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Fire and Suicide: A Three-Year Study of Self-Immolation Deaths

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ABSTRACT: Thirty-two self-immolation deaths by fire, representing about 1% of suicides, occurred in the province of Ontario (population 9 million), Canada, from 1986 through 1988. The victims, mostly male (male/female ratio, 26:6), were between 21 and 71 years old (mean age, 38 years). Although the scene of self-immolation was usually familiar to the deceased, some chose remote locations. Eleven were found dead in motor vehicles. An accelerant, usually gasoline, was used in most cases. Many of these individuals had, at some time, indicated their intent to commit suicide, a few by self-immolation, but only about half had a diagnosed psychiatric illness. Most of the victims had a reason to kill themselves, but the factors that motivated them to chose self-immolation by fire were uncertain. Fourteen individuals died in hospitals from severe burn complications. The remainder were found dead at the scene. The postmortem findings of soot in the airway and elevated carbon monoxide in the blood of most of these victims [the carboxyhemoglobin (COHb) concentration was in one case < 10%, in ten cases \geq 10 to 50%, and in seven cases > 50%] were helpful in determining that the individuals were not only alive at the time of the fire but also that a significant number died from smoke inhalation and carbon monoxide poisoning. The highest levels of carbon monoxide were observed in victims discovered in motor vehicles.

KEYWORDS: pathology and biology, fires, suicide, self-immolation

Death by self-immolation (literally, self-sacrifice) or, more accurately, self-incineration is an uncommon method of suicide [1]. This article not only documents the investigative findings of a series of such self-immolation deaths but also compares the authors' experience with other published reports.

Methods

Self-immolation deaths by fire occurring from 1986 through 1988 in the province of Ontario (population 9 million), Canada, were studied. Files from the Office of the Chief Coroner in Toronto were reviewed. These included the reports of coroners, police, fire marshals, pathologists, toxicologists, and other forensic scientists.

The following parameters were assessed: the age and sex of the victim; the scene of self-immolation; witnesses; accelerant use and analysis; expressions of suicidal intent, including previous attempts and threats; reasons for suicide; motivating factors influencing the choice of self-immolation as the method of suicide; psychiatric history; survival interval; and autopsy and toxicological findings.

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Results

The data for 32 self-immolation deaths by fire (10 cases in 1986, 11 cases in 1987, and 11 cases in 1988) are summarized in Table 1. These cases represented 0.91% of all suicides ($n = 3482$) and 6.7% of all fire-related deaths ($n = 478$) during the period studied. The age of the victims ranged from 21 to 71 years (the females age, from 31 to 55 years), the average being 38 years; about three quarters were 21 to 39 years old. There were 26 males and 6 females (Fig. 1).

Scene

The scene of self-immolation was familiar to 26 of the individuals. They chose either their residence (13 cases), its vicinity, or other familiar locations. Six of these victims were found in motor vehicles, and at least 2 others (Cases 3 and 17) drove to the scene. In 6 instances, the scene was remote (38 km to 1010 km from home). Five of these cases (Cases 5, 9, 10, 26, and 32) were discovered in motor vehicles (Fig. 2), and 1 person (Case 6) had hitchhiked to a distant sand pit.

Witnesses

The self-immolation was actually witnessed in 2 cases. After dousing themselves with accelerant, these individuals were seen either lighting clothing (Case 8) or a cigarette (Case 18). The events occurring around the time of the incident were observed in 10 other cases. Seven of these victims, all hospitalized, were active after self-immolation (Cases 1, 2, 4, 11, 18, 24, and 29). This observation was based on either eyewitness accounts (for example, the individual running from the scene) or investigators' reports (for example, a trail of scorched material around scene).

Accelerant

At least 28 victims used an accelerant, frequently gasoline (24 cases). In many instances, the scene findings (for example, either odor, matches, a lighter, or a container of flammable substance) were helpful in documenting the use of an accelerant. In 13 cases, scene investigation was supplemented with analysis by gas chromatography of recovered material. This either confirmed or determined (Case 10) the presence of gasoline in 8 cases. Gasoline was detected in either containers and debris recovered from the scene or in clothing and tissues removed from the deceased. During the investigation of Case 10, a lighter cap was found on the floor of the driver's side of the vehicle. The victim, a nonsmoker, did not ordinarily use a lighter. Analysis revealed the presence of gasoline vapor on the floor of the car. Other accelerants used were kerosene (Case 4, analysis negative), mineral spirits, a mixture of mineral spirits with methyl hydrate, and propane combined with gasoline. The use of an accelerant was suspected but not confirmed by analysis in 2 cases. At a bedroom scene, aerosol cans and burnt matches were found (Case 21). Analysis of fabrics revealed ethanol but not the other aerosol components—propane and isobutane, normally gases at room temperature. In the other case (Case 26), the victim, a few days before his death, was concerned about a missing bottle of kerosene. Subsequent examination of lung tissue, debris from the body surface, and soil samples from underneath the burned vehicle did not indicate the presence of an accelerant. Analysis did not determine the presence of an accelerant in 2 other cases. Charred wood was found under 1 victim (Case 6), and the other was discovered in a burnt bed (Case 16).

TABLE 1—Self-immolation deaths, Ontario, 1986 through 1988.

| Case | Age/Sex ^a | Scene ^b (Witness*) | Accelerant ^c (Analysis**) | Expressions ^d of Intent | Reason ^e | Psychiatric/ History | Survival, ^f Time | Postmortem ^h | |
|------|----------------------|----------------------------------|---|---------------------------------------|---------------------|---------------------------|---|--------------------------------------|--|
| | | | | | | | | Autopsy | Toxicology |
| 1 | 21 M | field near home* | gas | inc (V) past (A, B) | ? | schizophrenia | hospitalized, 9.5 h | soot - 2°/3° burns 90% BSA | - |
| 2 | 33 M | garage near home* | gas | inc (V, A) past (A) | ? | schizophrenia | hospitalized <1 day CL: 3° burns 90% BSA | - | - |
| 3 | 49 M | workplace bathroom | gas | past (A) | + | alcoholism, depression | DAS | soot + 1° to 3° burns 100% BSA | COHb 38% ETOH negative |
| 4 | 39 F | home* | kerosene*** | inc (W) past (A) | + | NOS | hospitalized 53 days | pneumonia 2°/3° burns 70% BSA | - |
| 5 | 27 M | car (210 km from home) | gas | inc (W) | + | - | DAS | soot + charred | COHb 38% BAC 220 mg% UAC 253 mg% |
| 6 | 25 M | sand pit (875 km from home) | -*** | inc (W) past (V) | ? | - | DAS | soot + charred | COHb 25% (EPID) DPH detected |
| 7 | 29 M | home | gas | ? | + | ? | hospitalized 105 days CL: burns 80% BSA | - | - |
| 8 | 54 M | home (patio)* | mineral spirits | inc (A) past (A) | + | Huntington's chorea | hospitalized 6 days | pneumonia 3° burns 65% BSA | - |
| 9 | 50 M | car (park 60 km from home) | gas*** | ? | ? | ? | DAS | soot - charred | COHb 28% drug screen negative |

| | | | | | | | | | |
|----|------|-------------------------|---------------------------------|-----------------------|---|---------------|--|----------------------------|---------------------------------------|
| 10 | 35 F | car (1010 km from home) | gas*** | ? | + | ? | DAS | soot - trace charred | COHb 56% UAC 18 mg% |
| 11 | 26 M | home (bedroom)* | mineral spirits, methyl hydrate | inc (A) | + | - | hospitalized 8 days CL: blood methanol 136 mMOL/L | pneumonia 3° burns 70% BSA | - |
| 12 | 31 M | lane near home | gas | - | ? | schizophrenia | DAS | soot + charred | COHb 17% ETOH negative |
| 13 | 27 M | parents' home (shed)* | gas*** | inc (V) past (A) | ? | schizophrenia | hospitalized 16.5 h | soot + burns 80% BSA | - |
| 14 | 24 M | home | gas | past (A) | ? | schizophrenia | hospitalized <1 day CL: burns 95% BSA | - | - |
| 15 | 50 M | truck (county road) | propane/gas | inc (V,W) past (V) | + | alcoholism | DAS | soot + charred | COHb 84% ETOH negative |
| 16 | 29 M | home (bedroom) | -**- | past (A) | ? | NOS | DAS | soot + charred | COHb 14% CPZ, haloperidol negative |
| 17 | 39 F | park road | gas | - | + | - | hospitalized 6.5 h CL: 2°/3° burns 100% BSA | - | - |
| 18 | 23 M | home (kitchen)* | gas | - | + | - | hospitalized 18 h CL: burns 90% BSA | - | - |

TABLE 1—Continued.

| Case | Age/Sex ^e | Scene ^b (Witness*) | Accelerant ^c (Analysis**) | Expressions ^d of Intent | Reason ^e | Psychiatric/ History | Survival, ^g Time | Postmortem ^f | |
|------|----------------------|----------------------------------|---|---------------------------------------|---------------------|-------------------------|--|---|--|
| | | | | | | | | Autopsy | Toxicology |
| 19 | 31 F | home (living room)* | mineral spirits | inc (V) past (A) | + | ? | hospitalized 6 h CL: 3° burns 70% BSA | — | — |
| 20 | 35 M | van (driveway) | gas*** | inc (W) past (V) | + | — | DAS | soot + charred | COHb 78% ETOH negative |
| 21 | 71 M | home (bedroom) | ?aerosols**± | inc (V) past (A) | + | depression | DAS | soot — trace 2°/3° burns 100% BSA | COHb 9% Halcion negative |
| 22 | 51 M | car (parking lot)* | gas | — | + | — | DAS | soot + burns upper body/hands | COHb 80% ETOH negative |
| 23 | 35 F | home (basement) | gas*** | inc (V,W, B, A) | + | — | DAS | soot + burns (NOS) | COHb 33% Butalbitol Salicylate (T) |
| 24 | 55 F | home (kitchen)* | gas | inc (V) past (A) | ? | schizophrenia (?) | hospitalized (?) CL: 3° burns 90% BSA | — | — |
| 25 | 46 M | car (township road) | gas*** | inc (V) | + | — | DAS | soot + charred | COHb 41% ETOH negative |
| 26 | 33 M | truck (125 km from home) | ?kerosene***- | inc (V,W, B) | + | — | DAS | soot + charred | COHb 51% ETOH negative |

| | | | | | | | | | |
|----|------|--------------------------|--------|---------------------|---|------------|-------------------------|--|--|
| 27 | 37 M | home (garden)* | gas | inc (V, A) | + | - | hospitalized 11 h | soot + 3° burns 99% BSA; chest stab wounds | COHb 0 ETOH negative |
| 28 | 49 M | car (field near home) | gas | ? ? | + | - | DAS | soot + 1° burns - head | COHb 75% ETOH negative |
| 29 | 36 M | road near home* | gas | inc (V) | ? | depression | hospitalized 93 days | burns 70% BSA sepsis | - |
| 30 | 30 M | home (basement) | gas*** | past (V, B) | + | - | DAS | soot + charred | COHb 11% ETOH negative |
| 31 | 22 M | car (road near home) | gas*** | inc (W) past (V) | + | - | DAS | airway N/A charred | COHb 72% ETOH negative |
| 32 | 62 M | car (38 km from home) | gas | - | + | - | DAS | soot + charred | COHb 30% BAC 178 mg% UAC 220 mg% |

*M = male; F = female.

** = witness(es).

*** = analysis for accelerants, detected (***+), not detected (**-), equivocal (**±); gas = gasoline; ? = suspected; - = unknown or not used.

^aInc = occurring around the time of the self-immolation; past = events unrelated to the time of self-immolation; V = verbal; A = attempt; B = behavior or gestures; W = written; ? = unknown; - = none.

^e? = unknown; + = known.

^fNOS = not otherwise specified; - = none; ? = unknown.

^gDAS = dead at scene; CL = clinical assessment; 1°/2°/3° = first, second, third degree burns; BSA = body surface area; ? = time interval not specified.

^hSoot = soot present (+) or absent (-) in airways; 1°/2°/3° = first, second, third degree burns; BSA = body surface area; NOS = not otherwise specified; N/A = not assessable; COHb = carboxyhemoglobin saturation; ETOH = ethanol (urine and/or blood); BAC = blood alcohol concentration; UAC = urine alcohol concentration; EPID = epidural blood; DPH = diphenhydramine; CPZ = chlorpromazine; and (T) = therapeutic levels.

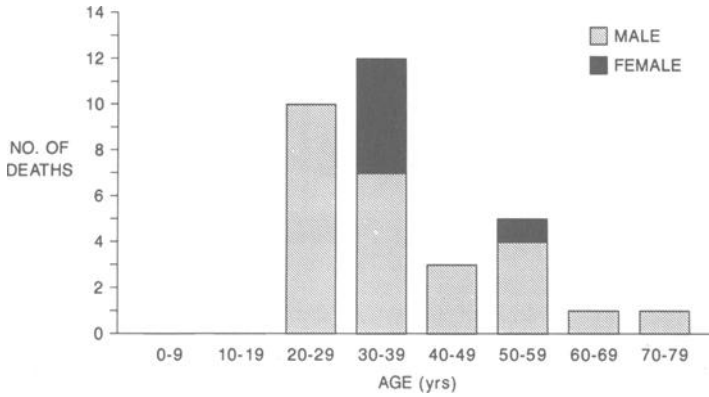


FIG. 1—Age and sex distribution of self-immolation deaths.

Expressions of Suicidal Intent

Twenty-three individuals expressed their suicidal intent, by various means, either around the time of the self-immolation (7 cases) or in the past (4 cases) or both (12 cases) (Fig. 3).

The Incident (Near or at the Time of the Fatal Incident)

Verbal statements made by the victim were the only sign of intent in 7 out of 12 cases in which the individual had spoken of suicide. Two people (Cases 15 and 23) had wished to self-immolate. In 5 out of 8 cases, written statements were the only sign of intent. Items such as notes or wills were found at the scene (Cases 4 and 5); at the victim's



FIG. 2—Case 10: Burned motor vehicle found 100 m from major highway. The female victim had driven 1010 km from her home. A lighter cap was found at the scene. Analysis of material from the floor of the car revealed gasoline vapor.

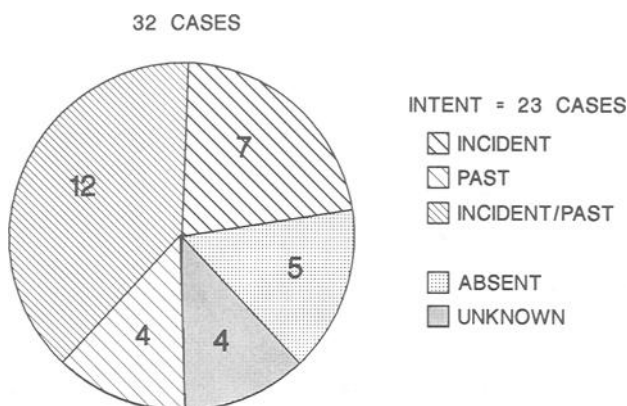


FIG. 3—Number of victims expressing their intent to commit suicide, by various means, either at or near the time of self-immolation (incident), in the past, or both.

residence distant from the scene (Cases 6 and 31), and sent to or left with others, such as a girlfriend, friend, supervisor, or psychiatrist (Cases 5, 15, 20, 23, and 26). In Case 26, a girlfriend burned the deceased's will. Three individuals wrote of their wish to be burned. Two desired cremation (Cases 4 and 6) and another (Case 15), in a letter to his psychiatrist, stated he was going to blow himself up with propane. Three people had attempted suicide a few days before self-immolation. These acts consisted of wrist slashing, three days before (Case 2); self-inflicted burns, six days prior (Case 8); and a deliberate motor vehicle collision, one day before death (Case 23). The latter victim and another (Case 26) also rid themselves of personal possessions. In 2 instances, there were concurrent self-inflicted nonfatal injuries. Toxicological analysis of the blood detected methanol during the hospitalization of 1 person who had ingested the accelerant he used (Case 11). The autopsy of another individual showed recent nonfatal chest stab wounds (Case 27). The initial scene investigation, in some cases, revealed unusual physical findings. A rag was seen in the mouth of an extensively burnt 35-year-old woman (Case 23). She had probably placed it there to stifle any screams of pain. A 46-year-old charred male was found with his arms wired to the steering wheel of his car (Case 25). Similar wire was discovered at his home, and he appeared to have manacled himself to prevent any escape (Fig. 4).

Past Events (Unrelated to the Time of Self-Immolation)

Half of the victims had either attempted or threatened (verbally or by gesture) to commit suicide on more than one occasion. An exception was a 71-year-old man (Case 21) for whom there was only a single documented attempt. When specified, these attempts included drug overdose (Cases 1, 2, 3, and 21) and self-inflicted stab or incised wounds (Cases 16 and 24). Self-immolation gestures were noted in 2 cases. One man had poured gasoline on himself but did not light a match (Case 1), and another male had drenched himself with water from a gasoline container (Case 30).

Reasons/Motivation

The reason the individual committed suicide was known in 22 cases. In 15, strained interpersonal relations were the major factor responsible. Depression, health problems, loss of his or her home, financial problems, and pending criminal charges also contributed.

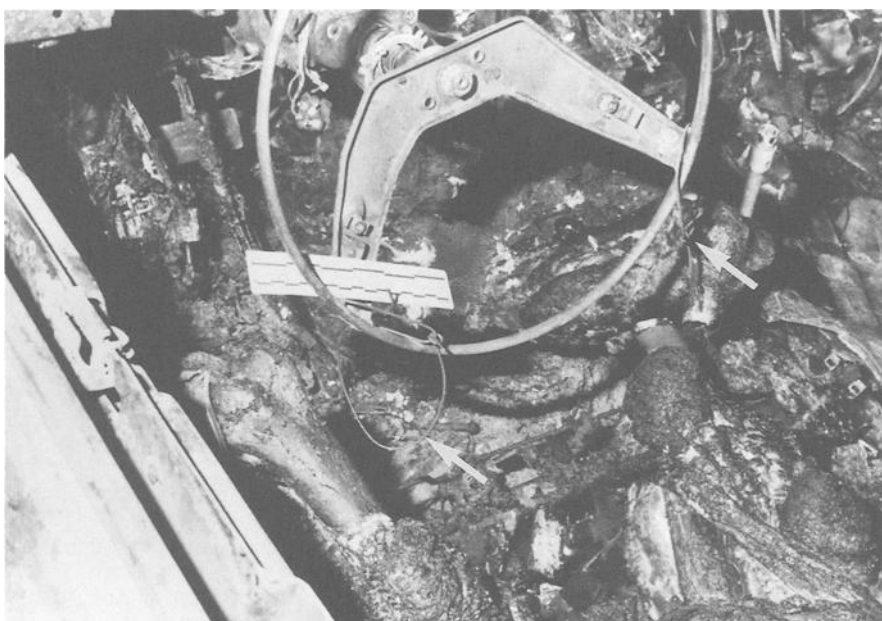


FIG. 4—Case 25: Burned interior of victim's motor vehicle. Wire manacles on steering wheel (arrows).

None of the cases appeared influenced by either a political cause or the news media. The role of either cultural-ethnic background or religion was inconclusive. Three victims were Oriental (Cases 9, 14, and 30) and 1 was a North American Indian (Case 23). Some individuals were described as either religious (Cases 1 and 27) or interested in satanism (Cases 1 and 6), the occult (Cases 6 and 26), or "Eastern religions" (Case 26).

Psychiatric History

There was no known diagnosed psychiatric illness in about half of the cases. Thirteen had been treated, most commonly for schizophrenia (6 cases) (Fig. 5). At the time of self-immolation, 2 were psychiatric hospital inpatients. One (Case 3) had left the hospital on a weekend pass and the other (Case 12), a voluntary inpatient, walked away from hospital leaving behind his personal possessions.

Survival

Eighteen were dead at the scene, including all 11 found in motor vehicles. The remainder died in the hospital, 6 h to 105 days after burning themselves. At least 8 died within 1 day (Fig. 6).

Postmortem Findings (As Related to Cause of Death)

Autopsies were done on 25 individuals, including 18 dead at the scene. The carboxyhemoglobin (COHb) concentration was determined using gas chromatography on all those dead at the scene. Soot was evident in the airways of 6 out of 7 cases having a COHb > 50% (for Case 31, the airway was not assessable because of burning); in 9 out

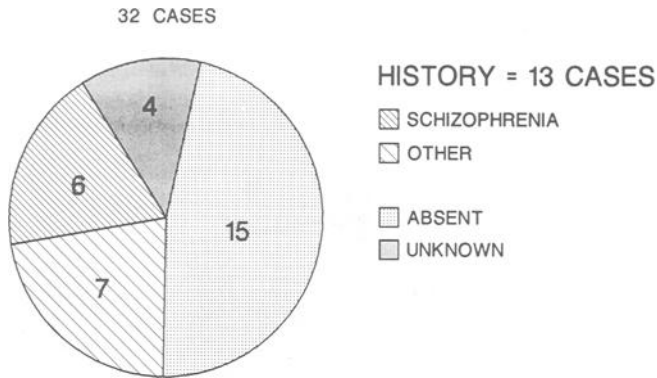


FIG. 5—Number of victims with a history of a previously diagnosed psychiatric illness.

of 10 cases with a COHb ≥ 10 to 50% (in Case 9, soot was absent), and in trace amounts in 1 individual, who presumably had used aerosols as an accelerant and had a COHb $< 10\%$ (Case 21). Case 9 involved a 50-year-old man (COHb, 28%) who, in the confines of his automobile, not only immolated himself but also burned his child (COHb, 67%, with soot present). Although soot was not seen in this man's airway, the larynx and trachea were partly burned and the mucosa reddened. The range of COHb concentration was 28 to 84% (mean, 58%) in victims found in motor vehicles. Individuals found in buildings or in the open had levels of 9 to 38% (mean, 21%) (Fig. 7). When mentioned, pulmonary congestion was evident in at least 15 victims dead at the scene. The burns were usually severe, with the exception of Cases 22 and 28. Postmortem examination performed on 3 patients dying within 24 h revealed severe burns; pulmonary congestion; and, in 2 cases, smoke inhalation (Case 13 survived 16½ h; Case 27 survived 11 h). Autopsies on 4 longer term survivors showed septic complications due to severe burns. Seven patients, not autopsied, were assessed clinically as suffering extensive burns.

Discussion

A total of 29 self-immolation deaths by fire in Dade County, Florida (population, 1.6 million in 1980), were described in two separate studies by Davis ($n = 5$) and Copeland

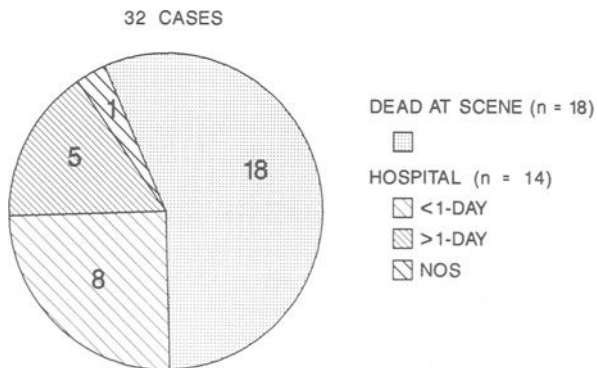


FIG. 6—Number of victims found either dead at the scene or hospitalized. The survival interval was <1 day, >1 day, or NOS (not otherwise specified).

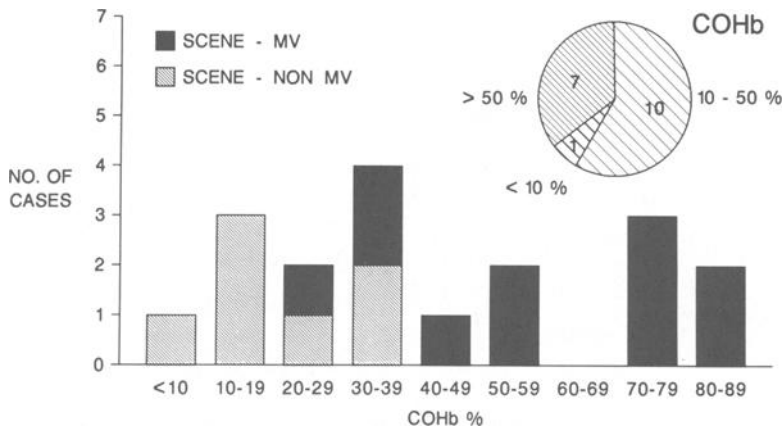


FIG. 7—Distribution of carbon monoxide concentrations (COHb%) in 18 victims found dead at the scene. Note the highest levels were recorded in individuals discovered in motor vehicles (MV).

($n = 24$) over a combined 12-year period (Davis, 1957 through 1960; Copeland, 1977 through 1984) [2,3]. These fatalities accounted for about 0.94% of suicides ($n = 3095$) during this time. In contrast to our review, these studies, as well as other published series of survivors and victims of self-immolation, have shown a female predominance [4–8]. Although the majority of the victims have been adults, adolescent self-immolation has occasionally occurred [6,7,9].

Individuals in Dade County usually burned themselves in their residences [2,3]. Only 4 incidents happened in motor vehicles [3]. No witnesses were mentioned. Various studies have documented the frequent use of an accelerant [2,3,5,6,9]. At least 24 out of the 29 Florida fatalities involved a flammable substance, usually either gasoline or isopropranol (9 cases each) [2,3]. Other articles have noted the victim's preference for gasoline, as was observed in this study [6,9].

About one third ($n = 10$) of the victims described by Davis and Copeland had attempted or threatened suicide recently or in the past [2,3]. The finding of a suicide note was the exception. In some cases, this suicidal intent was expressed as a desire to be burned. A 48-year-old man had previously threatened suicide by dynamite. A suicide note regarding cremation was found at the scene [2]. A 49-year-old female had burned her feet several months before self-immolation [2]. Andreason and Noyes mentioned 1 man who attempted suicide ten times, five by self-immolation [7]. Eight of the 15 survivors and victims of burning described by Scully and Hutcherson had attempted suicide previously, none by burning [6].

The reasons for committing suicide outlined by Davis and Copeland were similar to those in this present study [2,3]. Factors that could motivate an individual to choose self-immolation as a means of suicide, although not definite in this series, have been described by other authors.

Incidents of self-immolation by fire are uncommon and unusual in Western societies [9] and do attract media attention. Sporadic cases have been reported; however, in the decade following the highly publicized politically motivated self-immolation of a Vietnamese Buddhist monk in 1963, such occurrences clustered around various political causes [1,10]. Even these altruistic protests could have been overt or covert suicides [1]. The issue of individuals imitating media examples has been raised [1,11] and even implicated in certain outbreaks of self-immolation [12]. No outside media influence was evident in Copeland's study [3].

The symbolism of fire, as a means of purification, punishment, and sacrifice, is a part not only of Judeo-Christian beliefs but also of ancient and present-day cultures and religions throughout the world [1,9,13]. Examples include self-immolation as a means of supreme sacrifice described in the Buddhist religion [1,10,13] and the past practice of widow burning ("suttee") in Hindu society [1,13,14]. The latter has also been observed among certain North American Indian (Mohave) tribes [15]. The role of cultural or ethnic background has been implied in some self-immolations [2]. A two-year (1962 through 1963) study of suicides among the Israeli Jewish population showed that burning was the second most common method among women, a finding influenced by the high percentage of self-immolation deaths by females born in Africa and Asia [8]. Other reports have described self-immolators as having fundamentalist religious beliefs, accompanied by strong ideas regarding guilt, punishment, and the afterlife [7,9].

As a method of suicide, burning is violent and mutilating. To an institutionalized person intent on committing suicide, an access to matches, although not necessarily to accelerants, may make this method the only one available [7,13,16]. An individual may leave an institution (for example, a hospital) and self-immolate [17]. Because of the painful nature of self-immolation, Topp suggested that these people have an abnormal indifference to pain, a trait that could be present in schizophrenic individuals [13]. Studies, mainly psychiatric, have shown that a sizable number of survivors and victims have mental illnesses; however, only a minority are schizophrenic [2,5,6,7,12]. In Copeland's series, as in the present study, less than half of the deceased had had a known psychiatric disorder [3].

Serious self-immolation attempts result in either death at the scene or hospitalization with possible survival. Self-immolation cases account for 2 to 3% of burn unit admissions [4,5,7], although rates as high as 9% have been noted [6]. Although the severity of the burns sustained varies [6,7], the use of an accelerant is considered responsible for more extensive injuries [4] and consequently a higher mortality than that of other burn victims [5]. Of 70 total suicide attempts by burning described in separate reports, there were 30 deaths [4-7]. In contrast to this report, most of the Dade County victims ($n = 24$ out of 29) were not dead at the scene but succumbed either en route to or in a hospital. Eighteen died within 1 day of multiple burns and the remainder up to 2 months later of septic complications [2,3].

An individual can die during a fire, yet have a low carbon monoxide level (COHb < 10%) in the blood. This can occur during explosive or "flash" fires, and several mechanisms have been proposed [18,19]. Little carbon monoxide will be inhaled if the explosion of flammable substances generates either intense heat, causing rapid death from severe burns, or superheated gas, resulting in obstructive asphyxia from laryngospasm. The amount of carbon monoxide can be low during the initial stage of a flash fire if sufficient oxygen is available. Also, the exposure to carbon monoxide is reduced if the scene is either open or well ventilated. Although self-immolation is considered a type of flash fire characterized by a low carbon monoxide level in the deceased [20], there are few descriptions in the literature that detail the postmortem findings of these victims, particularly those dead at the scene. In the Dade County experience, only 12 carbon monoxide determinations (Copeland, 10; Davis, 2) were performed. Because many of the victims were alive after self-immolation and consequently had medical intervention, such analyses were not useful in most cases. Eight were positive (Copeland, 7, Davis, 1), all had less than 20% saturation [2,3]. The only case specified as dead at the scene had a COHb of 15% and soot in the airway [2]. Soot may or may not be present in the respiratory tract as a result of a flash fire, and the airway should be carefully examined at autopsy [18,19]. Anecdotal case reports have described the finding of carbon particles and low COHb in an occasional self-immolation victim dead at the scene [21]. The finding of soot can persist in an individual surviving even for a few hours [22].

Conclusions

Investigators must be aware of this unusual method of suicide during the inquiry of any fire-related fatality. Suspicion of foul play can be aroused by unusual scene characteristics, for example, a remote location, and objectivity may be challenged by denial of this manner of death by the victim's relatives. Questioning individuals at the scene, friends, associates, and relatives of the deceased, as well as inquiry about the deceased's psychiatric history is essential. Eyewitness accounts, reasons to commit suicide, indications of suicidal intent, and previous mental illness assist in the determination of death by self-immolation. Other motivating factors, such as news media influence, political and religious beliefs of the deceased, and his or her cultural or ethnic background should be considered. Careful scene investigation is necessary. An accelerant is usually present, a finding uncommon in accidental fires [23]. To help either determine or confirm the use of a flammable substance, appropriate samples for analysis can be collected at the scene and from the victim. If a victim is found in a motor vehicle, then accidental malfunction of the automobile may have to be first excluded as a possibility.

In dealing with a self-immolation death, the pathologist will be confronted with an individual who has either been hospitalized or discovered dead at the scene. In the former instance, the survival interval will vary and the victim may succumb either to burns, usually severe, and smoke inhalation shortly after admission or septic complications in the longer term. People found dead at the scene may require accurate personal identification because of extensive burning. In our experience, although such individuals occasionally had experienced a flash fire situation (that is, had low carboxyhemoglobin saturation), the presence of soot in the airway or elevated carbon monoxide in the blood was helpful in concluding not only that most of the victims had been alive during the fire but also that carbon monoxide poisoning was a factor in a significant number of deaths. Carbon monoxide was elevated, particularly in those individuals found in confined spaces, such as motor vehicles.

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