

The Protective Effect of Ramadan on Suicide: A Study Based on Monthly Suicide Statistics of Turkey

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ABSTRACT

Ramadan is one of the months in the Islamic lunar calendar and is considered the most sacred month. Ramadan brings significant changes to the daily lives of Muslims, and previous studies have identified various alterations in health-related parameters during this period. This study analyzed the relationship between Ramadan and suicide, a topic that has been relatively underexplored. This study analyzed monthly national suicide statistics in Turkey from 2003 to 2022 to investigate whether there was a statistically significant difference in suicide rates between months with Ramadan days and those without. As a result, it was found that suicide rates in months with Ramadan days were significantly lower in the total population and the male population. Although the rates were also lower in the female population compared to months without Ramadan days, the difference was not statistically significant. Religious sentiments and social environments during Ramadan may protect Muslims from suicide. Future studies using time series analysis could provide valuable insights and data free from the influence of seasonal effects.

Keywords: Suicide; Islam; Fasting; Protective Factors; Turkey

Introduction

Ramadan is one of the months in the Islamic lunar calendar and is considered the most sacred month. During this period, adult Muslims observe religious fasting, which is regarded as a significant religious obligation (1). During this month, activities such as consuming food and beverages, engaging in sexual intimacy, taking medication, and smoking are abstained from for a specific period of the day (2). Additionally, this period often involves increased social gatherings with loved ones, communal activities, and a heightened focus on religious practices and reflections in the lives of Muslims (3). Such significant changes lead to noticeable alterations in the human body, health parameters, and human behavior. Consequently, the predominantly positive effects of Ramadan on human health have been demonstrated in various biochemical, physiological, and statistical studies (1,4–8).

Although numerous studies have been conducted on the effects of Ramadan and fasting on human health, the number of studies examining their impact on suicide is quite limited. In the literature review conducted here, only five studies were identified that directly or indirectly addressed changes in suicide rates during the month of

Ramadan (7–11). The presence of some contradictory findings in these studies highlights the need for further research on the relationship between Ramadan and suicide (1).

The fact that Ramadan is a month in the lunar calendar and shifts by 11 or 12 days each year within the Gregorian calendar presents a significant challenge in studies related to Ramadan (1,7). Due to this shift, Ramadan falls in different seasons in different years, making it very challenging to distinguish the effects of seasonal variations from those of Ramadan. The contradictory findings reported in many studies may also stem from methodological errors related to this issue (1). One way to address this problem could be to conduct separate studies for each season. This approach may allow for obtaining reliable results that are free from the influence of seasonal effects (1).

Suicide is a significant public health concern, and according to WHO data, more than 720,000 people die by suicide each year (15,16). Numerous studies to date have identified that suicidal behavior is associated with a variety of factors. These include psychiatric disorders, substance abuse, cultural and religious influences, socioeconomic factors, and issues related to family life, work life, and personal life (17).

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Studies examining suicide behavior in relation to public and religious holidays and special days have identified some significant associations. Many studies have found evidence suggesting that suicide rates increase during or shortly after holidays (15,18–25). Conversely, some of these studies have found that certain holidays and special occasions reduce the risk of suicide (15,21,23,24,26). One of these studies, conducted in the United States, examined Memorial Day, Christmas, Thanksgiving, New Year's Day, July 4th, and Labor Day. It found that suicide rates significantly decreased on Memorial Day, Christmas, and Thanksgiving, while they significantly increased on New Year's Day, July 4th, and Labor Day (24). Another study analyzed statistics for Easter, Christmas, New Year's Day, Valentine's Day, and Anzac Day in Australia between 1990 and 2009. The results revealed that only Christmas Eve and New Year's Day showed a significant change, both in the form of an increase (19). In an analysis of suicide cases in Hungary between 1970 and 2002, it was found that suicide rates were significantly higher on New Year's Day and significantly lower on Christmas Day, Easter Sunday, and Easter Monday, with no changes observed on national holidays. This suggests that there may be cross-cultural similarities, as seen with New Year's Day, as well as differences, as observed with national holidays.

There are two hypotheses regarding the mechanisms by which suicide rates increase or decrease on national, cultural, and religious special days. The first is the "broken promise" mechanism. According to this hypothesis, the hope for a 'new beginning' brought about by a special day, such as New Year's, reduces the risk of suicide; however the subsequent disappointment that follows increases the risk. The increased suicide rates observed on the first day of the New Year in various studies support this hypothesis (15,19). The second hypothesis suggests that the absence of work on special days followed by its resumption afterward, manifests as a decrease in suicide risk during the holiday and an increase afterward (15). It remains a subject of interest whether these hypotheses, which are based on cultural elements of the Western world, also hold true within Muslim cultures. Similarly, it is necessary to investigate whether the findings on the relationship between Ramadan and suicide—derived from a small number of studies conducted on limited populations—are also reflected in nationwide statistics.

This study aimed to investigate the effect of Ramadan on the total number and incidence of suicides in Turkey. By analyzing nationwide suicide statistics from 2003 to 2022, during which Ramadan coincided with the summer months of May to October, changes in suicide incidence were examined.

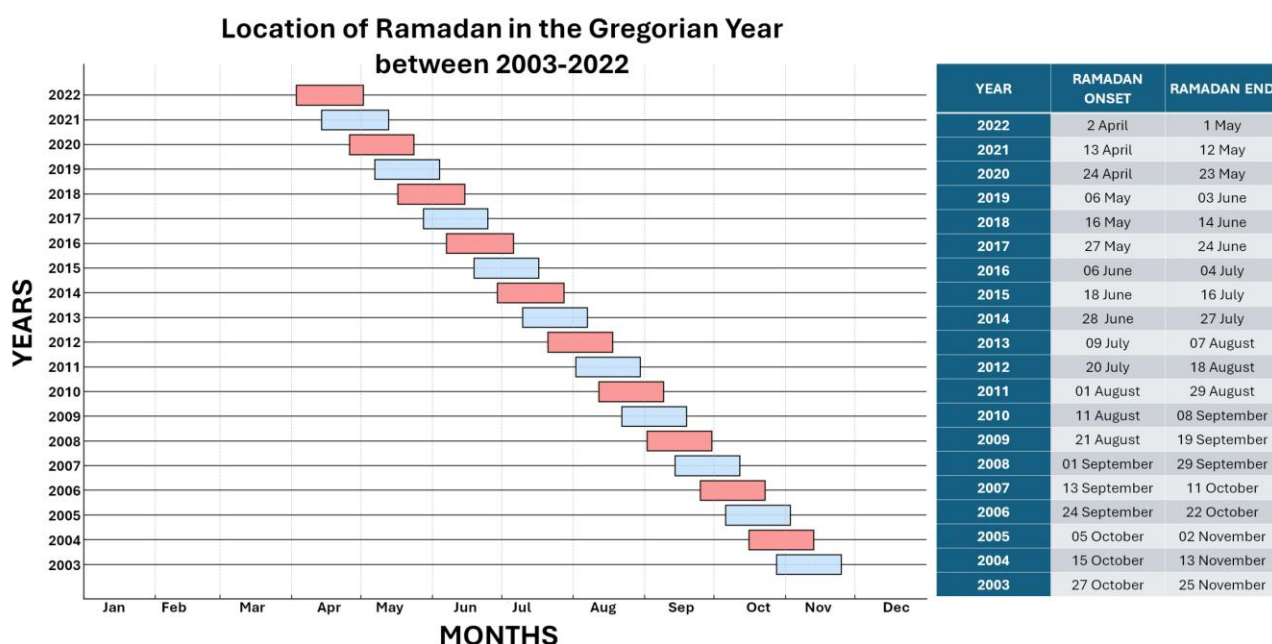
Material and Methods

Country: The study was conducted in Turkey, where 99.2% of the adult population identified as Muslim according to 2014 statistical data (12). According to the 2014 report by the Turkish Presidency of Religious Affairs, 83.4% of the adult population in Turkey observes fasting during Ramadan, with this rate being 80.7% among men and 86.0% among women. Based on these figures, it was anticipated that Ramadan would have a significant impact on daily life and health parameters in Turkey. From this perspective, if Ramadan has any effect on suicide rates, Turkey was deemed an appropriate location to investigate this phenomenon.

Suicide Statistics: Ideally, daily statistics would be the most suitable data for Ramadan studies; however, daily suicide statistics are unfortunately unavailable for Turkey. Instead, the Turkish Statistical Institute has been regularly publishing annual and monthly suicide statistics since year 2000. For this study, we conducted an analysis using the monthly national suicide statistics from the period between 2003 and 2022, during which Ramadan coincided with the summer months of May to October (13). In 2003, part of Ramadan coincided with the last 5 days of October. In subsequent years, Ramadan shifted "backward" according to the Gregorian calendar, with part of it coinciding with the first day of May in 2022 (Figure-1).

For the total of 120 summer months (from May to October) within this 20-year period, the number of suicides for males, females, and total population were recorded. These numbers were then converted into suicide incidence rates using population data from the Turkish Statistical Institute (14). For each of these 120 summer months, the number of Ramadan days falling within the respective month was also recorded. The recorded data can be accessed in Supplement-1 for further reading.

Since findings suggest that analyzing each season separately yields more reliable results in Ramadan studies (1), a similar approach was adopted in our study. Although a comparable analysis for the



winter months was considered, it could not be conducted due to the unavailability of monthly suicide statistics prior to the year 2000.

Statistical Analysis: To examine the effect of Ramadan on suicide rates, all months included in the analysis were first divided into two groups: months with Ramadan days and months without. Descriptive suicide statistics for these two groups were calculated for the male, female, and total populations. The distributions of suicide incidence in these two groups were then compared to test for any statistically significant differences.

A second analysis was conducted by creating a new grouping based on the number of Ramadan days in each month. Months with no Ramadan days were classified as Group 1, months with 1–9 Ramadan days as Group 2, months with 10–19 Ramadan days as Group 3, and months with 20–30 Ramadan days as Group 4. The distributions of suicide statistics were then compared across these groups to test for any differences.

A third analysis was conducted using correlation tests. The relationship between the number of Ramadan days in each month and the male, female, and total suicide incidence rates for that month was examined to determine whether there was a significant correlation.

Finally, a different approach was taken by creating new groups for comparison. This analysis was conducted to ensure that the increasing suicide trend over the years did not introduce bias into the results. For this purpose, suicide incidence rates for months with Ramadan were directly categorized as the Ramadan group. Then, for each

month, paired data were generated from years when Ramadan did not occur in that specific month, aiming to establish a non-Ramadan suicide statistic for each Ramadan month. For example, Ramadan occurred in September between 2006 and 2010. To answer the question, 'What would the suicide incidence in September 2010 have been if Ramadan had not occurred in that month?' the average suicide incidence rates for September in 2015 and 2005 (years when Ramadan did not fall in September) were calculated and considered the 'counterfactual suicide incidence for September 2010.' A comparison was then made between the suicide statistics of this counterfactual group and the Ramadan group to test for any differences.

To determine whether continuous variables followed a normal distribution, the Kolmogorov-Smirnov or Shapiro-Wilk test was applied. Parametric tests were used for variables with a normal distribution, while non-parametric tests were applied for those without a normal distribution. A significance level of 0.05 was considered statistically significant. Statistical analyses were performed using SPSS v.26.

Results

During the 20-year period between 2003 and 2022, a total of 33,331 suicide-related deaths occurred during the six-month periods between May and October. Of these cases, 23,682 (71.1%) were male, and 9,649 (28.9%) were female. The total number of suicide-related deaths during the 32 months containing Ramadan days was 8,472

Table 1: Descriptive Suicide Statistics of Summer Months with Ramadan Days and Summer Months without Ramadan Days

TOTAL POPULATION						
	Mean	Median	SD	IQR	Min-Max	p
Non-Ramadan Summer Months	0.370	0.367	0.041	0.053	0.269-0.490	0.003*
Ramadan Summer Months	0.344	0.344	0.055	0.069	0.249-0.511	
MALE POPULATION						
	Mean	Median	SD	IQR	Min-Max	p
Non-Ramadan Summer Months	0.521	0.515	0.084	0.110	0.360-0.740	0.047*
Ramadan Summer Months	0.483	0.495	0.108	0.150	0.310-0.750	
FEMALE POPULATION						
	Mean	Median	SD	IQR	Min-Max	p
Non-Ramadan Summer Months	0.218	0.209	0.054	0.072	0.116-0.355	0.223
Ramadan Summer Months	0.204	0.199	0.035	0.054	0.134-0.287	
* p value <0.05						

* p value <0.05

(25.4%), while the total for the 88 months without Ramadan days was 24,859 (74.6%). In the male population, these numbers were 5,998 (25.3%) and 17,684 (74.7%), respectively, while in the female population, they were 2,474 (25.6%) and 7,125 (74.4%), respectively.

When comparing suicide incidence rates between months with and without Ramadan days, the rates were found to be lower in months with Ramadan for the total population (Mean values: 0.344 vs. 0.370), male population (0.483 vs. 0.521), and female population (0.204 vs. 0.218). This difference was statistically significant for the total population ($p=0.003$) and the male population ($p=0.047$) (Table-1).

In the analysis conducted based on the grouping of months according to the number of Ramadan days they contained, a pattern was observed in which suicide incidence decreased as the number of Ramadan days in a month increased for the total, male, and female populations. This pattern was statistically significant in the total population ($p=0.009$) (Table-2).

In the correlation tests, a significant negative correlation was identified between the number of Ramadan days in a month and suicide incidence rates in the total and male populations (Total Population: Spearman Correlation= -0.310; $p=0.001$; Male Population: Spearman Correlation: -0.215; $p=0.018$). Although a negative correlation

and a trend was also observed in the female population, this correlation was not statistically significant (Spearman Correlation: -0.135; $p=0.142$).

When the suicide statistics of counterfactual months, calculated to exclude the effect of Ramadan, were compared with those of months containing Ramadan days, a similar pattern was observed with slight differences. While a significant difference was found between the groups in terms of total suicide incidence ($p=0.010$), a clear trend was observed in male cases ($p=0.054$). Although not statistically significant, suicide rates in female cases were also lower in months with Ramadan days ($p=0.224$) (Table-3).

Discussion

This study investigated the relationship between Ramadan and suicide, a topic that has received very limited attention in the existing literature. Ramadan is a period characterized by significant changes in the lifestyle of Muslims, and based on the hypothesis that such changes might influence national suicide rates—as they do other health statistics—this analysis was conducted. As a result, findings suggest a significant reduction in suicide rates during Ramadan, particularly among men.

Table 2: Descriptive Suicide Statistics Based on the Groups Arranged According to Number of Ramadan Days in Each Month

TOTAL POPULATION						
	Mean	Median	SD	IQR	Min-Max	<i>p</i>
Months without Ramadan Days	0.370	0.367	0.415	0.053	0.269-0.490	<i>0.009*</i>
Months with 1 to 9 Ramadan Days	0.369	0.348	0.062	0.062	0.298-0.511	
Months with 10 to 19 Ramadan Days	0.346	0.348	0.560	0.067	0.272-0.472	
Months with 20 to 30 Ramadan Days	0.322	0.332	0.0434	0.073	0.249-0.380	
MALE POPULATION						
	Mean	Median	SD	IQR	Min-Max	<i>p</i>
Months without Ramadan Days	0.521	0.515	0.084	0.110	0.360-0.740	<i>0.294</i>
Months with 1 to 9 Ramadan Days	0.520	0.490	0.117	0.190	0.390-0.740	
Months with 10 to 19 Ramadan Days	0.481	0.500	0.117	0.160	0.340-0.750	
Months with 20 to 30 Ramadan Days	0.454	0.460	0.089	0.160	0.310-0.600	
FEMALE POPULATION						
	Mean	Median	SD	IQR	Min-Max	<i>p</i>
Months without Ramadan Days	0.218	0.209	0.054	0.072	0.116-0.355	<i>0.133</i>
Months with 1 to 9 Ramadan Days	0.215	0.204	0.044	0.082	0.168-0.287	
Months with 10 to 19 Ramadan Days	0.210	0.212	0.026	0.049	0.166-0.248	
Months with 20 to 30 Ramadan Days	0.189	0.186	0.033	0.059	0.134-0.242	
* p value <0.05						

As previously explained, there are two main hypotheses regarding changes in suicide rates during religious, cultural, and national special days: the “broken promise” hypothesis and the “absence of work” hypothesis (15). Although these hypotheses were proposed to explain different cultures and their respective special days, they may also be partially applicable to Ramadan and its effects. Specifically, in a spiritual atmosphere like Ramadan, individuals might postpone suicide with the hope of a new beginning. The lower suicide rates observed during Ramadan in our study may be linked to this phenomenon.

The studies discussed thus far focus on Western cultures and their associated special days. In contrast, when examining studies related to the

Muslim world and Ramadan, it becomes evident that the number of such studies is insufficient. An important study on this subject examined suicide-related deaths in Istanbul between 1978 and 2012. The study’s focus on a 33-year period, corresponding to the time it takes for Ramadan to complete one full cycle within the Gregorian calendar year, adds particular significance to its findings. The study concluded that suicide-related deaths occurring during Ramadan were significantly lower compared to non-Ramadan periods (10). It was of interest to determine whether the findings of this study, conducted in Istanbul, Turkey's largest city, could be observed in nationwide statistics. The results of our study are consistent with those reported in this earlier research. Additionally, a potential limitation of this previous study could have been the relatively

Table 3: Descriptive Statistics for Months with Ramadan Days and Counterfactual Months

TOTAL POPULATION						
	Mean	Median	SD	IQR	Min-Max	<i>p</i>
Non-Ramadan Counterfactual Summer Months	0.370	0.381	0.043	0.050	0.260-0.460	0.010
Ramadan Summer Months	0.344	0.344	0.055	0.069	0.249-0.511	
MALE POPULATION						
	Mean	Median	SD	IQR	Min-Max	<i>p</i>
Non-Ramadan Counterfactual Summer Months	0.527	0.535	0.085	0.130	0.330-0.680	0.054
Ramadan Summer Months	0.483	0.495	0.108	0.150	0.310-0.750	
FEMALE POPULATION						
	Mean	Median	SD	IQR	Min-Max	<i>p</i>
Non-Ramadan Counterfactual Summer Months	0.211	0.213	0.019	0.040	0.180-0.250	0.224
Ramadan Summer Months	0.204	0.199	0.035	0.054	0.134-0.287	
* p value <0.05						

* *p* value <0.05

low number of total suicide deaths, particularly for deaths occurring around 1978. In contrast, our study, with its large-scale national data, confirms the findings of the Istanbul study and provides significant evidence supporting the reduction in suicide rates during Ramadan.

Another study conducted in Turkey investigated the effect of Ramadan on medicolegal deaths and found a significant reduction in both homicide and suicide numbers during Ramadan. In this study, the decrease in suicide rates during Ramadan was attributed to several potential factors: the perception of suicide as one of the gravest sins in Islam, the belief that even contemplating suicide is considered a sign of weak faith, and the heightened experience of religious sentiments during this period (7). In another study, no difference was found in the number of completed suicides between Ramadan and non-Ramadan periods. Interestingly, however, an increase in suicide attempts was observed during Ramadan. It was emphasized that this increase was more likely related to seasonal effects, which could not be controlled for in the study, rather than the specific impact of Ramadan (8). Two other studies on Ramadan and suicide also identified a significant decrease in suicide rates (9,11). The results of our study confirm the

findings of other studies in this field. In addition to the mechanisms proposed in the literature regarding the effect of Ramadan in reducing suicide rates, we suggest that social interactions may also play a role. Social isolation has been identified as a factor closely associated with an increased risk of suicide (27), whereas Ramadan is characterized by increased social activities and greater interaction with family and close circles (3). This environment may protect individuals at risk of suicide from taking such actions, at least temporarily.

The seasonality of suicide rates has been consistently demonstrated in numerous studies. Suicide rates particularly peak during the spring and early summer months of the year (28). Considering that Ramadan cycles through different times of the year and seasons every 33 years (1,7,10), seasonality emerges as a confounding factor that must be carefully accounted for and controlled when investigating the relationship between Ramadan and suicide cases. One way to overcome this issue is to conduct a study using 33 years of data. While there are studies on Ramadan and health conducted over such long periods (1,10), carrying out a study of this duration is often very challenging or practically impossible. Another

approach could involve single-season studies, where the statistics for each season are analyzed independently (1). Due to the unavailability of daily national suicide statistics and the lack of monthly data for a 33-year period, our study adopted this method. Although this approach is not ideal, it is valuable as it enables the execution of studies that would otherwise be unfeasible.

Suicide behavior shows significant differences between the sexes (29). One of the primary distinctions is in suicide rates: men are 2.50 to 3.67 times more likely to die by suicide than women (17, 30). In contrast, suicidal ideation and attempts are more frequent among women (29). The factors that increase or decrease suicide rates also vary between genders (31). Similarly, our study found a gender-based difference in the effect of Ramadan on suicide. While a significant decrease in suicide rates was observed in the male and overall populations during Ramadan, this level of reduction was not evident among women. This discrepancy may be partially explained by increased responsibilities traditionally assigned to women during Ramadan in Turkish culture. Social gatherings and events during Ramadan may place additional burdens on women in terms of meal preparation and household chores. Moreover, the need to wake earlier than other household members to prepare food for sahur may negatively affect sleep patterns (1). Such factors may increase stress levels among women and potentially counteract the protective effect of Ramadan against suicide. Further studies focusing specifically on women—particularly those examining depression, sleep quality, and stress levels during Ramadan—may help clarify this issue.

Finally, the most reliable method for producing accurate results is likely time series analysis, as it accounts for confounding factors such as population changes over the years, increasing suicide incidence rates, and seasonal fluctuations (1). Future studies aiming to demonstrate the protective effect of Ramadan on suicide rates could adopt this method.

This study investigated whether suicide statistics were affected during a 20-year period when Ramadan coincided with the summer months in Turkey, a country with a predominantly Muslim population, a significant portion of whom observe religious practices during Ramadan. In conclusion, Ramadan was found to be significantly associated with reduced suicide incidence rates. This decrease has been hypothesized to be related not only to the strict prohibition of suicide in Islam but also

to the increase in social interactions during this period. It is suggested that future research would benefit from further exploring this association. It is also suggested that future studies adopt time series analyses to more clearly elucidate the relationship between Ramadan and suicide.

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