

OLGU SUNUMU / CASE REPORT

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## Suicide by Homemade Hydrogen Sulfide in Turkey: A Case Report

### Türkiye’de Ev Yapımı Hidrojen Sülfür Gazı ile İntihar. Olgu Sunumu

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#### Abstract

Suicide is a major public health problem and globally the second leading cause of death among young adults. Most of deaths due to HS were seen among sewage or industrial workers because of acute exposure to this gas. Suicide by inhalation of homemade HS has been reported for the first time in Japan, in 2007. In this study, for the first time, a 24-years-old male university student (from Turkey) preparing homemade HS by using commercially available chemical products that were bought online in order to suicide was reported. The case is discussed in the light of related literature.

**Keywords:** Hydrogen Sulfide; Thiosulfate; Suicide; Knockdown; Asphyxia; Autopsy.

#### Özet

İntihar günümüzde temel bir halk sağlığı problemi olup genç yetişkinlerde ölüm nedenleri arasında ikinci sırayı almaktadır. Hidrojen Sülfüre bağlı ölümlerin büyük çoğunluğu, gazla akut maruz kalmaya bağlı olarak kanalizasyon veya endüstri işçilerinde görülmektedir. HS solunması yoluyla intihar ilk kez 2007 yılında Japonya’da bildirilmiştir. Bu çalışmada, Türkiye’de ilk kez market ve internet üzerinden satın aldığı kimyasal ürünleri kullanarak evinde hazırladığı HS gazı ile intihar eden 24 yaşındaki erkek üniversite öğrencisi bildirilmektedir. Olgu, güncel literatür ışığında tartışılmıştır.

**Anahtar Kelimeler:** Hidrojen Sülfür, Tiyosülfat, İntihar, Asfiksi, Otopsi.

#### 1. Introduction

Suicide is a major public health problem and globally the second leading cause of death among young adults (1). Suicide rates for 15-24 years group are estimated as 20/100,000 for males and 4.9/100,000 for females (2). Studies focusing on how mental health risk factors impact on youth suicidal behaviors suggest that psychopathological symptoms are associated with suicidal behavior (3,4). Particularly more than 90% suicide victims have had at least one major psychiatric disorder, although young adult suicide victims have lower rates of psychopathology, averaging 60% (5,6). In general, males are more likely to employ violent methods (e.g., hanging or shooting) whereas females are more likely to employ non-violent methods, such as poisoning with drugs

or pesticides (7,8). The most prevalent method of suicide differ among communities such as jumping from heights in South Korea and hanging in Japan, jumping in front of moving objects in Finland, use of firearms in the United States (7). Some of the methods that have recently become popular include mixing chemicals to produce hydrogen sulfide gas (9), and the use of helium gas (10).

Hydrogen sulfide (HS) is a colorless and flammable toxic gas. Besides existing in the volcanoes, coke oven plants, hot springs and other geothermal sources, it is produced by putrefaction of sulfur containing organic materials, accounting for the foul smell in sewage systems, swamps, manure-handling plants, and tanneries (11,12). Adverse effects of HS on human health vary from local irritation to immediate death depending on the form, concentration, duration and route of exposure (9,13,14). It has a distinctive pungent odor often described as “rotten egg” smell starting to be felt at low concentrations ranging from 0.0005 to 0.3 parts per million (ppm). While short time exposure at low concentrations (10-20 ppm) causes local irritation on mucous membranes (e.g., painful eye, nose and throat irritation, headaches, fatigue, irritability

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and insomnia, gastrointestinal disturbance and dizziness), prolonged exposure may cause conjunctivitis, bronchitis and pulmonary edema (13,15,16). Hydrogen sulfide however, is odorless at concentrations above 150 ppm, because it quickly impairs the olfactory senses. Inhalation of concentrations between 500 to 900 ppm causes severe systemic toxicity including respiratory paralysis, asphyxia and coma. It has been reported that single inhalation of gas above 1000 ppm results in instantaneous loss of consciousness, rapid apnea, and death. This kind of suicide is referred to as “knock down” and was introduced as a painless way to kill oneself (13,16).

Suicide by inhalation of homemade HS has been reported for the first time in Japan, in 2007 (17). With the fast spread of the information on the Internet explaining how to prepare chemical solution to produce the gas, there has been a huge increase in the number of cases reported in 2008 (13). Here, we report a 24-years-old male university student who prepared homemade HS in order to suicide. Since the search on medical literature reveals no previously reported case of suicide by Hydrogen sulfide in Turkey, this will be the first case to be reported. The case is discussed in the light of related literature.

## 2. Case report

**Scene Investigation;** The decedent was found lying supine in the bathroom. He was wearing a white under-shirt and jeans; right hand wrapped in a plastic bag. Outside the bath door, a 1000 mL of yellow bottle, and just near the deceased, another 750 mL blue bottle containing partially used toilet cleaner was present. There was a plastic bucket containing sawdust like wet substance (orpiment) in white color just beside the feet of the deceased. A delivery note belonging to the orpiment purchased from a chemical company was found in the living room. Two warning notes, one in the living room, and the other in the bathroom were attached to doors; written as “içerisi zehirli gaz dolu girmeyin!!” (Do not enter; inside is full of poisonous gas!!), and “kovanın içi kaynak H<sub>2</sub>S” (HS source is inside of bucket). Upon entering the flat, the first responder team felt the heavy chemical odor and saw the warning notes; so the flat was ventilated before the investigation.

**Autopsy;** On the external examination, the corpse showed moderately early changes of composition; a protruded tongue, gaseous distension of scrotum and abdomen, marbling, skin slippage and blistering in dependent areas. The internal examination revealed signs of autolysis in heart, lung, kidney and central nervous system macroscopically. Except diffuse macro and microvesicular steatosis in liver, autolysis was detected in all organs on

histopathological examination. The toxicological analysis was performed on the putrefaction fluids and organ samples obtained during autopsy. Toxicological analysis revealed 8.8% methemoglobin. It was reported that no alcohol analysis could be done since the sample was not appropriate, and no carboxyhemoglobin was detected. Additionally, no drugs or poisons were detected in systematic toxicological analysis. The toxicology report stated that thiosulfate could not be included in the screening at the forensic toxicology laboratory. Based on the evaluation of the findings, it was concluded that he generated HS gas by mixing bleach with orpiment in the bucket, and death occurred due to HS intoxication.

**Medical History;** Our case is a 24-years-old male university student living alone in a flat, and had introvert character having few friends in Afyon/Turkey. The review of the investigation file revealed that he is the younger of two siblings in a two-parent, middle-income household. He was attending Physics Department at Afyon Kocatepe University. He had a poor academic performance and this was his sixth year at university. He was introvert, did have few friends, living alone, and usually a heavy odor existed in his flat. His family and friends last contacted him 4 days ago, before found dead. Investigation of medical records revealed no history of psychiatric treatment or suicide attempt. He does not have a history of abuse or trauma. He lastly applied to the department of gastroenterology in May of 2011, five months before committing suicide. He complained about the abdominal pain lasting for 4 months, unrelated to meals, but worsening with stress. He had no complains of nausea, vomiting, diarrhea or constipation. The only physical finding was epigastric tenderness, and he was prescribed a proton pump inhibitor and spasmolytic.

## 3. Discussion

Most of deaths due to HS were seen among sewage or industrial workers because of acute exposure to this gas. Review of the literature reveals several occupational accidents that resulted in single or multiple deaths of workers (18,19). Similarly, most of the reported deaths due to HS gas have involved sewer systems, or industrial accidents in Turkey (20,21). In addition, Daldal et al., (2010) reported two cases of HS intoxication in a thermal facility; in which female victim was found dead at the scene, whereas her fiancée survived after hospital treatment (22).

Towards the end of 2000s, suicide by inhalation of HS gas was introduced, and it has rapidly become a widespread technique in Japan (9,13). Recent reporting of a suicide pact using this gas in the UK led to concerns that a similar rise in

suicides might occur (23). In 2008, at least 517 people died by suicide using this technique (15), and over 2000 cases have been reported since then in Japan (16).

Our search on Turkish daily newspapers revealed two other cases of suicide by homemade HS (24,25) but none of them has been published yet. The profile of first case is closely identical to ours. He is a 24 years old male university student, failed at the exams, has written a suicide letter and left warning notes about the toxic gas, and committed suicide at home. The news also reports that the scene investigation team was affected by toxic gas.

According to Turkish Statistical Institute (TUIK) 2013 report on suicide, 50.9% of people committed suicide by hanging, followed by firearms (25.5%), throwing from a high place (9.4%) and taking chemicals (6.0%), respectively. In terms of gender, firearms are preferred about twice by males (29%) than females (16%), whereas use of chemicals is preferred twice by females (9.0%) than males (4.9%) (426). To the best of our knowledge, this is the first reported case of suicide by hydrogen sulfide in Turkey. The information explaining suicide technique by HS on the Internet and the news in media may lead to an increase in suicide incidence by HS. This increase has been associated to wide availability and easy accessibility of the information and instructions obtained for use of this technique on the Internet (13). We can state that as the Internet has increasingly become an important part of life, the risk of youth being damaged increases.

In recent years, there is a striking increase in the number of publications dealing suicide as a major public health problem. About 800,000 people die by suicide each year, and it has become the second leading cause of death among young adults all over the world (1). Several risk factors have been described for suicide. Among these, depression is consistently reported increasing the risk of death by suicide. Substance abuse is also a significant risk factor, particularly among young people. Additional risk factors include a family history of suicide, being male, poor peer relationships, living apart from parents, and traumatic events (e.g., sexual abuse) (2). Although it was not found any risk factors for suicide in present case in terms of psychopathology, significant psychosocial risk factors were present such as poor academic achievement, poor peer relationship, living alone. In 2014, WHO published world suicide report in order to increase the public awareness on suicide and to make suicide prevention a higher priority on the global public health agenda (1). This report proposed several strategic actions for suicide prevention, such as reducing access to suicide means, conducting surveillance and improving data quality, raising awareness, and engaging the media.

In conclusion, most of the reported deaths due to HS gas have involved sewer systems, or industrial accidents in the world. By the late 2000s, suicide by inhalation of homemade HS was introduced, and it has rapidly become a widespread technique. In this study, for the first time, a 24-years-old male university student (from Turkey) preparing homemade HS by using commercially available products that were bought online in order to suicide was reported. It is known that worldwide Internet use is highest among 14-24 years age group (527). About 17% of Turkish population is consisted by 15-24 years age group (628). Therefore, as in Japan, the government executives should take necessary measures in order to prevent the dissemination of the information concerning this fatal suicide method in Turkey.

#### Ethical Approval

This study was approved by the Ethical Committee of The Council of Forensic Medicine, Turkey.

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