



Original Contribution

Comparison of Clinical Characteristics of Intentional vs Accidental Drowning Patients[☆]Seon Hee Woo, MD^a, Jeong Ho Park, MD^b, Seung Pill Choi, MD, PhD^b, Jung Hee Wee, MD, PhD^{b,*}^a Department of Emergency Medicine, Incheon St. Mary's Hospital, College of Medicine, The Catholic University of Korea, Seoul, Korea^b Department of Emergency Medicine, Yeouido St. Mary's Hospital, College of Medicine, The Catholic University of Korea, Seoul, Korea

ARTICLE INFO

Article history:

Received 7 April 2015

Received in revised form 23 April 2015

Accepted 24 April 2015

ABSTRACT

Purposes: Drowning may happen by accident or as a method of committing suicide. The aim of this study was to determine some characteristics of drowning patients who committed intentionally.

Methods: A retrospective review was performed on 462 patients who visited the emergency department complaining of drowning between January 1998 and October 2011. Of these patients, we only included the patients for whom the cause could be identified. Age, sex, cause, time of drowning, season, mechanism, cardiopulmonary resuscitation performance, body temperature, alcohol ingestion, history of previous suicide attempts, outcome, and other characteristics were collected.

Results: A total of 380 patients were included. Among them, 282 (74.2%) had drowned themselves intentionally, and they were older than those who had drowned accidentally (median age, 35.0 years [25.0–49.0 years] vs 26.5 years [19.0–35.5 years], $P < .001$) and showed lower body temperature (below 34°C, 32.1% vs 12.2%, $P = .027$). Ninety-four cases (33.3%) jumped off the river from a bridge, and 185 (65.6%) walked into the river from the riverside. In the intentional group, 59 (20.9%) had depressive disorder in their history. The rate of death showed no clinical difference (19.5% vs 16.3%, $P = .487$), but more males died in the accidental group (61.8% vs 93.8%, $P = .015$).

Conclusions: Intentional drowning happened more in older subjects and presented lower initial body temperature. Walking from the riverside happened more often than jumping off a bridge. More males died of drowning regardless of intentionality.

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1. Introduction

Drowning may show different dispersion patterns depending on regional influences and socioeconomic level, and the rates of death caused by drowning tend to be higher in low-income countries [1–4]. Although the number of deaths from drowning is following a decreasing trend around the world, drowning remains a common cause of unnatural death. Young children are particularly high-risk targets for drowning death [1,2]. According to statistical data on the causes of death from the National Statistics Office between 1991 and 2010, a total of 38267 people died of drowning in the last 20 years, with an average of 1913 deaths every year. Of the total, 27054, approximately 70.7%, were caused by unintentional accidents. The total number of deaths from drowning has been constantly decreasing from 1991, whereas the number of drowning deaths caused by self-harm and suicide has been continuously increasing [5,6].

In South Korea, the occurrence rate of drowning is the highest in the Han River of the Seoul metropolitan region. With the recent cultural in-

fluence of leisure life and the development of water sport activities, drowning cases have become more frequent [5,7]. The causes of drowning can be categorized into unintended cases, which occur in accidents at a pool, bathtub, river, or ocean, and intended cases, in which one drowns oneself for the purpose of committing suicide [8–10]. In addition, drowning after consuming alcohol or drugs tends to increase the death rate of drowned patients [11,12].

If various preventive measures are established, not only the accidental drowning cases but also suicide attempts may be prevented, and the resulting death rate may be reduced. In addition, considering the prognosis of drowned patients, the drowning time, rapid rescue of the patient, and first aid at the time of rescue are extremely important. Thus, there is a need to establish preventive measures against intentional drowning cases and for full understanding of the epidemiology and clinical properties thereof for rapid rescue when drowning occurs. However, most of the domestic and overseas studies are about the prognosis and predictive factors of severely drowned patients, whereas there is a lack of studies that investigate the aspects of intentional drowning cases.

Because this hospital is a tertiary university hospital located near the Han River and treats many patients who drown not only in the Han River but also other places, such as pools and bathtubs, the aim of this study was to conduct a comparative analysis on the epidemiology and clinical properties of intended vs unintended drowning cases.

[☆] Funding sources/disclosures: None.

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2. Methods

The medical records of all drowned patients who were hospitalized between January 1, 1998, and October 31, 2011, in the emergency department (ED) of Yeouuido St. Mary's Hospital were retrospectively analyzed. Approximately 35 000 patients are admitted to the ED for medical treatment every year.

This study was approved by the institutional review board of the Catholic University of Korea, Yeouido St. Mary's Hospital. From the medical charts of all patients, intentionality in the cause of drowning, the site and method of drowning, age and sex, season, time of the incident, and the duration of drowning were investigated. Information about consciousness, initial temperature, and the existence of cardiac arrest at ED arrival were collected. Interviews with guardians, witnesses, and the patients themselves were also conducted to investigate the existence of suicide attempts, consumption of alcohol before drowning, records of neuropsychiatric diseases in the past, and whether the patient was alive at the time of leaving the hospital.

Of all the studied drowned patients, those harmed in suicide attempts or by other intentional causes are categorized in the "intentional group," and those harmed by loss of footing during water activities or in other accidents are categorized in the "accidental group." Any cases for which the intentionality of the drowning was unknown or the epidemiological data were vague were excluded from the study.

Statistical analyses were performed using SPSS 12.0 (SPSS Inc, Chicago, IL). To compare the 2 groups, median and quartiles were measured for cases of which the continuous variables were normally distributed, and the Mann-Whitney *U* test was conducted. For cases with discontinuous variables, Pearson χ^2 test and Fisher exact test were conducted at a significance level of $P < .05$.

3. Results

3.1. General characteristics of patients injured from drowning

There were a total of 462 drowned patients who were hospitalized during the research period, and 380 of them, excluding 82 whose intentionality and epidemiological data were unknown, were analyzed. There were 282 sample patients (74.2%) in the intentional group and 98 (25.8%) in the accidental group. The median ages for the intentional and accidental group were 35.0 years (25.0–49.0 years) and 26.5 years (19.0–35.5 years), respectively ($P < .001$), with 143 (50.7%) males in the intentional group and 58 (59.2%) males in the accidental group ($P = .148$). In addition, the age group with the largest proportion in the intentional group was 20 to 49 years (69.2%), whereas those in the accidental group were 0 to 9 years (19.4%) and 20 to 39 years (51.0%), showing a distinction between the 2 groups ($P < .001$). Because of the location of the hospital, 358 of the patients were drowned in a river. Except for a single patient who attempted suicide in a bathtub, all 281 patients in the intentional group had incidents in the river, with 94 (33.3%) jumping off a bridge and 185 (65.5%) walking into the river (Fig. 1). Of

all patients in the accidental group, most, 77 representing 78.6%, drowned in the river, followed by 19 patients (19.4%) in a pool and 2 patients (2.0%) in a bathtub (Fig. 2). For the intentional and accidental groups, 101 (36.1%) and 46 (46.9%) incidents, respectively, occurred between June and August, showing that the drowning cases occurred mainly in summer. However, there were no statistical differences in seasonal aspects between the 2 groups ($P = .093$). Regarding the time of the drowning incident, the number of patients who drowned between 1200 and 1800 was 87 (30.9%) and 34 (34.7%), showing that the incidents occurred in the afternoon the most for both groups. In addition, 59 (20.9%) of the cases in the intentional group occurred during 0600 to 1200, showing a statistically significant higher frequency than those in the accidental group ($P = .026$) (Table 1).

3.2. Comparison of the clinical characteristics between the intentional and accidental groups

Eighty-one patients (28.7%) in the intentional group and 27 patients (27.6%) in the accidental group were in a coma at arrival at the emergency center, showing no significant statistical difference between the initial conscious state of the 2 groups ($P = .452$).

At the time of ED arrival, 77 patients (27.3%) in the intentional group and 23 patients (23.5%) in the accidental group were in cardiac arrest ($P = .458$). For both groups, the largest number of patients, 106 (37.6%) and 37 (37.8%), had their initial temperature between 34°C and 36°C. However, 34 patients (34.7%) in the accidental group had initial temperature above 36°C, and 54 patients (19.1%) in the intentional group had initial temperature below 30°C, showing a significantly higher frequency than that of incidental group ($P = .033$). Fifty-nine patients (20.9%) in the intentional group had history of depression, whereas none of the patients in the accidental group had such history ($P < .001$). Considering alcohol ingestion, 56 cases (57.1%) in the accidental group occurred without drinking, showing a higher frequency than the cases in the intentional group ($P < .001$). There were no statistical differences between the immersion times of the 2 groups (Table 2).

3.3. Comparison of the death rates between the 2 groups

Of the 77 patients in the intentional group who were in cardiac arrest at arrival, 23 survived, and 1 patient who was alive at arrival died during hospitalization, resulting in a total of 55 deaths (19.5%). Of the 23 patients in the accidental group who were in cardiac arrest at arrival, 8 survived, and 1 patient who was alive at arrival died, resulting in total of 16 deaths (16.3%). There was no statistical difference between the 2 groups regarding the death rate ($P = .487$) (Table 2).

In sex analysis, more male patients were found in both groups (34 patients [61.8%] in intentional group and 15 patients [93.8%] in the accidental group, $P = .015$). Deaths in the intentional group occurred at a higher average age (38.5 vs 25.0 years, $P < .001$), and none of the deaths that

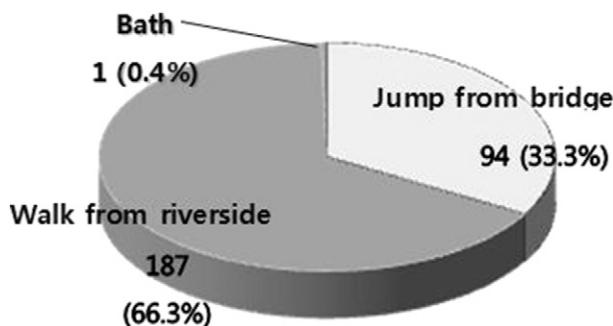


Fig. 1. Method of drowning in the intentional group.

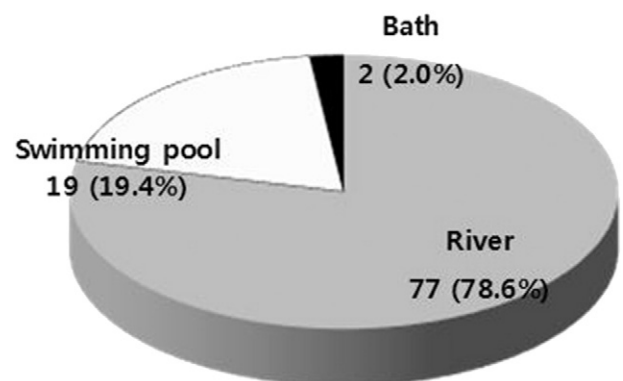


Fig. 2. Place of drowning in the accidental group.

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