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Self-burning – A rare suicide method in Switzerland and other industrialised nations – A review

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ABSTRACT

News items reporting self-immolation by Tibetans have been on the increase in recent years. After examining the corpse of a Swiss man who had committed suicide by deliberate self-burning, we wondered how often this occurs in Switzerland. The Federal Statistics Office (FSO) does not register self-burning specifically so no official national data on this form of suicide are available. However, we had access to the data from a Swiss National Science Foundation (SNSF) project *Suicides in Switzerland between 2000 and 2010*, which collected information on all (4885) cases of suicide investigated by the various institutes of forensic medicine. From this data pool we extracted 50 cases (1.02%) of suicide by self-burning, in order to determine the details and to identify the possible reasons for choosing this method. To look at our results in the light of studies from other countries, we searched the literature for studies that had also retrospectively examined suicide by self-immolation based on forensic records. Our results showed that, on the whole, personal aspects of self-burning in Switzerland do not differ from those in other industrialised nations. Some data, including religious and sociocultural background, were unfortunately missing – not only from our study but also from the similar ones. In our opinion, the most important prevention strategy is to make healthcare professionals more aware of this rare method of suicide.

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1. Introduction

Media reporting of self-immolation amongst Tibetans has been noticeably on the increase. Since February 2009, at least 120 Tibetans, most of them monks, died from setting themselves on fire after dowsing their clothes and bodies

with inflammable liquids. The reason given for this increase in self-immolation has been protest against the suppressive politics of China [1–4]. The literature shows that self-immolation is a common way of ending one's own life, not only amongst Tibetans but also in India, where approximately 7–9% of all suicides are due to deliberate self-burning [5,6], as well as the Middle East, Africa and South Asia [5]. In some

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countries, such as Iran, the suicide rate from self-immolation is said to be as high as 71% [7] or 22.4/100,000 inhabitants [8]. The underlying reasons are of a political nature, especially in the Arab world, including the Maghreb, Tibet and South Korea [5,9] and the so-called dowry deaths of young women in the Middle East and central Asia, especially in Iran, Iraq, Afghanistan, Uzbekistan and Tajikistan [10–12]. Sociocultural reasons can also be found in India, where widows used to – and in some regions still do – burn themselves during the funerals of their deceased husbands [9,10].

In our work as forensic pathologists in Switzerland, we are sometimes confronted with this highly aggressive method of committing suicide: for example, we recently had to examine the body of a middle-aged Swiss man who had killed himself by setting himself alight after dowsing his body with petrol. Having read about the self-immolation of Tibetan monks in the news, we wondered about the situation of self-burning in Switzerland and whether there are any known factors influencing the choice of this highly aggressive method, such as cultural or immigrant background. Our research at the Federal Statistics Office (FSO) showed that no details are available on suicide by self-burning in Switzerland. Furthermore, this method is not even listed amongst the suicide methods. In general, information provided by the FSO is sparse, as it lists only the seven most common methods of suicide without any further distinction other than gender and age group [13,14]. Thanks to a research cooperation, we had access to the data pool of a Swiss National Science Foundation (SNSF) project, which retrospectively examined all suicides under forensic investigation in Switzerland between 2000 and 2010. The aim of that huge project was to gain greater insight into suicide methods than is provided by the FSO, in order to develop new prevention strategies [15]. We extracted all cases of suicide by self-burning from the data pool, with the following aims:

1. to determine details of suicide by self-burning, which is given in official statistics listed in Switzerland, and possibly to discover drivers such as religious, political and cultural background;
2. to give an overview of the existing literature, especially retrospective studies based on forensic investigations of suicide by self-burning;
3. to look at our results in the light of these other studies.

2. Methods

The study is part of an SNSF project – *Suicides in Switzerland: a detailed national survey of the years 2000 to 2010*, which retrospectively examined all cases of completed suicide that had been investigated by full postmortem examination or simple external examination by institutes of legal and forensic medicine in Switzerland [15]. The databases of all these institutes were searched for suicides occurring in the period 2000–2010. Only cases where suicide was the manner of death, as defined by the forensic experts, were included. Searches differed between the individual institutes of legal and forensic medicine: some had an electronic system in place, in others

the database had to be searched manually. A non-standardised questionnaire with sociodemographic aspects and detailed questions on the main suicide methods was used. This questionnaire had been developed by the research group after a trial period and contained closed-ended questions on sociodemographic parameters and details for the most common methods of suicide (intoxication, shooting, drowning, strangulation, thermal trauma, sharp trauma, blunt trauma). Other suicide methods could be specified by writing in an open-ended question. Master's students, who had all been instructed and tested by the same academic research assistant, were sent to collect data from the different institutes in Switzerland (Zurich, Bern, Basel, Chur, St. Gallen, Lausanne and Geneva) between spring 2011 and winter 2013. The completed questionnaires were transferred in SPSS files. For the present study, we extracted all suicides by self-burning from the SPSS database of 4885 cases. We used SPSS 20 software to perform a retrospective data analysis and a frequency analysis. For review purposes, we searched the internet for studies on self-immolation using the search terms “self-immolation”, “self-burning”, “suicide fire”, “self-incineration”, “death fire” and “forensic”. References of the studies found were searched for publications on completed suicides due to setting oneself on fire. In the present review, we included only retrospective studies based on suicides by self-burning investigated by forensic experts, and looked at our results in the light of these studies.

3. Results

In the 4885 cases of suicide in Switzerland between 2000 and 2010 identified so far (autumn 2013), we found 50 (1.02%) instances of self-immolation. Four cases were investigated by external examinations of the body only, whilst 46 had full postmortem examinations. Table 1 shows our main findings together with a summary of the results of the 13 studies identified in the literature [16–28]. In our study, most suicides were Swiss men, and the other studies also showed a preponderance of male nationals. The median ages were about 43 and 41 respectively. Most were either employed or retired on a pension, including those on a disability allowance. Marital status throughout showed that most of the people committing suicide were not married. From the cases available, 30% of our study group and 51% of the cases in the literature left suicide notes. Little was found on previous suicide attempts: the data available on a few cases showed that most of them had attempted suicide before, although the information provided was sparse, with little detail of the method or number of attempts. The psychiatric history was unknown in 23 of our cases and unremarkable in six. Where the information was available from the 229 cases in the literature, nearly 85% had a known history of psychiatric disorders. The diagnoses in the remaining 21 cases from our study group can be seen in Table 2: seven had a combination of two diseases. Psychotic disorders and schizophrenia were most frequent. The motive for the suicide in our study group was available in 31 (62%) cases. Mental problems were the reasons assumed for the suicide in 27 (87.0%) of those cases. Other motives mentioned were physical problems (19.3%),

Table 1 – Main findings and comparison with previous studies of forensically investigated self-burning suicides in industrialised nations.

	This study (%)	Summary of studies from the literature (%)
Number of studies	1	13
Period	2000–2010	1947–2009
Countries	Switzerland	Germany, UK, Denmark, Italy, France, USA Canada, Turkey
Total number of cases	50 (100)	410 (100)
Gender	n = 50 (100)	n = 385 (100)
Female	18 (36.0)	146 (37.9)
Male	32 (64.0)	239 (62.1)
Age	n = 50	n = 222
Median	42.6	Na
Mean	44.4	41.44
Range	19–91	14–89
Marital status	n = 35 (100)	n = 146 (100)
Unmarried	25 (71.4)	100 (68.5)
Married	10 (28.6)	46 (31.5)
Nationality	n = 43 (100)	n = 127 (100)
Citizens of study country	36 (83.7)	111 (87.4)
Citizens of other countries	7 (16.3)	16 (12.6)
Occupation	n = 34 (100)	n = 60 (100)
Employed	14 (41.2)	25 (41.7)
Pensioner (including early retirement/disability)	14 (41.2)	21 (35.0)
Unemployed	3 (8.8)	6 (10.0)
Others (e.g. student, housewife)	3 (8.8)	8 (13.3)
Suicide note (letter/email/text message)	n = 50 (100)	n = 135 (100)
Yes	15 (30.0)	70 (51.9)
No	35 (70.0)	65 (48.1)
Previous suicide attempt(s)	n = 17 (100)	n = 118 (100)
Yes	14 (82.4)	110 (93.2)
No	3 (17.6)	8 (6.8)
History of psychiatric disorders	n = 27 (100)	n = 229 (100)
Yes	21 (77.8)	194 (84.7)
No (unremarkable)	6 (22.2)	35 (15.3)
Ethanol in blood or muscle	n = 36 (100)	n = 92 (100)
Yes	7 (14.0)	40 (43.5)
No	29 (58.0)	52 (56.5)
Venue of death	n = 50 (100)	n = 336 (100)
Indoors	37	168 (50.0)
Outdoors	13	168 (50.0)

financial problems (16.1%), strained interpersonal relations (16.1%), necessity for an elderly care home (3.2%), preventive detention (3.2%) and difficulties at work (3.2%). The four people with physical problems had chronic pain syndrome, malignancy, liver cirrhosis, and severe lung disease. Alcohol testing in peripheral blood or muscle was negative in 29 cases in our study group, with alcohol being demonstrated in only seven cases (blood alcohol level ranging between 1.0 and 2.13 per mill in three cases), and in 40 cases from the literature. Toxicology screening in urine or kidney tissue

was not performed in 24% of our cases and was negative in 34%. Substances, predominantly benzodiazepines and cannabis, were found in 19 cases. The majority of our study group died of asphyxia (42.8%) or multiple organ failure (35.7%), as shown in Table 3. Most of the rest died of combined causes. The carbon monoxide (CO) concentration in the blood of the suicide victims was not available in all cases of asphyxia; CO poisoning was identified in five of our cases, but CO was also found in another nine cases without any details of the blood concentration. Suicide by self-immolation in Switzerland varied between six and nine

Table 2 – Available psychiatric diagnosis (n = 21, multiple answers possible).

Psychiatric diagnosis	n	%
Schizophrenia/psychotic disorder	7	33.3
Depression	5	23.8
Previous suicidal behaviour	4	19.0
Alcohol abuse	4	19.0
Drug dependence	3	14.3
Personality disorder	2	9.5
Anorexia	1	4.8

Table 3 – Cause of death.

Cause of death (n = 42); multiple answers possible	n	%
Asphyxia	18	42.8
Multiple organ failure after burns	15	35.7
Failure of central regulation	12	28.6
Overkill/polytrauma	6	14.3
Cardiac failure	5	11.9

Table 4 – Venue of death (n = 50).

Venue of death	n	%
Flat	13	26.0
Hotel	11	22.0
Public building	7	14.0
Forest	6	12.0
Car/street	5	10.0
Police custody	2	4.0
Cellar	2	4.0
In a public place (not further specified)	1	2.0
Field	1	2.0
Elderly care home	1	2.0
Workplace	1	2.0

Table 5 – Accelerant (n = 31).

Accelerant	n	%
Petrol	16	51.7
Methylated Spirit	6	19.4
Solvent	5	16.1
Gas	2	6.4
Brush cleaner	1	3.2
Oil	1	3.2

cases annually between 2000 and 2005. There were no cases in 2006, and only 1–3 per year from 2007 to 2010. The distribution throughout the year showed that slightly more suicides by self-immolation occurred during the winter months, with fewest in September. Table 4 shows that most suicides (n = 37, 74%) in Switzerland took place at home. In the cases found in the literature, about half took place indoors and half outdoors. Accelerants, predominantly petrol, were used by 62%, as can be seen in Table 5.

4. Discussion

Cases of suicide by self-immolation in the present study represent 1.02% of the 4885 suicides identified in Switzerland between 2000 and 2010 by the SNSF project on all suicides investigated by forensic institutes. Compared with the official FSO statistics, listing a total of 14 138 suicides in Switzerland for this period [29], the institutes of legal and forensic medicine investigated some 34.6% of all suicides. This rate seems to be quite low, but the pilot study by Habenstein et al., in which they compared institute data with FSO data on suicide, showed that collecting data from the institutes provided the possibility of gaining useful detailed information in a retrospective way, despite the relatively low rate [30]. Official statistics on suicide by burning are not only lacking in detail, they do not even exist [14]. There is only one study from Zurich, a retrospective review of 191 survivors of self-immolation who were admitted to the burns unit of the university hospital in the period 1968–2008. Between 2001 and 2008, 43 persons were admitted for this reason [31]. The mortality rate given for the whole study period was 42.9%. We do not know which of the deceased were investigated forensically and subsequently included in the present study, so a comparison of the results would not allow us to draw any conclusions on the rates of suicide by burning in Switzerland

or Zurich. The number of cases of attempted suicides admitted to the Zurich university hospital burns unit remained relatively stable at some 40 cases per year [31].

In order to examine our results in the light of other studies, we included only studies similar to our own: based on completed suicides by self-burning that had been investigated forensically. Looking at all the results, it is clear that a great deal of information is missing from this kind of study. The retrospective nature of these studies means that they are not suitable for gaining all the information on a case of suicide. Furthermore, these studies usually only include completed suicides. Because such a great deal of information was missing, we have also included studies on survivors of self-immolation in the discussion.

All over the world, suicide is more common amongst men than women. The male:female ratio for suicide in Switzerland was 69:31 between 2000 and 2010 [29]. In our study population the gender distribution for self-immolation (64:36) has shifted slightly towards women, compared with the overall study population (67:33) and the official statistics. A similar shift is seen in the cases from the literature [16–28] and in a US study on suicide by deliberate self-burning [32], even though suicide by self-immolation is still generally more common amongst men than women in Western industrialised nations [5,6,11,16,18,19,21,26,28,31,33–41]. Studies from Ireland and France that examined suicide victims in burns units have shown that predominantly more women used self-immolation as a suicide method [42,43]. This contrast might be due to the fact that those studies included survivors of suicide attempts, whilst our study was solely on completed suicides. It is well known that women more often attempt suicide than men [44]. On the other hand, adolescent girls and young women are the most vulnerable group for committing suicide by self-burning in low-income countries, such as Iran, Iraq or India, for sociocultural reasons [11,12,36,41,45,46].

The median age of about 43 years found in our study is only slightly less than that of the most common age group (45–64) for suicide in Switzerland [14,29] and is fairly consistent with the results of most other studies on self-immolation in industrialised nations [11,16,19–21,26,31,34]. Studies performed in Italy in the 90s, in the USA, in Canada, and more recent studies from Finland and Hong Kong reported mean ages between 30 and 39 [6,23,33,35,38–40]. Thombs et al. concluded that the highest risk for committing suicide by self-immolation is between the ages of 30 and 59 [32]. In low income countries, people who commit suicide by self-immolation are much younger, with a mean age of 24 years in Iran and Iraq [12,45–47]. According to a review by Laloë, deliberate self-burning victims in Asia are approximately 10 years younger than their counterparts in Europe [41].

In general, being married or living in a partnership is said to be a protective factor against committing suicide [48]. In most of our cases and those we identified from the literature, people were not married. Living alone has been found to be a factor in many other studies regarding self-immolation in industrialised nations [6,18,20,22,26,34]; this is totally different from the findings in studies from other regions, such as Iran, Iraq and India, where self-immolation is the result of partnership difficulties and domestic suppression [8,12,41,46,47]. A further

common risk factor for suicide is unemployment, and this is also true for cases of self-immolation [5,6,33,34,40,46].

Some studies have postulated a higher risk for suicide by self-immolation amongst immigrants [5,22,32–49] and in native-born Asians, living in the US [26], although other studies from Germany, Denmark, and the UK did not find a higher risk for immigrants or people of different sociocultural background [16,18,20,34].

The results of our study and of those in the literature show that, both in Switzerland and elsewhere, more than three-quarters of the study population were citizens of the country concerned. Unfortunately our data do not provide further information on social, religious or political background; this information could also not be found in most of the other studies on suicide by self-burning. These aspects are of great interest in this context and should be investigated in a further study.

About one-third of our cases were in regular employment and another third were drawing a pension. This finding is in contrast to the study from Hong Kong, where only 6% were retired [6]. On the other hand, Palmu and co-workers found similar percentages of pensioners in Finland, where nearly 31% had a disability allowance [33]. A study in Denmark from the 1980s found that 19% of the study group had been receiving a disability pension, and concluded that this high percentage was due to mental health problems [20]. We did not distinguish further between those on disability allowances and persons aged 65 or more with old-age pensions, nor could this information be found in the similar studies we identified. The occupational status of the remaining third remains unknown, so we cannot draw any conclusions on this interesting aspect without further research.

Mental health problems, especially depression, are common with suicide in general. In Switzerland, 56% of all suicides have depression as a comorbidity [13]. Mental health problems seem to be especially high risk factors in suicide by self-immolation [5,6,11,16,18–22,26,31,32–41,49–53], especially affective and psychotic disorders [5,23,26,31,32,37–39,41]. According to Thombs and co-workers, mental health problems seem to be even more common in self-burning suicides than in suicides in general [32], although we were unable to confirm this in our retrospective study with its limited data from medical records. Information was available from 42% of our cases, most of whom suffered from a psychotic disorder or schizophrenia, consistent with the findings in Finland, Italy, and the USA [22,26,33]. Two studies from Hong Kong revealed a history of substance abuse as the most common risk factor [6,40] but we found only a few cases with chronic abuse of alcohol or drugs. Given the retrospective nature of our study, these results have to be interpreted carefully, because there was no information for most of the cases. Adjustment disorders have been identified for more than three-quarters of the women who committed suicide by self-burning in countries such as Iran [8,11].

Most motives mentioned for suicide were mental health problems, consistent with psychiatric disorders being major risk factors for committing suicide, as previously mentioned. The other common reasons we found are in agreement with those of other studies citing relationship and financial problems [6,11,16,18–21,23,25,35]. We had no information on religious, political or sociocultural motives, which does not

mean that they did not exist but that they were probably not gathered due to the retrospective nature of the study. Other studies did not find any political reasons for suicide by self-immolation [18,19]. Physical illness has also been mentioned as a common reason [18–20,31,39].

Information on previous suicide attempts was sparse in our study group. Studies from Scotland, France and the US found the rate of previous suicide attempts to be between 25% and 51% [18–21,26].

Alcohol abuse is a further risk factor for the suicide method of self-burning [5,34,39,40]. Alcohol testing in peripheral blood or muscle was negative in nearly 60% of our cases, a figure that is consistent with the findings of others [16,19,21].

In most cases, people died of asphyxia or multiple organ failure, which includes burn shock, and might be due to the smouldering of clothing and textiles. Similar results were found in Scotland, where smoke inhalation was the most common cause of death [19]; in Germany, where the combination of burn shock and smoke inhalation was the second most common reason [16]; in the UK, where the cause of death was a combination of burns and shock [18]; in Florida, where death was due to multiple burns and extensive injuries [25]; and in Istanbul, where the severity of the burns most commonly led to death [27]. Studies from other countries, such as India, have found hypovolaemic shock to be the cause of death in most cases [47].

People tended to set themselves alight indoors, which can be dangerous to others. This finding is consistent with most other studies from industrialised nations and with the results of the 30-year review between 1965 and 1994 mentioned previously [6,11,19–22,24–26,35]. Pöschla noted a trend of self-immolation in private and interpreted this as a reluctance to be prevented by others and not letting anyone witness the event [11]. Deliberate self-burning was more common outdoors in some of the studies [16–18,21,23], and this was interpreted as the suicidal persons not wishing to harm anybody else [16]. Although most suicides in our study took place indoors, we did not find any other victims within the buildings. Depending on the reason for the suicide, self-immolation in other countries takes place either outdoors, for example as a political protest with lots of witnesses [11], or indoors, especially in the kitchen where there is access to inflammable liquids, in the case of dowry deaths [47].

Slightly more of the suicides in our study occurred in the winter months, which is compatible with a study from Hong Kong, where most suicides by self-burning also occurred during the winter [6]. One explanation for this seasonal frequency might be the increase in indoor fires during the cold weather, which might provide the inspiration for self-burning. Only a few studies have examined the seasonal frequency and Rothschild did not find any seasonal or monthly prevalence [16].

Most of our cases used accelerants, predominantly petrol, for their self-immolation. Several other studies [6,11,16,17,19–26,31,35,38–40] found that accelerants were used in between 53% [39] and 93% of cases [16]. Petrol was also the substance most commonly used in studies from Germany, Scotland, and the USA [16,19,26], possibly due to easy access at filling stations. In the eastern world, most cases also used an accelerant, such as kerosene or petrol, which might be due to their ready availability in cooking areas [11,41,47].

Possible prevention strategies for this highly aggressive suicide method are scarce. Considering the prevalence of mental health problems, especially psychotic disorders, we consider it essential to make healthcare professionals, such as psychiatrists or psychologists, more aware of this rare suicide method. Furthermore, our study group included many pensioners, another fact that is important for healthcare professionals to know. Another preventive approach would be to install flammable gas detectors within flats and/or rooms to alert family members or roommates, because most suicides occurred indoors. As the most commonly used accelerant was petrol, training filling station employees to ask why someone wants to buy petrol might provide a prevention strategy, as is done with charcoal in Taiwan [54].

5. Conclusions

Our results show that suicide by self-burning is a method only rarely used in Switzerland and does not differ from self-burning in rest of the Western and industrialised nations. Unfortunately, neither we nor the other relevant studies had any data on sociocultural, political or religious factors influencing the choice of this highly aggressive method, so that further studies in this field are still needed. We suggest prospective studies in burns units, combined with detailed semi-prospective case studies of postmortem examinations, focussing specifically on these questions. It would also be interesting to know whether there has been an increase in cases of self-immolation recently, because of media reports and copy-cat behaviour, as is recognised for people throwing themselves in front of trains. The usual prevention strategies are of no use with this rare method, because measures such as method restriction cannot be achieved, nor has our pilot study identified particular patterns or hotspots. As the most important prevention strategy, we consider it essential to inform healthcare professionals such as psychiatrists about this suicide method. Although rare, it does indeed occur in Switzerland and other industrialised nations and shows comorbidity with mental health problems, especially psychotic disorders. The retrospective nature of both our study and most of the other studies on completed suicides by self-immolation meant that certain details of the person committing suicide were not available. This lack emphasises the need for prospective studies to gain a deeper insight. Only by knowing and publishing the details can there be effective prevention.

Ethical approval

The SNSF project Suicide in Switzerland between 2000 and 2010 was approved by the Eidgenössische Expertenkommission für das Berufsgeheimnis in der medizinischen Forschung.

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Conflict of interest

The authors declare that there is no conflict of interest relating to this work.

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