

Exploring Suicide Methods in Sudan: Insights from General Hospitals

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<https://doi.org/10.56893/ajhes2024v03i01.04>

Abstract

Background: Suicide is a major concern worldwide. Understanding the various methods and tools used for suicide is crucial for developing effective preventive strategies. The objective of this study is to investigate and assess methods of suicide in Sudan.

Methods: This study is a cross-sectional hospital-based investigation of individuals who presented with attempted suicide at the Emergency Departments of four major general hospitals in Khartoum State, Sudan. The study was conducted between January 2014 and December 2014. A total of 200 respondents agreed to participate in the study and completed a questionnaire covering various topics, including methods of attempted suicide.

Results: Hair dye was the major method of attempted suicide (79%, N= 158), followed by drug overdose (13.5%, N=27). There is a significant relationship between the methods used for suicide, age, and gender.

Conclusion: Restricting access to commonly used and highly lethal methods of suicide is highly effective in reducing the overall number of suicides. It is important to implement this strategy along with other suicide prevention measures to achieve the best results.

Keywords: Methods of suicide, Suicide behavior, Sudan, non-suicidal self-injury

Introduction

Suicide is a major health issue representing the second leading cause of death in 15–24-year-olds globally (Bachmann, 2018; World Health Organization [WHO], 2014). While it is conventionally believed that suicide rates in Africa are low (1 in 100,000 in both genders). La Vecchia et al. (1994) reported an increasing trend. Between

2000 and 2015, suicide rates in Africa surged by 38% across all age groups (WHO, 2014). Mental disorders and psychopathology play a pivotal role in the higher rates of suicide.

Suicide is a deliberate termination of life. The legal definition extends this to include the statement that death is the result of the victim's direct or indirect action or negligence. It is essential that

the victims fully realize the effect of their actions (Zetterqvist, 2015). In contrast, non-suicidal self-injury (NSSI), defined as the deliberate, self-inflicted destruction of body tissue without suicidal intent and for purposes not socially sanctioned, includes behaviors such as cutting, burning, biting, and scratching the skin (Putowski et al., 2015; Zetterqvist, 2015). A large body of literature indicates that most attempters do not die by suicide (Sarchiapone et al. 2011).

The methods and tools used for suicide are important in determining the outcome of suicide attempts and are quite different from one society to another (Bachmann, 2018). Identifying effective intervention strategies to prevent this represents an important public health challenge. Restricting access to suicide means is effective in reducing completion (Kyu et al., 2016; WHO, 2014).

Pesticide poisoning is common in many Asian countries and in Latin America. Drug poisoning is frequently reported in Nordic countries and the United Kingdom, while hanging is the preferred method of suicide in Eastern Europe. Firearms are commonly used in the United States, and jumping from a high place is prevalent in cities, such as Hong Kong (Johnson & Coyne-Beasley, 2009). The International Classification of Diseases (ICD-10) code for suicide classifies suicide based on methods such as pesticides, unspecific poisons, hanging, drowning, firearms, and explosives, jumping from higher, and other methods (Ajdacic-Gross et al., 2008). As shown in many studies (Johnson & Coyne-Beasley, 2009; Lim

et al., 2014; Värnik et al., 2008), several factors influence the lethality of a given suicide method. These factors were summarized by Spicer and colleagues (Spicer & Miller, 2000), including ease of use, accessibility, ability to abort mid-attempt and acceptability. Studies have reported that males use more lethal and violent methods of suicide, such as hanging and gunshots, than adult females, who tend to use less violent methods (Sarchiapone et al., 2011).

In the World Health Organization (WHO/EURO) Multicenter Study on Parasuicide of adults, a similar gender distribution of methods was found for suicide attempts, that is, males chose more often cutting, hanging, jumping, and throwing themselves in front of a moving object, whereas women chose intoxication more often than males chose intoxication (Paris, 2006). Furthermore, Shah and colleagues illustrated that the most common methods of suicide in England and Wales in individuals aged 65 years and over were hanging, strangulation, suffocation, drowning and submersion, other and unspecified drugs, medicaments and biological substances, and other unspecified means (Shah & Buckley, 2011). On the other hand, the most common methods of suicide in order of frequency in women aged 65 years and over were: other and unspecified drugs, medications, and biological substances; hanging, strangulation, and suffocation; drowning and submersion; anti-epileptic, sedative-hypnotic, anti-parkinsonism, and psychotropic drugs; and other unspecified means (Shah & Buckley, 2011).

Research Setting

Sudan is located in northeastern Africa and is bordered by seven countries (see Figure 1). The country occupies 1.8 million km² and has approximately 38.6 million living there; 61.7% are younger than 24 years old (United Nations Department of Economic and Social Affairs [UNDESA], 2022). It is unique and complex in its climate, politics, environment, languages, cultures, and ethnicities (United Nations Population Fund [UNFPA], 2019). The country comprises 18 states (provinces), and the capital state is Khartoum (Hamid et al., 2021). Khartoum state has an area of 22,000 km² with an estimated population of 4.5 million, however, unofficial estimates suggest a population of over 7 million (Pantuliano et al., 2011). The people of Khartoum reflect Sudan's ethnic, geographical, and social backgrounds. As in Figure 1, Khartoum state is divided into seven localities (Khartoum, Jabal Awliya, Omdurman, Ombada, Karary, Bahry, and Sharq Enil).

While there is limited published research data on suicide in Sudan, WHO reported an all-age suicide rate of 8.1 per 100,000 in the country (WHO, 2019). This limited data is drawn from various and possibly biased samples, making it challenging to construct a precise and evidence-based understanding of suicide in Sudan. Given the limited knowledge about the methods used for suicide in Sudan, this paper describes the methods used for suicide in Khartoum State.

Methods

Study Design, Context and Boundaries

This cross-sectional hospital-based study was conducted in Sudan and targeted individuals presented to the emergency units of four main general hospitals in Khartoum state, Sudan, namely, Khartoum Teaching Hospital, Omdurman Teaching Hospital, Bahri Teaching Hospital, and El Ribat Hospital. These hospitals served the majority of the Khartoum city population with diverse backgrounds and were selected because they were geographically distributed across the Khartoum state. The study took place from January 1st, 2014, to December 31st, 2014.

Data Collection Tools

We designed a comprehensive questionnaire that covered various aspects of suicide, including methods of suicide and non-suicidal self-injury. The questionnaire included the following questions: Sociodemographic data (e.g., participants' age, gender, education, marital status, etc.); detailed risk factors for suicide (prior attempt, family history, substance use); and medical and legal outcomes of suicide (consequences of suicide attempts from both medical and legal perspectives).

The Positive and Negative Syndrome Scale (PNSS) for schizophrenia is an established psychiatric rating scale that offers a balanced representation of features of psychosis (positive and negative symptoms) and estimates their

relationship with one another and global psychopathology (Kay et al., 1987). It has a 30-item Arabic version, divided into three subscales: positive, negative, and general psychopathology. Each item is rated on a 7-point scale from 1 (absent) to 7 (extreme). It has good internal consistency, inter-rater reliability, test-retest reliability, sensitivity, specificity, and construct validity, which was tested previously in a study conducted by Kay et al. (1988).

The Beck Depression Inventory (BDI) (Hautzinger, 1991) is a self-report questionnaire that measures the symptoms and severity of depression symptoms. The scale was translated into Arabic and tested on 200 psychiatric patients and 200 healthy people in Egypt, which revealed good reliability (Cronbach's alpha = 0.86, $r = 0.92$) and validity ($r = 0.81$ with the Hamilton Rating Scale for Depression) (Fawzi et al., 2012).

The questionnaire underwent a rigorous review by three senior consultant psychiatrists and was pilot-tested in 20 participants to ensure consistency and reliability. The piloting involved ten patients with suicidal thoughts in a mental facility and ten healthy individuals selected randomly.

Data Collection Procedure

For this study, dedicated psychiatric doctors were assigned as focal persons to each hospital following comprehensive training in data collection, using a specifically designed questionnaire. Before commencing the study, necessary permissions and approvals were obtained

from all hospital administrations, the Ministry of Interior, and the Khartoum State Ministry of Health. Individual consent was sought from each participant after the purpose of the study was explained to them. The study included all individuals who presented during the study period with suicide attempts at the four hospitals and willingly agreed to participate during the study period. Notably, repeated suicide attempts were considered only once in the analysis. The study included two hundred participants (29 males and 171 females). This number represents the total number of those present with suicidal behavior at different hospital emergency Units. Unfortunately, we could not obtain the total number of cases of suicidal behavior, as they were not systematically registered in the hospital database. Individuals who presented with suicidal behaviors received medical assistance from frontline clinical professionals in the emergency rooms of specified hospitals. Subsequently, the focal person at each hospital explained the purpose of the study to the participants and assisted them in completing the questionnaire. In this study, we specifically focused on self-harm or suicidal behavior with clear suicidal intent. Participants with self-harming behavior lacking intent or awareness of the consequences or those who refused to consent were excluded from the study.

Data Analysis

The data were summarized and analyzed using Statistical Package for the Social Sciences (IBM® SPSS®). Descriptive statistics such as frequencies and percentages were presented in tables.

Research Ethics

The ethical board of the Directorate General of the Medical Services, Ministry of the Interior, reviewed and approved the study proposal. Permissions were obtained from the relevant hospitals. Furthermore, we facilitated the referral of participants to the nearest psychiatric facility.

Results

Two hundred individuals with suicide attempts presented to the emergency units of the four stated hospitals in Khartoum State during the study period; most of them (N= 123, 61.5%) were seen at Khartoum Hospital. More than two-thirds of the suicide attempters (N=137, 68.5%) were younger than 24 years old. Among the attempters, females (N=171, 85.5%) outnumbered males (N=29, 14.5%). Most participants were single (N=114, 57%) and unemployed (N=111, 55.5%).

In Table 1, it is evident that poisoning from hair dye was the most commonly used method for suicide (N=158, 97%), followed by drug overdose (N=27, 13.5%). Other methods, including burning, hanging, and the use of sharp objects, also contributed to the overall statistics.

Table 1

Methods of Suicidal Attempts among Sudanese Participants

Methods used for suicide	Frequency (N)	Percent (%)
Hair dye	158	79
Drugs overdose	27	13.5
Burning	1	0.5
Hanging	6	3
Firearm	1	0.5
Sharp object	3	1.5
Jumping from height	2	1
Poisoning (Not specified)	2	1
Total	200	100

Table 2 presents the breakdown of suicide plans. 69% (N=138) of suicide attempts were unplanned, while 31% (N=62) were planned.

Table 2

Planning Suicide Attempts among Sudanese Participants

Table 3 shows differences in suicide methods based on gender. Notably, females tend to choose to use hair dyes and overdose on medicines or drugs.

Planning	Frequency (N)	Percent (%)
Unplanned	138	69
Planned	62	31
Total	200	100

Table 3

Association between Gender and Methods used in Suicidal Attempts

		Gender		Total
		Male	Female	
Methods of suicide	Hair dye	14	144	158
	Drugs overdose	7	20	27
	Burning	1	0	1
	Hanging	2	4	6
	Firearm	0	1	1
	Sharp object	3	0	3
	Jumping from height	1	1	2
	Poisoning (Not specified)	1	1	2
Total		29	171	200

Regarding the distribution of suicide methods across different age groups, Table 4 shows that hair dye is the most common method among those aged 18-24 years, followed by those under 18 years while hanging is less frequent across all age groups.

Table 4*Methods of Suicide by Participants' Age*

40 years and more	35-39 years	30-34 years	25-29 years	18-24 years	less than 18 years	Method Used
6 (3%)	3 (1.5%)	7 (3.5%)	23 (13.5%)	69 (34.5%)	50 (25%)	Hair Dye (%)
4 (2%)	0 (0.5%)	1(0.5%)	1(0.5%)	0 (0%)	0 (0%)	Hanging
1(0.5%)	0 (0%)	2 (1%)	7 (3.5%)	10 5%	7 (3.5%)	Drugs overdose
2 (1%)	0 (0%)	0 (0%)	0 (0%)	1(0.5%)	0 (0%)	Sharp object
0 (0%)	0 (0%)	1(0.5%)	0 (0%)	0 (0%)	0 (0%)	Firearm
0 (0%)	0 (0%)	1(0.5%)	1(0.5%)	0 (0%)	0 (0%)	Jumping from Height
0 (0%)	0 (0%)	1(0.5%)	1(0.5%)	0 (0%)	0 (0%)	Poisoning (unspecified)
0 (0%)	1(0.5%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	Burning
13 (6.5%)	4 (2%)	13 (6.5%)	33 (16.5%)	80 (40%)	57 (28.5%)	Total

Discussion

This study presents a preliminary assessment of suicide methods in Sudan. Ingestion of hair dye emerged as the most common method of suicide (79%) and was the most prevalent method in both genders. This can be attributed to the easy accessibility of hair dyes in beauty shops and groceries. In contrast, studies from European and Asian countries revealed that hanging was the most prevalent means of suicide (49.5%), followed by poisoning with drugs (12.7%) (Sarchiapone et al., 2011). Other studies have highlighted three primary methods that dominate country-specific suicide patterns: hanging, pesticide ingestion, and firearm suicide. Jumping from a height and different methods of poisoning (mainly poisoning by drugs) occasionally appear as significant alternative methods (Sarchiapone et al., 2011). Implementing restrictions for quick and accessible methods of suicide can be particularly

effective in the prevention of impulsive suicide behaviors with a high risk of lethality (Hawton, 2002).

The proportion of hair dye use in suicide typically decreases as age increases (see Table 4). Hair dye suicide has been recognized as a major public health problem, especially in general hospital emergency units (Elgamel & Ahmed, 2013). Hair dye contains paraphenylenediamine, which can result in acute health complications that can directly or indirectly result in death.

Vladeta Ajdacic-Gross and colleagues reported the methods used for suicide internationally. They found that hanging is the predominant method in most countries (Ajdacic-Gross et al., 2008). However, there are variations in suicide patterns across different regions. For example, firearm suicide was the most common method in the United States, Argentina, Switzerland, and Uruguay. Jumping from a height is prevalent in Hong Kong SAR,

Luxembourg, and Malta; poisoning with pesticides was a major method used in rural Latin American and Asian countries; and poisoning by drugs was common in Nordic countries and the United Kingdom (Ajdacic-Gross et al., 2008).

Also, this study included 171 female participants and 29 male participants. The data show that females are more likely to attempt suicide than males, which is consistent with findings from other studies. Data from a systemic review related to gender choice of suicide methods revealed that females are more likely to attempt suicide than males (Lim et al., 2014). The current study yielded similar results, as male suicide attempts were more serious and likely to be fatal than female attempts.

Conclusion

The current study has some limitations, such as the small sample size, which does not represent the entire scope or diversity of suicide methods in Sudan. Additionally, the study relied on outdated data, which could affect the validity and applicability of the results. Therefore, we recommend conducting the study again as medical practices and treatments evolve, and the demographic of the population has changed since the original data was collected. Moreover, many people who attempt suicide do not seek medical help because of the stigma and cultural barriers. Nevertheless, attempted suicide is a serious issue in Sudan and requires careful attention and intervention. One of the key prevention strategies is to limit access to and availability of lethal

suicide methods. Since suicidal thoughts are often transient (O'Connor et al., 2012), reducing the available means of suicide that can cause immediate harm can potentially lower the suicide risk. Therefore, reducing the availability of lethal means could theoretically lower the overall suicide risk.

Recommendations

Some recommendations for possible suicide prevention in relation to the methods used are as follows.

Method Specific: Raising public awareness about the potential risk is essential, especially with hair dye ingestion and other methods. In addition, promoting the safety of medicine storage and disposal is crucial to prevent medication overdosing. Furthermore, collaboration with beauty salons, stores, and social media influencers should be implemented to impose more restrictions and disseminate safety measures related to hair dye use.

Planning-Specific: Providing easy access to mental health services (i.e., helplines, training of frontline health professionals, medical guidelines, and basic counseling) is important for mitigating the risk of suicide.

Broadly speaking, the keywords for suicide prevention in relation to suicide methods are community education, clear intervention pathways, accessibility to medical services, and collaboration between different stakeholders.

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