



# Thank God it's Friday?—Correlation of the beginning and end of the week in general and Christmas holidays in particular with manner of death

## A retrospective cohort study

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### Abstract

**Objective:** We evaluated the phrase “Thank God it’s Friday” (TGIF) from a forensic pathologist’s view, i.e. the correlation between the beginning and end of the week in general and Christmas Holidays in particular and the manner of death.

**Material and methods:** We retrospectively analyzed 758 consecutive autopsy cases from January 2017 to June 2019.

**Results:** There was no correlation between natural deaths and the beginning or the end of the week. One of our main findings in terms of a weekday effect was a profound increase in homicides towards the end of the week. In terms of a Christmas Holiday effect, we sadly observed a profoundly higher rate of suicide cases during Christmas Holidays compared with the rest of the year.

**Conclusion:** The TGIF phrase should be modified towards something like “Thank God, it’s Monday” (TGIM). We also should look out for our lonely and mood-susceptible fellow human beings in particular during Christmas Holidays.

### Keywords

Natural death · Suicide · Homicide · Accident · Forensic Pathology

## Introduction

The possible correlation between weekdays with random events and incidents has always been of great interest to both serious researchers and curious people of all kinds.

Regarding the latter, seemingly fantastic questions arise, such as if there was a correlation between weekday and the position of the planets, which are discussed creatively in open access online platforms [12].

More serious studies from the USA are concerned with traffic safety, showing that Saturday was the most dangerous day of the week to drive, followed by Friday and Sunday [2, 10].

In healthcare, the weekend correlation varies: on the one hand, there are studies with no weekend effect, i.e. in hip fractures [9] or liver transplantations [1]. On the other hand, different studies show significant evidence of a weekend effect with a higher mortality for patients either undergoing surgery or being admitted at



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**Table 1** Overview of the cases divided in groups by manner of death and sex

Manner of death		Females	Males
Natural	353	117	236
Suicide	70	19	51
Accident	201	61	140
Homicide	17	8	9
Intoxication	117	41	76
Total	758	246	512

the weekend, even after accounting for the severity of disease [5]. Also in emergency general surgery, a significant weekend effect is found for both the USA and Europe [4] and the demand for emergency medical services (for the night period) is higher at the weekend compared to weekdays [14].

During Christmas time, an elevation in cardiovascular mortality for both the northern and the southern hemisphere has been observed [7, 8]. Also, certain types of psychopathology seem to increase (worsening of mood, alcohol-related fatalities), while overall utilization of psychiatric emergency services and admissions, self-harm behavior and suicide attempts/completions decrease [13].

What about forensics? In clinical forensics, in cases such as rape and domestic violence, a correlation with weekends has already been shown [3]. A Russian study also showed a weekend effect on binge drinking and homicide: there is a high correlation between the daily alcohol intake (binge drinking) and homicide deaths, rising significantly on Saturdays and Sundays [11].

So, should we really be looking forward to weekends? Moreover, what about Christmas Holidays? Is everything really just merry and bright?

It was the aim of our study to analyze (I) whether the expression "Thank God, It's Friday!" (TGIF) is justified in the context of forensic death investigations by evaluating the correlation between the beginning and end of the week in general and the manner of death and (II) to assess the correlation between manner of death and Christmas Holidays in particular.

## Material and methods

The Institute of Forensic Medicine is one of the largest institutes in Switzerland with an average of 450 autopsy cases per year; depending on the circumstances and if results from post-mortem imaging and autopsy are inconclusive, complementary toxicological analysis (in approximately half of the cases) or histological analysis are performed. For this retrospective study, all autopsy cases from January 2017 to July 2019 from the Institute of Forensic Medicine, were retrieved, resulting in 1178 cases. We excluded all cases with an estimated time of death of more than 1 day (to allow for an accurate estimation of the respective weekday as date of death), all cases of medical malpractice and inconclusive manner of death (for example accident versus suicide in a motorcycle crash against a tree). We obtained 758 cases in total (512 males, 246 females). Demographic data, day of autopsy and manner of death were taken directly from the autopsy report. Manner of death was recorded as either natural, suicide, accident or homicide. Since there was a large group of fatal intoxication that could not be assigned clearly to either suicide or accident, we decided to consider these cases as a separate group (intoxication) beneath the actual manners of death. For an overview, see **Table 1**.

In our evaluation, we had to consider that autopsies were overwhelmingly performed weekdays only, meaning autopsies performed on Monday consisted of all cases from Friday afternoon on, whereas on Tuesday to Friday only cases from yesterday's afternoon on were autopsied the following day. For the figures of each weekday to be comparable, we therefore divided the autopsy cases on Monday by 2.5.

## Statistics

To test if differences were significant between males and females, we performed a Kruskal-Wallis one-way analysis of variance (Kruskal-Wallis H test) on the total cases from Monday to Friday for each manner of death, for each sex separately. To assess the significance of our results, we chose a probability value (*p*-value) less than 5% ( $p < 0.05$ ).

To evaluate the relative fraction of each manner of death during the Christmas period compared to the rest of the year, the total numbers for the whole period were compared to the case numbers during Christmas Holidays (public holidays: last week of December and first week of January). The resulting relative fractions were expressed in percent.

## Results

### Correlation with the beginning and end of the week

An overview of all 758 cases divided in manners of death compared to the beginning and end of the week is shown in **Fig. 1**. For the subsequent evaluation of a correlation between manner of death and beginning or end of week, we calculated backwards under the assumption that autopsy cases on Mondays represent the events from the weekend (Friday afternoon till Sunday), autopsy cases on Tuesdays represent events from Mondays and so on. For the figures of each weekday to be comparable, we additionally divided the autopsy cases from Monday by 2.5.

### Natural death

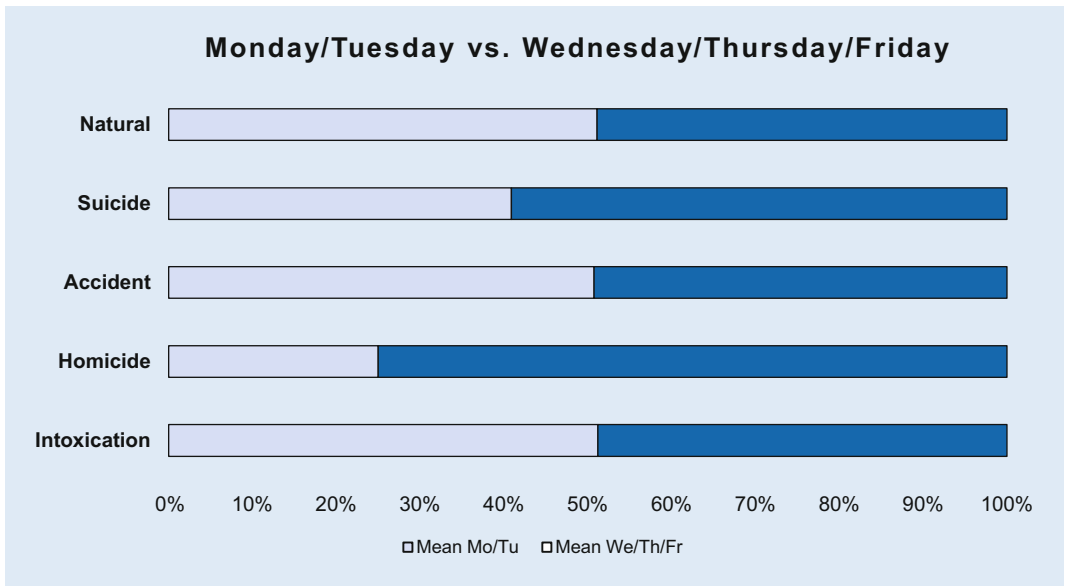
There was a pronounced sex difference: significantly more men ( $p = 0.009$ ) were diagnosed with a natural death at autopsy. There was no significant correlation between natural deaths and the beginning or the end of the week.

### Suicide

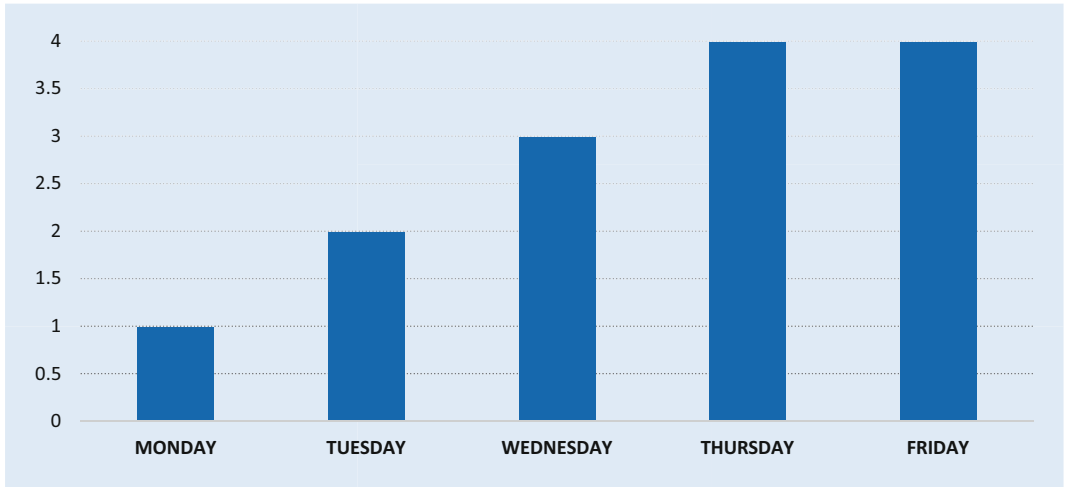
There was a near significant sex difference for suicides with more men committing suicide ( $p = 0.06$ ). There was a tendency to more suicides towards the end of the week.

### Accident

There was a significant sex difference: significantly more men ( $p = 0.009$ ) died due to an accident. There was no significant correlation between accidents and the beginning or the end of the week.



**Fig. 1** ◀ Correlation between manner of death (in relative fractions of overall autopsies) and the beginning and end of the week for both sexes combined; percentage of cases on the x-axis, manner of death on the y-axis; light grey beginning of the week; blue end of the week



**Fig. 2** ◀ Increasing cases of homicides (both genders combined) towards the end of the week; weekdays displayed on the x-axis, cases of homicide on the y-axis

**Intoxication**

There was a sex-specific difference with significantly more males dying of an intoxication ( $p=0.01$ ). There was an increase of fatal intoxication cases towards the end of the week.

**Homicide**

There was no sex-specific difference in homicide ( $p 0.8$ ), and men and women were equally affected. There were increasingly more homicides towards the end of the week (■ Fig. 2).

**Correlations with Christmas Holidays**

There was no change in overall autopsy rate during Christmas Holidays. There was

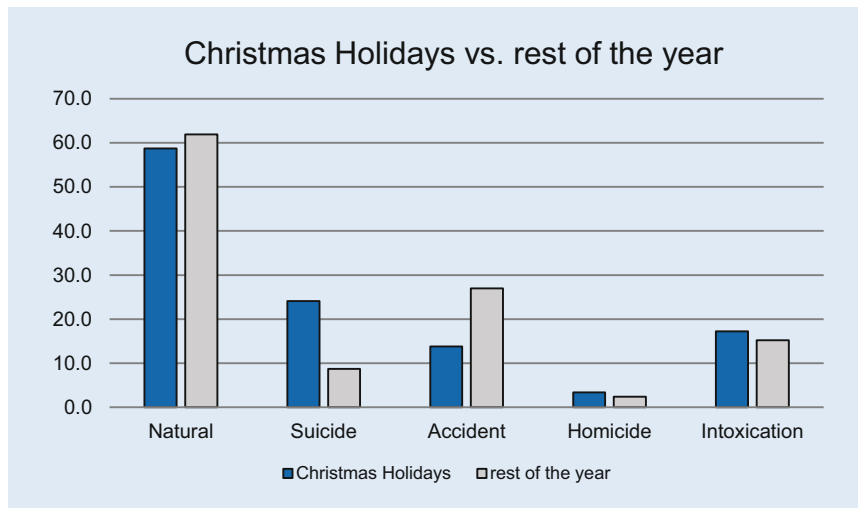
a slight decrease in natural deaths (relative fraction of 41.5% during Christmas Holidays vs. 46.7% during the rest of the year) and a significant decrease in accidents (13.8% vs. 27.0%) during Christmas Holidays. There was a very slight increase in homicides (3.4% vs. 2.4%) and intoxications (17.2% vs. 15.2%). There were significantly (by almost a factor of 3) more suicides during Christmas Holidays (24.1% vs. 8.7%), (■ Fig. 3).

**Discussion**

We wanted to evaluate on the one hand, whether the expression TGIF is justified in the context of forensic death investigations by evaluating the correlation between manner of death and the beginning and end of the week and on the other hand,

if there was a correlation between manner of death and Christmas Holidays.

Regarding natural deaths, accidents and suicides, we found no significant correlation with either the beginning or the end of the week. Therein, our results disagree with prior studies from the USA, claiming the weekend to be the most dangerous time to drive [2, 10]. In these studies, all accidents (survived and fatal) were included, so we could have a bias here. Furthermore, since we do not know the relative fractions of accidents of the studies cited above, we do not know if there are generally more or less lethal accidents in Switzerland compared to the USA. Considering that Switzerland in general has a low tolerance towards traffic offences (imposing high fines), high standards for obtaining a driving license



**Fig. 3** ▲ Distribution of manner of death in relative fractions during Christmas Holidays and the rest of the year. Manner of death displayed on the x-axis, relative fraction of cases on the y-axis

and a very good public transport system that can be used when being under the influence of alcohol or drugs, one could assume that the rate of fatal accidents is generally lower. On the other hand, an opposing explanation for our findings (if the general rate of fatal accidents was unexpectedly higher than in the USA) might be the metropolitan area from which our cases originated: the streets are always crowded with people and might therefore be dangerous to drive on every day, not only on weekends.

We observed only a slight increase of intoxications towards the end of the week. If there was a correlation with the type of job, compelling the people to increased substance abuse in the course of the week (bankers for instance?), we do not know yet—further studies are necessary.

However, there was a profound increase in homicides towards the end of the week, which in our opinion might be due to the increasing tension at work in the course of the week. We suggest an inevitable modification of the TGIF towards something like Thank God, It's Monday! (TGIM). Therefore, even though the mood of most of us (including that of the authors) usually suffers a massive low on Mondays, we should rethink our attitude and be happy to have survived the end of the week without having met Freddy Krueger and co.

In terms of Christmas Holidays, in our forensic (post-mortem) cases we found no effect of Christmas Holidays on natural

deaths, as has been postulated in prior (hospital-based) studies [7, 8]. This might be simply due to a selection bias in our study group: people with a known cardiovascular precondition are generally less likely to be examined in a medicolegal context when they die after showing typical cardiac symptoms beforehand.

Surprisingly, we had fewer fatal accidents during Christmas Holidays, compared with the rest of the year. We could argue about a protecting Christmas Spirit here, but we are clearly lacking adequate methods and resources to prove that. As a more serious explanation, there might simply be less work-related accidents with most of the people having the 2 weeks off during Christmas Holidays.

We could only identify a very slight increase in homicides and intoxications during Christmas Holidays, although both seem rather plausible to us: there are an unfamiliarly high number of family members around, more and more embarrassing family histories are being retold (rarely truthfully in the experience of the authors) and conflicting opinions are uttered ceaselessly, resulting in high-risk situations for the mind to easily switch from eustress to distress. With mulled wine, egg-nog, etc. accessible almost anywhere—you know how the cookie crumbles.

Sadly, we had a substantially higher rate of suicide cases—by almost a factor of three—during Christmas Holidays compared with the rest of the year, partly

contradicting a prior US study with an increase in the overall utilization of psychiatric emergency services and admissions, but a decrease in suicides [13]. In our opinion, this contradictory finding might be due to a cultural difference: while it seems to be more acceptable and almost belonging to the modern US lifestyle to have the support of a psychologist, it still is quite stigmatized in Switzerland to seek psychological assistance, resulting in a potentially lower prevention of suicides. Yet, to prove this hypothesis, further studies are necessary.

In the meanwhile, we all should look out for our lonely and mood-susceptible fellow human beings (not only but in particular) during Christmas Holidays. We should joyfully support them with our just recently scientifically proven Christmas Spirit [6] to overcome this strenuous time—for a Merry Christmas for truly everyone.

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**Ethical standards.** For this article no studies with living human participants or animals were performed by any of the authors. All studies cited were in accordance with the ethical standards indicated in each case. This retrospective study was performed after consultation with the institutional ethics committee and in accordance with national legal requirements. A no-responsibility declaration of the ethics committee has been received (KEK-ZH No: 2015-0686).

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## „Thank God it's Friday?“ – Korrelation von Wochenanfang/-ende allgemein und der Weihnachtsferien im Speziellen mit der Todesart. Eine retrospektive Kohorten Studie

**Ziel:** Wir untersuchten die Phrase „TGIF“ („Thank God it's Friday“) aus der Sicht der Rechtsmedizin, genauer gesagt, ob es einen Zusammenhang zwischen Wochenanfang/-ende allgemein bzw. speziell zwischen den Weihnachtsferien und der Todesart gibt.

**Material und Methoden:** Wir analysierten retrospektiv 758 aufeinanderfolgende Fälle von Januar 2017 bis Juni 2019.

**Resultate:** Es zeigte sich keine Korrelation zwischen natürlichem innerem Geschehen (NIG) und dem Wochenanfang oder -ende. Allerdings fanden wir einen signifikanten Anstieg von Homiziden auf das Ende der Woche hin. In Bezug auf die Weihnachtsferien sahen wir einen signifikanten Anstieg an Suiziden, verglichen mit dem Rest des Jahres.

**Diskussion:** Die Phrase „TGIF“ („Thank God it's Friday“) sollte gegebenenfalls modifiziert werden zu einem „TGIM“ („Thank God it's Monday“). Besonders in der Weihnachtszeit sollten wir außerdem ein besonderes Augenmerk auf einsame und stimmungsanfällige Mitmenschen richten.

### Schlüsselwörter

Natürlicher Tod · Suizid · Homizid · Unfall · Rechtsmedizin