phases. In the pre-motivational phase the biopsychosocial context of the individual is addressed, where personal vulnerabilities added to negative events result in an adverse reaction to stress; the motivational phase is the cornerstone, it is the point where suicidal thinking arises and the suicide attempt can be predicted, the exposure to feelings of defeat or humiliation generate the perception of being trapped with no possibility of escape, experienced as entrapment; and finally the motivational phase, where the suicidal behaviors developed beforehand are joined by the determination to end one's life and the availability of means to this end result in a suicide attempt or the consummation of suicide.[23]

The purpose of MMV is to detect the variables involved in the development of each suicidal behavior, which at research and clinical practice levels orients us to work with variables that have the potential to positively change suicidal behavior, one of these variables is the feeling of entrapment, a checkpoint associated with the generation of suicidal thoughts, the characteristics that allow its potential predictor are: the intermediate location between feelings of humiliation and defeat, perceived as adversities and whose resolution is found in suicidal thoughts, as well as the highly fluctuating bidirectional dynamics in narrow periods of time, from 3 to 12 h in which eventualities are experienced, the passage through feelings of defeat or humiliation and finally the perception of being trapped.[24] In medical students who denied a history of suicidal behavior or neuropsychiatric disorders, it was found that about 6.16% reported experiencing the feeling of entrapment to de novo stressful events, with subsequent generation of SI, making entrapment a predictor of first-time SI, but persistence of entrapment was found to be related to greater tolerance to unfortunate situations.[13]

RISK FACTORS FOR SUICIDAL IDEATION

The following are the risk factors associated with the generation of suicidal thoughts in medical students following the MMV scheme, grouping the risk factors into their respective phases.

PREMOTIVATIONAL PHASE

In the premotivational phase we find the factors that are associated with individual vulnerability and correspond to the categories of genetic, biological or cognitive characteristics, and stressful events, which when interacting result in a negative response.[23]

1. Individual Vulnerabilities: Diathesis

- Sex

Sex is a non-modifiable variable, and female sex is strongly associated with the generation of suicidal thoughts. However, male sex is mostly associated with attempts and completed suicides.[25] In parallel, the constructs that allow us to create our identity from socially constructed roles, have established attributes to the feminine identity such as great capacity to establish social relationships and good communication, while the masculine identity is shaped by competition and social success. The questioning of masculinity can arise from a sense of perceiving oneself as a burden, which can provoke feelings of failure and self-loathing, which if avoided by seeking help to deal with emotional repression ends up causing greater psychological pressure and exacerbation of depressive symptoms. On the other hand, women are often expected to play the role of a kind, caring and sociable figure, characteristics that would make it easier for her to seek out other people, but if women feel excluded or isolated, this feeling of exclusion can lead to strong depressive emotions.[26]

- Sexual orientation

One of the primary components for the free development of personality is the full expression of sexuality, however, aspects such as sexual orientation and gender identity are a source of social stigma, even in some countries this expression is criminalized and has fatal consequences, so that pronouncing oneself as part of the LGBTQ+ community can generate concern in the individual[25,27], also self-perception as non-heterosexual is associated with the prevalence of suicidal thoughts in the previous 12 months.[28,29]

- History of neuropsychiatric disorder: depression, ADHD, anxiety and others

The neuropsychiatric burden of having a mental disorder has been documented in 9 out of 10 patients with a history of suicide, mostly mood disorders such as major depressive disorder.[30,31]

Depression is a strong predictor of suicide, however the intensity with which depressive symptoms occur is directly associated with the frequency with which SI and SP are manifested.[28,32] The prevalence of suicidal thoughts in medical students ranges from 2.8% to 58.6%[27,33], 18.1% of the students manifested clinically significant depressive symptoms. Suicidal symptoms are

associated with 7.43 more times of experiencing SI at some point in life, while the use of antidepressants increased the risk 5.18 times, and the use of these drugs without prescription is higher among men.[34,35] There are other psychiatric comorbidities that converge and increase the risk factor, as a higher prevalence of SI was found among students with symptoms of depression who present autism spectrum traits, proposing that there is a stigmatization at the level of mental health that makes them victims of harassment and propensity to experience social exclusion.[36]

The intensity of anxiety has the ability to predict the occurrence of suicidal thoughts because when experiencing ruminative thoughts of distress and biases to perceive reality, it acts as an enhancer of depressive symptoms.[37]

When evaluating the 5 most frequently expressed personality traits, it was found that students who scored higher for neuroticism reported higher prevalence of SI and depressive symptoms, which explains how increased sensitivity to experience emotions such as sadness or anxiety, while being responsible reduced the likelihood of experiencing depression, however, the study suggests cautiously assessing that the generation of lytic thoughts is not a remnant of insufficient antidepressant management.[38]

Attention Deficit Disorder (ADHD) has a prevalence of 3.5% in medical students, with Inattentive and Combined ADHD types predicting SI by indicating that inattention promotes cognitive impairment and lower performance, while the prevalence of hyperactivity is associated with suicide attempts due to increased impulsivity.[39]

The use of psychostimulant substances such as khat, a non-legalized narcotic drug popular in the Middle East, in Ethiopian students increased the risk of SI 4.4-fold, as its long-term effects disinhibit behavioral regulation and potentiate depressive symptoms.[21] Caffeine-induced neurostimulation indirectly increased the generation of SI by directly reducing sleep time and causing insomnia in individuals with greater sensitivity to methylxanthine and in those who consumed greater amounts.[28,40]

Alcohol consumption was related to SI, with the disinhibition phase occurring and potentially triggering impulsive actions, while the depressive phase increased the prevalence of suicidal thoughts.[28] Overall, substance use in the previous 3 months, initiation of substance use in high school, or alcohol abuse were strongly related to suicide attempts.[25]

The expression of suicidal thoughts during consultation with a professional was found to be strongly related to mental health problems; students who self-reported needing psychotherapeutic follow-up, both those who reported experiencing mental health problems and those who did not, had symptoms of mild to moderate depression.[41]

- Childhood Adversities and Neglectful Parental Care

There are critical periods in childhood when brain cytoarchitecture and physiology are regulated, so learning acquired at this stage is the basis for behavior and pattern replication during adulthood. Exposure to physical, sexual or other types of abuse and lack of attention from the caregiver may antagonize the formation of emotional regulation skills, greater impulsivity or cognitive impairment.[42,43] When evaluating parenting models, the care and protection perceived by students with respect to their caregivers was studied, indicating that the prevalence of SI and major depressive disorder is more prevalent among those who perceive low care with high control, classified as neglect; on the other hand, good care by both parents was a protective factor for SI and depressive symptoms.[43]

- Poor physical activity

A weekly physical activity rate <3 hours was related to a higher persistence of SI, compared to those students who reported between 3 to 5 hours per week of physical exercise, who indicated higher levels of well-being and reduction in anxiety symptoms, so it is proposed that a sedentary lifestyle indirectly influences suicidal behavior through exalting anxiety symptoms and promoting inflammatory processes.[32]

2. Stressor events

- Prolonged use of electronic devices

Excessive use of digital media is not directly related to suicidal behavior, however there is a relationship between the manifestation of anxiety and depression symptoms with periods of daily exposure >3 hours[40], it is important to consider that an addictive process has been established in young people that directly impacts quality of life, for example, by increasing the latency time to fall asleep, reducing sleep cycles and increasing daytime sleepiness that end up altering the circadian cycle and dysfunctioning the neuroendocrine axes.[44]

- Financial difficulties

One of the adversities that causes great uncertainty is having restricted economic income, which prevents covering basic needs. When medical students dedicate themselves to full-time academic activities, they find it difficult to obtain financial remuneration through employment, so they depend on their parents or guardians financially, and this is associated with a feeling of “burden”, which manifests itself as anguish.[32,45]

- Violence

Actions that threaten the individual integrity and the level of well-being of a person, infringed consciously by a person or a group of people through verbal, physical or sexual, threatening, intimidating, abusive and harassing behaviors, constitute violent acts. Students in clinical cycles and internships experienced

higher rates of verbal workplace violence, with a prevalence of 35.2%, inflicted by their superiors, perceived as a lack of support, or by patients and their families, because of an inconsistent doctor-patient relationship due to errors in communication.[46] The prevalence of SI among students exposed to workplace violence than those without exposure was higher, causing emotional exhaustion, depressive symptoms, anxiety symptoms, which is why it is important for health care workers to receive mental health care.

The perception of insecurity on the part of Mexican citizens >18 years of age living in urbanized areas was 63.2% by June 2025, perceiving a greater persistence of criminal acts such as robbery or extortion and antisocial behavior such as homicide, with little or no performance by the authorities responsible for providing security, resulting in the forced displacement of the use of public spaces and a change in habits of interaction with the street[46], exposure of medical students to areas of violence did not constitute a direct predictor of suicidal behavior, but it is a risk factor that makes depressive symptoms more complex.[47]

At the school level, violent actions among peers, known as bullying, were directly related to a rate of suicide attempts between 25 and 66%[25], while violence by teachers has been little reported, it was indicated in a study that 19% of the students who presented SI also perceived mistreatment by their teachers.[48]

A special situation was the contingency that occurred in 2020 during the COVID-19 pandemic, the confinement and the health situation were a cause of uncertainty for the entire population, basic aspects of life such as obtaining resources were not guaranteed and caused concern.[49]

MOTIVATIONAL PHASE

The Motivational Phase is the point of convergence between adversities, the emergence of feelings such as defeat and humiliation, which channel the maladaptive response of perceived confinement, and from this response self-destructive thoughts begin to be synthesized.[23]

Perfectionism, negative thoughts of repetition, also known as rumination, and loneliness interact together to generate SI. Indirectly, perfectionism is associated with negative thoughts of repetition, in a context of high demands from the individual and his/her environment, which can cause distress and perception of loss of control, since a gap is conceptualized between what I should be and what I really am, responding with maladaptive coping strategies, the cognitive biases of defeat and hopelessness, which create a vulnerable environment for the generation of SI and depressive symptoms, self-criticism and low self-esteem. In the interaction of perfectionism with loneliness, the perception experienced by the students is frustrated belonging; around 49% of the students who presented IS manifested difficulties in integrating into the university environment[48], ho find it difficult to perceive the support networks they have and are bothered by self-perceived "isolationism".[9,50]

- Dissatisfaction with academic performance

It is estimated that academic dissatisfaction increases 10 times the risk of presenting suicidal behavior.[48] About 27% of all medical students presented feelings of dissatisfaction, 19% associated it to factors in the school environment. In undergraduates who presented SI, there is a wide gap between 46.5% and 72.9% of those who indicated dissatisfaction[25,51], however, only 12.6% expressed feelings of regret related to their choice to study medicine.[48] 40.73% of students with a history of suicide attempts reported dissatisfaction with their academic performance; this figure is reduced to half in students who did not manifest suicidal behavior.[30]

- High academic demand

The academic load in medical schools can become a challenge, mainly during the first years because students who recently graduated from high school need to adapt to a more demanding work rhythm, about 6% of the students reported feeling stress because of their academic load[19], 53.3% of the students reported having a moderately demanding academic load while 38.8% indicated that it was heavy and of the latter 3.4% presented some suicidal behavior.[40]

Preclinical students also expressed greater depressive symptoms, with the maximum peak during the first year of their training, probably because when faced with new situations they need to have great receptive capacity, and when they do not achieve their goals they may experience frustration, also because clinical students have greater autonomy and independence that allows them to perform better in hospital work.[25]

VOLITIONAL PHASE

The Volitional Phase includes factors associated with heredofamilial antecedents, and personal antecedents of suicidal behavior and access to methods to end one's life.

- History of Suicidal Behavior

Of a total of 710 students evaluated, it was found that 208 had SI, 28 had made plans and 45 had made attempts, of the latter 48.9% indicated having a firm conviction to end their lives, while 46.7% did not, in addition the frequency of suicide attempts for a first attempt was 62.2%, 33.3% had made two attempts and 4.4% more than twice, the most frequently used methods were the use of toxic substances followed by hanging[52]. In this context, the history of having experienced suicidal behavior acts as a starting point, with a dynamic that increases the frequency and violence for an upcoming event, which is why it is important to detect and channel the suicidal behavior for a timely approach.[53]

- Hereditary-familial history of neuropsychiatric disorders and suicidal behavior

The hereditary-familial burden of a neuropsychiatric diagnosis among students with suicidal behavior showed a prevalence between 11% to 18.1%[19,48], between 7.3% to 11% indicated a history of suicide attempt[48,54] and 4.5% of the family members committed suicide.[54,55]

PROTECTIVE FACTORS AGAINST SUICIDAL IDEATION

It is important to provide formal training in mental health for students at all levels but with special emphasis on medical students, since various factors such as academic stress predispose to the development of unfavorable behaviors, on the other hand, protective factors have been found such as good self-esteem and having a support network, in contrast to resilience, which did not show a direct impact on protection against SI but does have a regulating effect on depression and anxiety.[53] When assessing strategies to address stress through cognitive-behavioral and dialectical behavioral therapies, the coping measures most frequently present were problem solving, social support, verbalizing feelings, and self-distraction, and those that showed less presence were avoidance, substance use, and self-blame, The final result showed an immediate reduction of stress and its persistence after 6 months, and it was also evidenced that with the use of adaptive coping strategies, the result is the behavioral self-regulation of the participants, taking a proactive approach to the situations that caused them stress and improving their self-perception.[56]

The psychotherapeutic approach with a gender focus demonstrated that it is possible to work on SI risk factors, cognitive-behavioral therapy in women helped to improve emotional and depressive symptoms, while psychological interventions in men helped to reduce the perception of incompetence and may reduce suicidal ideation; however, it is important to make cultural adaptations for the context.[26]

CONCLUSION

Suicide is a preventable health problem, so it is important to work on the variables that have the capacity to modify suicidal behavior. In the academic environment of physicians in training it is important to develop within the curricular framework training in mental health to promote self-care, tolerance to uncertainty and frustration, and the development of positive coping strategies, with the objective that the students themselves are able to evaluate their emotional state, as well as to carry out training to detect suicidal behavior among peers, and to achieve the goal of caring for the mental health of future professionals who will be in charge of safeguarding the health status of our population.

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