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Original Article

# Investigating the Changes in the Frequency of Suicide Attempts before and after Coronavirus Disease 2019 in Afzalipour Hospital in Kerman

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**Abstract**

**Background:** One of the social phenomena threatening human health is suicide. According to research, social factors are closely associated with and impact suicide attempts. The present research was conducted to investigate the changes in the frequency of suicide attempts before and after coronavirus disease 2019 (COVID-19) at Afzalipour Hospital, Kerman, Iran.

**Methods:** The current descriptive-retrospective research was conducted as a secondary analysis using data recorded in the hospital information system (HIS) at Afzalipour Medical-Educational Center, Kerman, Iran, in 2021. The research data were extracted anonymously from the HIS and in an Excel file format during a three-year period (2018 to 2021). In this study, the correlations of individuals' demographic characteristics and characteristics of suicide with the frequency of suicide attempts before and after COVID-19 were explored. Frequency and percentage indicators were used to describe the data, and the chi-square test (with a significance level of 0.05) and Excel and SPSS software were used for data analysis.

**Results:** The changes in the frequency of suicide attempts according to individuals' demographic characteristics, except for age group ($P=0.130$) and place of residence ($P=0.396$), were significant before and after COVID-19 in other groups ($P<0.05$). These changes were significant in terms of characteristics of suicide in all groups ($P<0.05$).

**Conclusion:** In order to reduce the possible undesirable consequences of COVID-19, including suicide attempts, efforts and measures should be implemented to reduce the mortality rate caused by suicide attempts.

**Keywords:** Suicide attempt, Coronavirus disease 2019, Hospital

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## Introduction

Nowadays, there are numerous definitions of health. According to one of these definitions, health is a state of balance an individual has established within themselves and between themselves and their social and physical setting (1). In the traditional approach to health, the health system is seen as the central custodian of health (2). However, in recent years, the health system custodianship has been introduced as a complicated and multi-dimensional process involving intra-sectoral and inter-sectoral cooperation (3). Thus, in modern approaches to health promotion, various social, economic, and environmental factors impacting health are taken into account (2). Among these factors, the role of social factors receives more attention (3). Social factors that are determinants of health include conditions under which individuals are born, raised, live, work, and finally grow old. These factors integrate with other economic, cultural, psychological, and behavioral conditions that affect the population's health status. Ultimately, all these factors must be organized and evaluated to be able to define and assess health entirely (4).

One of the social phenomena endangering human health is suicide (5). Suicide is considered a serious issue at the global health level (6) and is among the twenty leading causes of mortality all around the world, the resultant frequency of mortality of which is more than malaria, breast cancer, war, and murder (7). Suicide attempt behavior is a complex collection of ideas, plans, and measures taken to terminate a person's life. In addition, suicide attempts are 10-20 times more frequent than complete suicide, and numerous factors, such as biological, behavioral, and social factors, influence its occurrence (8).

A comparison of suicide statistics in Iran, similar to

most Muslim countries, demonstrates a lower rate than other countries (about 5 per 100 000 people in Iran) (9,10). The assessment of factors influencing suicide in Iran indicates that social factors considerably contribute to the frequency of suicide (11). As a type of preventable harm, death by suicide disrupts families, communities, and countries; also, suicide is regarded as a global, substantial health problem because more than 700 000 people die by suicide annually (12).

Based on evidence, the COVID-19 pandemic spreading in early 2020 has had profound psychological and social effects, with its psychological effects probably lasting for months and years (13). COVID-19 has led to some crises, such as the economic crisis, in many countries, culminating in an increased suicide rate (14). During economic crises, mental health is damaged immediately and maybe more severely than physical health, and by worsening stress and anxiety in the most affected individuals, results in increased suicide cases, cardiovascular diseases, and total mortality rates (15). The research results reveal that about 90% of suicide attempts occur in individuals with mental disorders, such as depression; therefore, the increased frequency of suicide attempts during the COVID-19 and post-COVID-19 periods is not unexpected and even in countries such as Pakistan, Bangladesh, and India, cases of suicide attempt caused by the fear of COVID-19 have been reported (16). Thus, conducting studies on the effect of COVID-19 on suicide and suicide attempts has spread rapidly (12,17-20). Moreover, some studies have reported an ascending trend of suicide attempts during the COVID-19 era compared to the pre-COVID-19 era (12). However, despite the numerous studies conducted in this field, there is no consensus on whether the frequency of suicide attempts has been impacted by COVID-19 (20); therefore, it seems essential to publish more evidence on the occurrence of suicide attempt cases and rates during the COVID-19 pandemic. Hence, considering the increased socioeconomic damages following the COVID-19 pandemic and the occurrence of behaviors such as suicide attempts resulting from fear and depression in this period, the present research was conducted to explore the changes in the frequency of suicide attempts as one of the social consequences of COVID-19 before and after the pandemic in Afzalipour Medical-Educational Center, Kerman, Iran, in 2021. The results of this study can help policy-makers and planners in the field of evidence-based decision-making to face this social phenomenon effectively and appropriately in other similar and probable future situations.

## Methods

### *Research type*

The current descriptive-retrospective study was conducted as a secondary analysis using data recorded in the hospital information system (HIS) at Afzalipour Medical-Educational Center, Kerman, Iran, in 2021.

### *Data collection*

For data collection, one of the researchers visited the hospital after receiving the code of ethics from the Ethics Committee of Kerman University of Medical Sciences. After making the required coordination and the administrative procedures, the related data were extracted from the HIS anonymously and in an Excel file format during a three-year period (from March 21, 2018 to January 19, 2021) and were submitted to the research team. At this stage, given that the data collection source was the HIS and all suicide attempt cases referring to this center in the target period of time were registered in the HIS, there were no missing data, and all the data were entered into the study as a census.

The reason for choosing Afzalipour Medical-Educational Center as the research environment for data collection was that this center in Kerman is the only poisoning center hospital in Kerman province with an emergency ward and the intensive care unit (ICU) ward for poisoning, and all poisoning-related suicide attempts are referred to this center. Notably, since this center was the referral hospital for COVID-19 patients at the provincial level and the first case of COVID-19 was observed in this center on February 20, 2020, the suicide attempt data registered before this date were considered the pre-COVID-19 data and those registered after this date were considered the post-COVID-19 data.

### *Research variables*

In this study, on the one hand, the correlation of individuals' demographic characteristics, including gender, education level, age group, marital status, occupation, and place of residence, with the frequency of suicide attempts before and after COVID-19, and on the other hand, the correlation of the characteristics of suicide, including the result of the suicide attempts, the history of suicide, the history of mental disorders, the cause of suicide, and the method used for suicide, with the frequency of suicide attempts before and after COVID-19 were assessed.

### *Research sample*

The data regarding the pre-COVID-19 period belonged to March 21, 2018 until February 19, 2020, and the data regarding the post-COVID-19 period belonged to February 20, 2020, to January 19, 2021. Given that the frequency of suicide attempts in the pre-COVID-19 era was equal to 2678 cases and in the post-COVID-19 era was 966 cases, in order to equalize the sample size of data before and after COVID-19, 966 cases from the pre-COVID-19 suicide attempts were selected as random samples using a random sampling method and a table of random numbers; thus, the pre-COVID-19 and post-COVID-19 data were compared using two samples with

the same number.

### *Data analysis*

Descriptive indices, such as frequency and percentage, and the chi-square test (with a significance level of 0.05) and Excel and SPSS software were used for data analysis.

## Results

The total frequency of suicide attempt cases was 1475, 1268, and 901 in 2018, 2019, and the first ten months of 2020, respectively. The frequency of suicide attempts recorded in three years is provided in Figure 1 by month. According to this diagram, the frequency of suicide attempts was less in all months of 2020 (post-COVID-19) than in 2018 (pre-COVID-19), and only from September 22 to November 20, 2020, the frequency of suicide attempts elevated compared to 2019 (pre-COVID-19).

According to the results provided in Table 1, in the pre-COVID-19 and post-COVID-19 time periods, the frequency of women was more than that of men, although in the post-COVID-19 period, the frequency of women decreased compared to the pre-COVID-19 period, while it increased in men. In different groups according to education level, in the post-COVID-19 period, the frequency of suicide attempts considerably increased among individuals with primary school education compared to the pre-COVID-19 period, reaching from 9 to 377 cases. On the contrary, among individuals with associate's degrees, the frequency of suicide attempts decreased in the post-COVID-19 period than in the pre-COVID-19 period, reaching from 387 to 23 cases. In the pre-COVID-19 period, the frequency of suicide attempts was generally higher in groups with diploma and associate's degree compared to other groups; however, in the post-COVID-19 period, individuals with an education level of elementary school and diploma had the highest frequency. The individuals' mean age group before and after COVID-19 was the same (equal to 26 years). No considerable changes were found in the frequency of suicide attempts in the pre-COVID-19 and post-COVID-19 periods in different age groups; however, in the age group of 31-40 years, the frequency of suicide attempts decreased after COVID-19 compared to before it, reaching from 182 to 159 cases; overall, the frequency of suicide attempts was higher in the age group of 10-40 years than in other age groups. Regarding marital status, the frequency of suicide attempts among married individuals decreased in the post-COVID-19 compared to the pre-COVID-19 period, and increased among single individuals; the frequency of suicide attempts was generally higher among single individuals than in other groups. In different occupational groups, the frequency of suicide attempts increased among self-employed and unemployed subjects in the post-COVID-19 period than in the pre-COVID-19 period; however, it decreased among housewives and students. In general, the frequency of suicide attempts was higher among self-employed and unemployed individuals, housewives, and students than among other groups. Regarding the place of residence, the frequency of suicide attempts in the city of Kerman decreased in the post-COVID-19 period than in the pre-COVID-19 period and increased in other cities of the province; the frequency of suicide attempts was generally higher in the city of Kerman than in other groups. According to the chi-square test results, the changes in the frequency of suicide attempts based on individuals' demographic characteristics were significant in other groups (p-value $< 0.05$) in the post-COVID-19 compared to the pre-COVID-19 period, except for the age group (p-value $= 0.130$) and the place of residence ($P = 0.396$).

According to Table 2, the frequency of suicide attempts culminating in death increased in the post-COVID-19

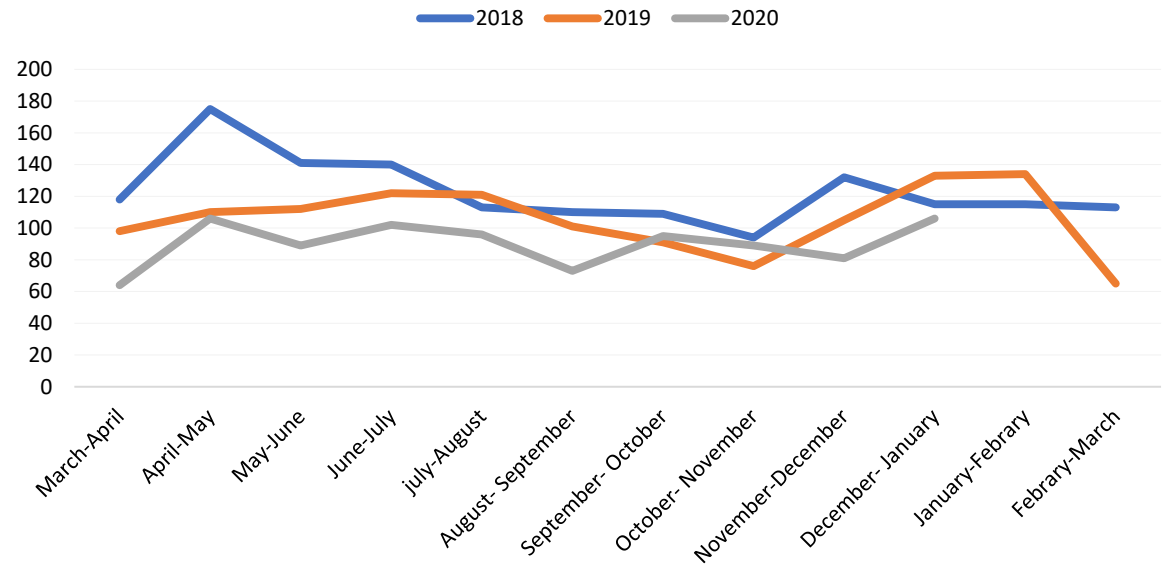


**Figure 1.** The frequency of suicide attempts recorded in different months of 2018 to 2020

**Table 1.** Changes in the frequency of suicide attempts based on individuals' demographic characteristics before and after COVID-19

| General characteristics | Categorization | Pre-COVID-19 period | | Post-COVID-19 period | | *P* value* |
|---|---|---|---|---|---|---|
| | | Frequency | % | Frequency | % | |
| Gender | Female | 591 | 61.18 | 521 | 53.93 | 0.001 |
| | Male | 375 | 38.82 | 445 | 46.07 | |
| Education level | Elementary school | 9 | 0.93 | 377 | 39.03 | <0.001 |
| | Illiterate | 42 | 4.35 | 66 | 6.83 | |
| | Guidance school | 58 | 6.00 | 0 | 0.00 | |
| | Diploma | 407 | 42.13 | 426 | 44.10 | |
| | Associate | 387 | 40.06 | 23 | 2.38 | |
| | Bachelor | 27 | 2.80 | 28 | 2.90 | |
| | Master | 31 | 3.21 | 6 | 0.62 | |
| | Ph.D. | 5 | 0.52 | 1 | 0.10 | |
| | Unknown | 0 | 0.00 | 39 | 4.04 | |
| Age group | 10-20 years | 359 | 37.16 | 370 | 38.30 | 0.130 |
| | 21-30 years | 360 | 37.27 | 351 | 36.34 | |
| | 31-40 years | 182 | 18.84 | 159 | 16.46 | |
| | 41-50 years | 47 | 4.87 | 53 | 5.49 | |
| | 51-60 years | 14 | 1.45 | 19 | 1.97 | |
| | Over 60 years | 4 | 0.41 | 14 | 1.45 | |
| Marital status | Married | 410 | 42.44 | 373 | 38.61 | 0.032 |
| | Single | 471 | 48.76 | 526 | 54.45 | |
| | Divorced | 19 | 1.97 | 8 | 0.83 | |
| | Widow | 1 | 0.10 | 0 | 0.00 | |
| | Unknown | 65 | 6.73 | 59 | 6.11 | |
| Occupation type | Self-employed | 247 | 25.57 | 299 | 30.95 | 0.002 |
| | Employee | 12 | 1.24 | 16 | 1.66 | |
| | Worker | 3 | 0.31 | 4 | 0.41 | |
| | Retired | 1 | 0.10 | 1 | 0.10 | |
| | University student | 29 | 3.00 | 11 | 1.14 | |
| | Housewife | 369 | 38.20 | 337 | 34.89 | |
| | Unemployed | 95 | 9.83 | 126 | 13.04 | |
| | Student | 158 | 16.36 | 136 | 14.08 | |
| | Unknown | 52 | 5.38 | 36 | 3.73 | |
| Place of residence | Capital (Kerman) | 817 | 84.58 | 791 | 81.88 | 0.396 |
| | Other cities in the province | 116 | 12.01 | 137 | 14.18 | |
| | Outside the province | 2 | 0.21 | 4 | 0.41 | |
| | Unknown | 31 | 3.21 | 34 | 3.52 | |

*According to the chi-square test.

than in the pre-COVID-19 period and decreased in the category of discharge with personal consent; overall, about 96% of suicide attempts culminate in recovery. Regarding the history of suicide or mental problems, the frequency of suicide attempts was lower in individuals with a previous history of suicide or mental health problems in the post-COVID-19 than in the pre-COVID-19 period; overall, the frequency of suicide attempts was higher in individuals without a history of suicide or mental health problems. In relation to the cause of suicide, the frequency of suicide attempts due to family problems and also for unknown reasons increased in the post-COVID-19 period compared to the pre-COVID-19 period, while the frequency of suicide attempts due to drug abuse decreased in the post-COVID-19 period compared to the pre-COVID-19 period; in general, the frequency of suicide attempts due to mental disorders and family problems was higher than other causes. Regarding the method used for suicide, the frequency of suicide attempts using methadone and tramadol tablets, detergents, paraquat, poison, insecticides, and combined methods elevated in the post-COVID-19 compared to the pre-COVID-19

**Table 2.** Changes in the frequency of suicide attempts based on characteristics of suicide before and after COVID-19

| General characteristics | Categorization | Pre-COVID-19 period | | Post-COVID-19 period | | *P* value* |
|---|---|---|---|---|---|---|
| | | Frequency | % | Frequency | % | |
| Suicide attempt result | Recovery | 928 | 96.07 | 933 | 96.58 | <0.001 |
| | Discharge by personal consent | 27 | 2.80 | 8 | 0.83 | |
| | Death | 11 | 1.14 | 25 | 2.59 | |
| A history of suicide | No | 956 | 98.96 | 965 | 99.90 | 0.006 |
| | Yes | 10 | 1.04 | 1 | 0.10 | |
| A history of mental disorders | No | 954 | 98.76 | 965 | 99.90 | 0.002 |
| | Yes | 12 | 1.24 | 1 | 0.10 | |
| Cause of suicide | Psychiatric problems | 139 | 14.39 | 128 | 13.25 | 0.008 |
| | Dispute | 65 | 6.73 | 62 | 6.42 | |
| | Drug abuse | 12 | 1.24 | 0 | 0.00 | |
| | Accused prisoner | 1 | 0.10 | 1 | 0.10 | |
| | Family problems | 717 | 74.22 | 741 | 76.71 | |
| | Emotional problems | 4 | 0.41 | 0 | 0.00 | |
| | Unknown | 28 | 2.90 | 34 | 3.52 | |
| Suicide method | Drugs (opium, crystal, heroin, marijuana) | 29 | 3.00 | 31 | 3.21 | 0.003 |
| | Alcohol | 14 | 1.45 | 8 | 0.83 | |
| | Methadone and tramadol tablets | 88 | 9.11 | 136 | 14.08 | |
| | Rice tablets | 9 | 0.93 | 11 | 1.14 | |
| | Other tablets | 721 | 74.64 | 644 | 66.67 | |
| | Detergents (plunger, acid, thinner) | 5 | 0.52 | 18 | 1.86 | |
| | Paraguat, poison, insecticide | 63 | 6.52 | 73 | 7.56 | |
| | Oil and gasoline | 1 | 0.10 | 1 | 0.10 | |
| | Unknown and other methods | 15 | 1.55 | 15 | 1.55 | |
| | A combination of several simultaneous methods (alcohol, opium, methadone, pills) | 19 | 1.97 | 28 | 2.90 | |
| | Hanging | 2 | 0.21 | 2 | 0.21 | |

*According to the chi-square test.

period. On the contrary, the use of methods such as alcohol and other pills declined; overall, suicide attempts using other pills, methadone, tramadol, paraquat, poison, and insecticides were more frequent than other methods. According to the chi-square test results, the changes in the frequency of suicide attempts were significant in the post-COVID-19 compared to the pre-COVID-19 period based on characteristics of suicide in all categories ($P < 0.05$).

## Discussion

According to the present study results at Afzalipour hospital, Kerman, Iran, the frequency of suicide attempts has significantly changed regarding individuals' gender, education level, marital status, and occupation, and all suicide-related characteristics in the post-COVID-19 compared to the pre-COVID-19 period.

The results of the present research demonstrate the increased frequency of suicide attempts among men after the COVID-19 pandemic. In addition, men exhibited a higher suicide rate than women at all times, in all regions of the world, and in various ethnic and socio-economic groups (21,22); recent studies also indicate a similar trend during the COVID-19 pandemic (23,24). One of the reasons reported for the increased frequency of suicide attempts among men during the COVID-19 epidemic was the existence of economic problems originating from the temporary closure of businesses (25). Thus, according to the results of previous studies and those of the current study, it is necessary for policy-makers of the health system to make appropriate decisions and policies to reduce suicide, particularly among men, in crises such as COVID-19 (26).

In the current study, in the post-COVID-19 period, suicide attempts were the most frequent among individuals with an education level of elementary school and diploma. The results of Mamun and colleagues' study revealed that individuals' low education level plus other factors could culminate in the incidence of suicide under critical conditions, such as COVID-19 (27). Previous studies have indicated that a high education level can lead to social welfare, probably mitigating the level of depression and the occurrence of suicidal thoughts in

individuals (28); hence, the majority of individuals with low education levels are self-employed or unemployed, are not in suitable conditions economically, and under COVID-19 conditions, due to restrictions on household and freelance businesses, the frequency of suicide attempts has increased among these individuals.

The results of the present study indicated that after the COVID-19 period, the frequency of suicide attempts elevated among single individuals. According to the results of Holik and colleagues' study, suicide is mostly committed by single individuals and that married individuals have committed suicide significantly less in the post-COVID-19 period than in the pre-COVID-19 period, denoting the relationship between loneliness and its detrimental effects on mental health and the incidence of thoughts, such as suicide attempt, among single individuals (29).

In the current research, unemployed individuals and those with self-employed occupations had higher frequencies of suicide attempts than other occupational groups during the COVID-19 period. On the other hand, the frequency of suicide attempts decreased among students. Rahmani and Rezaeian's study indicated that COVID-19 resulted in disrupting individuals' economic status, livelihood, and employment (16), and unemployment was linked to a higher prevalence of suicide among individuals (6). Unemployed individuals or those with self-employed occupations who became unemployed during COVID-19 were subjected to the risk of poor mental health more than their employed counterparts; subsequently, more households fell below the minimum income level required for living (15). Suicide, as the second leading cause of mortality among American students, has induced substantial concern in the health sector (30). Academic stress also gives rise to the incidence of depression symptoms and, consequently, suicidal behaviors among students (16). According to the results of previous studies, holding virtual classes and tests during the COVID-19 era has played a substantial role in mitigating anxiety, stress, and excitement among students (31), resulting in decreasing their suicidal thoughts.

As shown by the current research results, the frequency of suicide attempts decreased in the city of Kerman, the capital of the province, and increased in other cities of the province in the post-COVID-19 compared to the pre-COVID-19 period. Similarly, the frequency of suicide is higher in low-populated cities and rural regions than in the capitals of provinces and high-populated urban regions, resulting from individuals' low social capital, extreme social fragmentation, and low access to appropriate healthcare, treatment, and welfare facilities (29). Monteith et al indicated in their study that during the COVID-19 outbreak, the suicide risk factors might be intensified among people living in low-populated urban and rural regions, and the suicide rate might subsequently increase; moreover, by being aware of this problem, the health system policy-makers must take steps toward preventing suicide in underdeveloped urban and rural communities, whether during or after crises such as COVID-19, by adopting appropriate policies (32).

The results of this research demonstrated that the frequency of suicide attempts resulting in death slightly increased in the post-COVID-19 period than in the pre-pandemic era; however, based on previous studies, there is no robust evidence denoting a considerable increase in death by suicide during COVID-19 (12).

Based on the results of this study, suicide attempts have decreased among individuals with a previous history of suicide or mental problems in the post-COVID-19 period than in the pre-COVID-19 period, showing the prevalence of suicide among healthy individuals without a history of mental disorders. Research results demonstrate that the frequency of suicides during the COVID-19 period is higher among individuals without a history of mental health problems, and during this critical period, even healthy individuals have committed suicide because of economic and financial problems (33).

Considering the present research, the frequency of suicide attempts due to family problems has increased during the COVID-19 period. Research reveals that applying social restrictions, individuals' quarantine, and policies made in this regard in different countries have led a large number of individuals to stay at home in this period and, subsequently, a considerable increase in the frequency of marital conflicts, parent-children conflicts, violence, and family problems (12,34).

This study indicated that in the COVID-19 period, suicide attempts using methods such as pills, detergents, and poisons have increased compared to other methods. As suggested by Fernández et al, the most commonly used method for suicide was the use of several drugs, particularly antidepressants and anti-anxiety drugs (18). During the COVID-19 outbreak, given the increased use of detergents by families, the rate of poisoning due to the use of detergents increased compared to before the outbreak, the reason for which could be attributed to their increased accessibility (35).

## Conclusion

A suicide attempt is one of the probable unwanted consequences of the COVID-19 outbreak. During the COVID-19 era, social distancing and quarantine have resulted in financial and social crises, and low-educated men, often self-employed or unemployed, living in rural or low-income urban regions were more affected. The increased amount of staying at home for individuals culminated in the incidence of family conflicts and problems, and by increasing the stress and anxiety resulting from the fear of facing this disease, taking antidepressants and anti-anxiety tablets was enhanced. On the other hand,

the use of detergents for disinfection increased; thus, most of the suicide attempt cases have had such characteristics and conditions. Based on the results of the present research, it is necessary for health system policy-makers to develop measures and policies for inhibiting suicide during and after epidemics. Furthermore, it is recommended that via early diagnosis and proper management of high-risk and vulnerable individuals and groups against suicide and also the use of psychiatric and psychological counseling services, essential interventions be implemented to inhibit the consequences of suicide.

### Authors' Contribution

**Conceptualization:** Mohammad Hossein Mehrolhassani.
**Data curation:** Rohaneh Rahimisadegh, Mohammad Hossein Mehrolhassani.
**Formal analysis:** Rohaneh Rahimisadegh, Mohammad Hossein Mehrolhassani.
**Methodology:** Rohaneh Rahimisadegh, Mohammad Hossein Mehrolhassani.
**Software:** Rohaneh Rahimisadegh.
**Validation:** Rohaneh Rahimisadegh, Mohammad Hossein Mehrolhassani.
**Writing–original draft:** Rohaneh Rahimisadegh.
**Writing–review & editing:** Rohaneh Rahimisadegh, Mohammad Hossein Mehrolhassani.

### Competing Interests

The authors declared no conflict of interest in the present study.

### Ethical Approval

This study received a code of ethics (IR.KMU.REC.1400.119) from the Ethics Committee of Kerman University of Medical Sciences. In order to comply with the confidentiality of the participant information, the data were extracted anonymously and submitted to the research team; therefore, the individuals' names were not known in the data analysis stage.

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