

# Case Report: Victims of the Long Term Effects of Chemical Weapons on Health in Kurdistan of Iraq

## ABSTRACT

Extensive exposure to chemical weapons such as mustard gas, nerve gas and cyanide causes high mortality, morbidity, injuries, and chronic side effects in vital organs, especially the respiratory tract.

Globally, chemical weapons have been documented as having been used since 429 BC, when they were used by the Spartans in the Peloponnesian War. In the First World War (WW1) the use of chemical agents caused an estimated 1,300,000 casualties, including 90,000 deaths. Chemical weapons were heavily used by Iraq against Iranian soldiers between 1984-1986, then, against the Iraqi Kurds in Sheikh Wasan and Balisan valley, during April 1987 and in Halabja on 18th March 1988.

Reports suggested that as many as 2.9% of the Kurdish population have been exposed to chemical weapons at some level.

This case report describes a Kurdish lady who was exposed to mustard gas during a chemical attack in Sheikh Wasan in Iraq.

A forty eight years old woman wearing black clothes presented to our center at 1999 complaining from shortness of breath (SOB). Her condition started 12 years ago when the Iraqi Government attacked her village Sheikh Wasan by Chemical weapons which included Mustard gas and nerve gases such as Sarin, Tabun and VX in April 1987. She described how the gas smelled like rotten apples as it spread over the village. During the attack she suffered from sever SOB, cough, skin burn and eye irritation and lacrimation. After several days of being without medical care, she received some medical attention by local medical staff in the area because the Iraqi authorities at that time refused and prohibited them from management at the major hospitals. When she returned to her home she found that several members of her family had died during the exposure to chemical gases. Among the dead people were her parents, two brothers, husband and son, in addition to other second and third degree relatives. Since that time she has suffered from repeated attacks of cough and SOB and wheezing that were increased by exertion and cold exposure. The attacks were more severe with time and the SOB has interfered with her daily activity and eventually she was suffering from SOB at rest and during sleep that made her unable to sleep lying down. Moreover she was suffering from severe depression since that time for which she consulted several doctors but without improvement. In the end of 2001, she suffered from severe cough and Hemoptysis associated with anorexia and loss of weight. She consulted our center for this purpose and we asked for a medical care for her. Available haematological and radiological investigations were done for her showing a preliminary diagnosis of non-small cell lung cancer. . She was sent for further investigations and treatment, but since then she has been disappeared and no more information was recorded about her situation.

This is one example of many of those who suffered from the effect of chemical weapons in Kurdistan of Iraq.

**Key words:** Chemical weapon, Mustard gas, shortness of breath, Cancer.

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## Introduction

The use of chemical warfare agents dates back to 429 BC and various agents have been developed and used against populations since that time. (Table 1 - below)

The NATO definition of a chemical agent is: A chemical substance which is intended for use in military operations to kill, seriously injure or incapacitate people because of its physiological effects. (1).

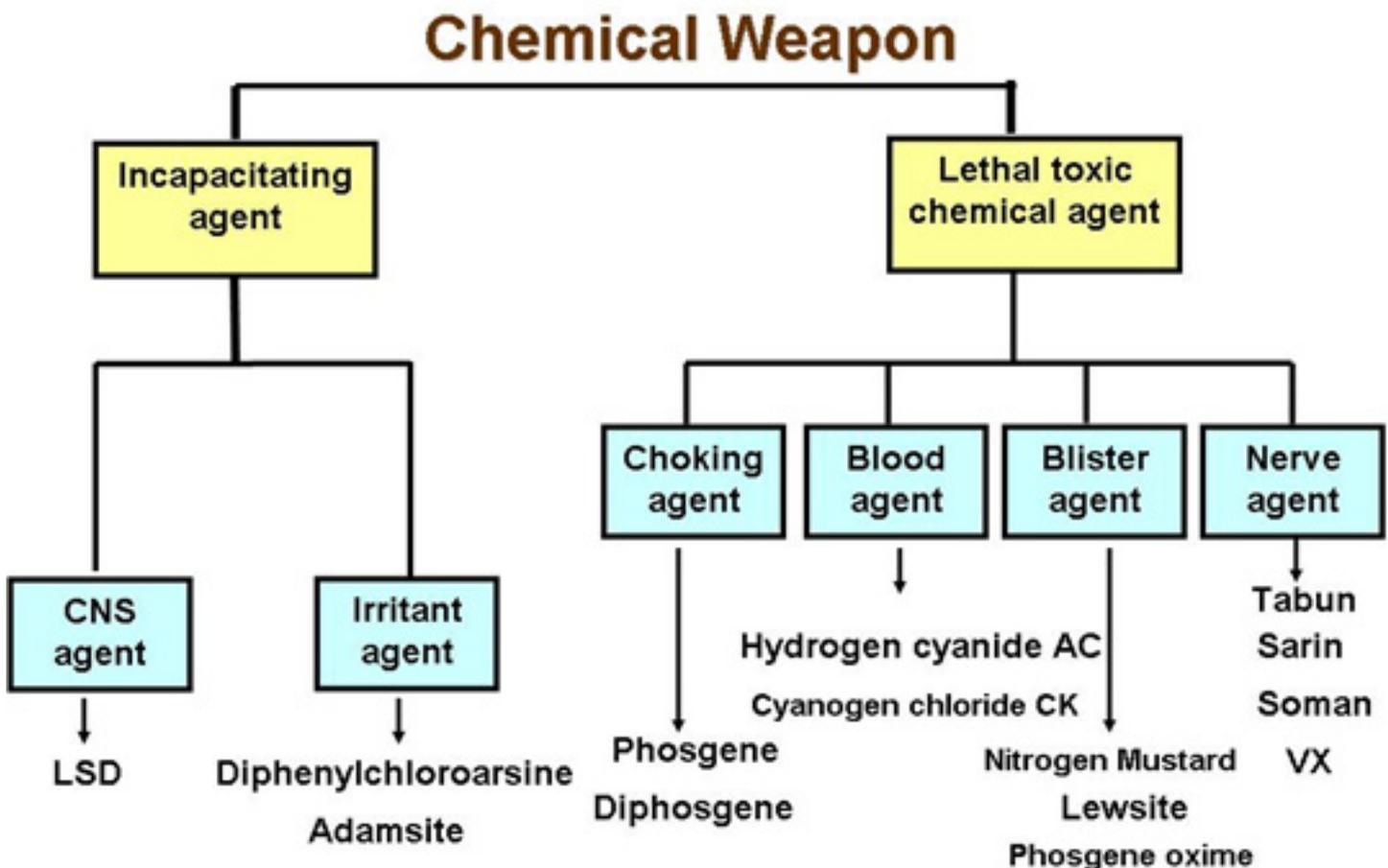
- **429 B.C.** - Spartans ignite pitch and sulphur to create toxic fumes in the Peloponnesian War (CW)
- **424 B.C.** - Toxic fumes used in siege of Delium during the Peloponnesian War (CW)
- **960-1279 A.D.** - Arsenical smoke used in battle during China's Sung Dynasty (CW)
- **1346-1347** - Mongols catapult corpses contaminated with plague over the walls into Kaffa (in Crimea), forcing besieged Genoans to flee (BW)
- **1456** - City of Belgrade defeats invading Turks by igniting rags dipped in poison to create a toxic cloud (CW)
- **1710** - Russian troops allegedly use plague-infected corpses against Swedes (BW)
- **1767** - During the French and Indian Wars, the British give blankets used to wrap British smallpox victims to hostile Indian tribes (BW)
- **April 24, 1863** - The U.S. War Department issues General Order 100, proclaiming "The use of poison in any manner, be it to poison wells, or foods, or arms, is wholly excluded from modern warfare"
- **July 29, 1899** - "Hague Convention (II) with Respect to the Laws and Customs of War on Land" is signed. The Convention declares "it is especially prohibited... To employ poison or poisoned arms"
- **1914** - French begin using tear gas in grenades and Germans retaliate with tear gas in artillery shells (CW)
- **April 22, 1915** - Germans attack the French with chlorine gas at Ypres, France. This was the first significant use of chemical warfare in WWI (CW)
- **September 25, 1915** - First British chemical weapons attack; chlorine gas is used against Germans at the Battle of Loos (CW)
- **1916-1918** - German agents use anthrax and the equine disease glanders to infect livestock and feed for export to Allied forces. Incidents include the infection of Romanian sheep with anthrax and glanders for export to Russia, Argentinian mules with anthrax for export to Allied troops, and American horses and feed with glanders for export to France (BW)
- **February 26, 1918** - Germans launch the first projectile attack against U.S. troops with phosgene and chloropicrin shells. The first major use of gas against American forces (CW)
- **June 1918** - First U.S. use of gas in warfare (CW)
- **June 28, 1918** - The United States begins its formal chemical weapons program with the establishment of the Chemical Warfare Service (CW)
- **1919** - British use Adamsite against the Bolsheviks during the Russian Civil War (CW)
- **1922-1927** - The Spanish use chemical weapons against the Rif rebels in Spanish Morocco (CW)
- **June 17, 1925** - "Geneva Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare" is signed - not ratified by U.S. and not signed by Japan
- **1936** - Italy uses mustard gas against Ethiopians during its invasion of Abyssinia (CW)
- **1937** - Japan begins its offensive biological weapons program. Unit 731, the biological weapons research and development unit, is located in Harbin, Manchuria. Over the course of the program, at least 10,000 prisoners are killed in Japanese experiments (BW)
- **1939** - Nomonhan Incident - Japanese poison Soviet water supply with intestinal typhoid bacteria at former Mongolian border. First use of biological weapons by Japanese (BW)
- **1940** - The Japanese drop rice and wheat mixed with plague-carrying fleas over China and Manchuria (BW)
- **1942** - U.S. begins its offensive biological weapons program and chooses Camp Detrick, Frederick, Maryland as its research and development site (BW)
- **1942** - Nazis begin using Zyklon B (hydrocyanic acid) in gas chambers for the mass murder of concentration camp prisoners (CW)
- **December 1943** - A U.S. ship loaded with mustard bombs is attacked in the port of Bari, Italy by Germans; 83 U.S. troops die in poisoned waters (CW)
- **April 1945** - Germans manufacture and stockpile large amounts of tabun and sarin nerve gases but do not use them (CW)
- **May, 1945** - Only known tactical use of biological weapons by Germany. A large reservoir in Bohemia is poisoned with sewage (BW)
- **September, 1950-February, 1951** - In a test of biological weapons dispersal methods, biological simulants are sprayed over San Francisco (BW)
- **1962-1970** - U.S. uses tear gas and four types of defoliant, including Agent Orange, in Vietnam (CW)

**Table 1: Chronology of biological and chemical weapons use and control, 429 B.C.–1998 (continued top of next page)**

Source: (<http://www.libraryindex.com/pages/1888/Proliferation-Weapons-Mass-Destruction-WMD-HISTORY-USAGE-PROLIFERATION.html>)

- **1963-1967** - Egypt uses chemical weapons (phosgene, mustard) against Yemen (CW)
- **June, 1966** - The United States conducts a test of vulnerability to covert biological weapons attack by releasing a harmless biological simulant into the New York City subway system (BW)
- **November 25, 1969** - President Nixon announces unilateral dismantlement of the U.S. offensive biological weapons program (BW)
- **February 14, 1970** - President Nixon extends the dismantlement efforts to toxins, closing a loophole which might have allowed for their production (BW)
- **April 10, 1972** - “Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction” (BWC) is opened for signature
- **1975** - U.S. ratifies Geneva Protocol (1925) and BWC
- **1975-1983** - Alleged use of Yellow Rain (trichothecene mycotoxins) by Soviet-backed forces in Laos and Kampuchea. There is evidence to suggest use of T-2 toxin, but an alternative hypothesis suggests that the yellow spots labeled Yellow Rain were caused by swarms of defecating bees (CW)
- **1978** - In a case of Soviet state-sponsored assassination, Bulgarian exile Georgi Markov, living in London, is stabbed with an umbrella that injects him with a tiny pellet containing ricin (BW)
- **1979** - The U.S. government alleges Soviets use of chemical weapons in Afghanistan, including Yellow Rain (CW)
- **April 2, 1979** - Outbreak of pulmonary anthrax in Sverdlovsk, Soviet Union. In 1992, Russian president Boris Yeltsin acknowledges that the outbreak was caused by an accidental release of anthrax spores from a Soviet military microbiological facility (BW)
- **August, 1983** - Iraq begins using chemical weapons (mustard gas), in Iran-Iraq War (CW)
- **1984** - First ever use of nerve agent tabun on the battlefield, by Iraq during Iran-Iraq War (CW)
- **1985-1991** - Iraq develops an offensive biological weapons capability including anthrax, botulium toxin, and aflatoxin (BW)
- **1987-1988** - Iraq uses chemical weapons (hydrogen cyanide, mustard gas) in its Anfal Campaign against the Kurds, most notably in the Halabja Massacre of 1988 (CW)
- **September 3, 1992** - “Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction” (CWC) approved by United Nations
- **April 29, 1997** - Entry into force of CWC
- **1998** - Iraq is suspected of maintaining an active CBW program in violation of the ceasefire agreement it signed with the UN Security Council. Baghdad refuses to allow UNSCOM inspectors to visit undeclared sites (CW/BW)

**Table 1: Chronology of biological and chemical weapons use and control, 429 B.C.–1998**



**Figure 1: Classification of chemical weapon according to their mechanism of action**

About 70 different chemicals have been used or stockpiled as chemical warfare agents during the 20th century and the 21st century. These agents may be in liquid, gas or solid form. Liquid agents are generally designed to evaporate quickly; such liquids are said to be volatile or have a high vapor pressure. Many chemical agents are made volatile so they can be dispersed over a large region quickly. These agents were designed specifically to harm people by any route of exposure and to be effective at low doses (2).

Chemical Weapons can be divided into lethal and incapacitating categories (Figure 1).

A substance is classified as incapacitating if less than 1/100 of the lethal dose causes incapacitation, e.g., through nausea or visual problems. The limit between lethal and incapacitating substances is not absolute but refers to a statistical average. In comparison, it may be mentioned that the ratio for the nerve agents between the incapacitating and lethal dose is approximately 1/10. Chemical warfare agents are generally also classified according to their effect on the organism. The two major threat classes of chemical weapons are mustard gas and the nerve agents, and this has not changed in over 50 years. Both types are commonly called gases, but they are actually liquids that are not remarkably volatile. (3, 4).

It must also be remembered that possible new agents are constantly being discovered, and also, that some chemical agents may be used together as a mixture. From the medical standpoint, toxins could pose similar problems to those produced by chemical agents. (1)

Chemical agents in the modern sense were first used in World War I when chlorine gas was released, from large cylinders, in a favorable wind.

The French were the first to use chemical weapons during the First World War, using tear gas. The German's first use of chemical weapons were shells containing xylyl bromide that were fired at the Russians near the town of Bolimów, Poland in January 1915 (5). Official figures declare about 1,176,500 non-fatal casualties and 85,000 fatalities directly caused by chemical warfare agents during the course of the war (6).

Later in the War they used mustard gas. Soon both sides were using chemical warfare extensively leading to the introduction of gas masks. The fear of the detrimental effects of chemical warfare caused many countries to abstain from using it and except for the use of poison gas by the Italians in the war against Ethiopia (1935-36) and by the Japanese against Chinese guerrillas (1937-42), chemical warfare was not employed after World War I. This is not to say however, that the military powers of the world did not continue to develop new gases (7).

Chemical weapons were heavily used by Iraq against Iranian soldiers between 1984-1986, then, against the Iraqi Kurd (2). In 1987-88 Iraqi forces launched chemical attacks against approximately 40 Kurdish villages and thousands of innocent civilians (8).

Initial scientific studies conducted by local doctors and international specialists indicate that as many as 2.9% of the population of almost four million people in northern Iraq have been exposed to chemical weapon at some level between April 1987 and August 1988. In April of 1987, the regime attacked the villages of Sheik Wasan and Balisan, using chemical weapons for the first time, killing more than a hundred people (Figure 2), mostly women and children. The worst of these attacks devastated the city of Halabja on March 16, 1988. (9) The attack on Halabja, a town of 80,000 to 90,000 people, is the largest chemical attack against civilians in history (10).

The Halabja attack involved multiple chemical agents including mustard gas, and the nerve agents SARIN, TABUN and VX. Some sources report that cyanide was also used. It may be that an impure form of TABUN, which has a cyanide residue, released the cyanide compound. Most attempts directed to developing strategies against chemical or biological weapons have been directed towards a single threat. The attack on Halabja illustrates the importance of careful tactical planning directed towards more than one agent, and specific knowledge about the effects of each of the agents. More than 5000 people were killed during the attack on Halabja, and more than 20,000 were injured (11).

Date	Area Used	Types of agents	Approximate casualties	Target Population
Aug-83	Hajj Umran	Mustard Gas	Fewer than 100	Iranians/Kurds
Oct. - Nov 1983	Panjwin	Mustard Gas	3000	Iranians/Kurds
Apr-87	Balisan Vali	Mustard/Nerve agent	Hundreds	Kurds
Mar-88	Halabja	Mustard/Nerve agent	5000	Kurds

Table 2: Documented Iraqi Use of Chemical Weapons on the Kurds



**Figure 2: Samples of chemical weapon used in Balisan Vali in 1987.**

Today at Balisan and Sheikh Wassan, 23 commemorative graves are representing 233 lost in the attack. The remains of the dead were too difficult to separate and identify Figure (3).



**Figure 3: Today at Balisan and Sheikh Wassan, 23 commemorative graves are representing 233 lost in the attack**

Unlike Halabja, the Balisan valley is far from the Iran border Figure 4. Injured survivors seeking treatment at hospitals in government-controlled Arbil were taken away by the security forces -- and many were never seen again.

Residents of the villages recall that planes appeared, dropping canisters that spewed yellow dust. The dust was mustard gas, but most civilians did not recognize the danger until symptoms appeared hours later. Many who did not die in the attacks were permanently blinded; children and the elderly were particularly affected.

Extensive exposure to chemical weapons such as mustard gas, nerve gas and cyanide caused high mortality, morbidity, injuries, and chronic side effects in vital organs, especially the respiratory tract (12).

Mustard a poisonous chemical agent is a cell poison that causes disruption and impairment of a variety of cellular activities. Mustard is an alkylating agent, and once absorbed, its toxic effects result from chemical reactions with cellular constituents. These biochemical reactions cause inhibition of mitosis, nicotinamide adenine dinucleotide (NAD) depletion, decreased tissue respiration, and ultimately, cell death (13, 14,15).



**Figure 4: Location of Balisan Vali and Halabja in northern Iraq**

Mustard agent was produced for the first time in 1822 but its harmful effects were not discovered until 1860. Mustard agent was first used as a CW agent during the latter part of the First World War and caused lung and eye injuries to a very large number of soldiers. Many of them still suffered pain 30-40 years after they had been exposed, mainly as a result of injuries to the eyes and chronic respiratory disorders (16)

Mustard agents are usually classified as “blistering agents” owing to the similarity of the wounds caused by these substances resembling burns and blisters. It produces blisters and damage to skin, eyes, respiratory and gastrointestinal tracts. There is usually erythema; vesication; burns and lung damage. Mustard gas also affects many other systems including haematopoietic and immune systems. Haematological effects include leucopenia, thrombocytopenia, decrease in RBCs and sepsis. Secondary infections of damaged tissue can occur easily. The most serious of the long term effects arise because mustard gas is carcinogenic and mutagenic. In the respiratory system there are increased risks of chronic lung disease, asthma, bronchitis. Permanent impairment of vision may occur and eye damage may be severe, leading to blindness. Skin lesions and burns may be severe with persistent changes and hypersensitivity to mechanical injury. Carcinogenic and mutagenic effects can result in cancers, congenital malformations and infertility. Long term effects (mutagenesis, carcinogenesis, eye, skin, lung, fertility) etc are dose and route dependent (17, 18, 19).

## Case report

This case report describes a Kurdish lady who was exposed to mustard gas and nerve agent during a chemical attack in Sheikh Wasan and Balisan vale in Iraq.



**Figure 5: Badriya Saed Khidir**

A forty eight year old woman wearing black clothes presented to our center at 1999 complaining from shortness of breath (SOB). Her condition started 12 years ago when the Iraqi Government attacked her village Sheikh Wasan by Chemical weapons which included Mustard gas and nerve gases such as Sarin, Tabun and VX in April 1987. She described how the gas smelled like rotten apples as it spread over the village.

During the attack she suffered from severe SOB, cough, skin burn and eyes irritation and lacrimation. After several days of being without medical care, she received some medical attention by local medical staff in the area because the Iraqi authorities at that time refused and prohibited them from management at the major hospitals. When she returned back to her home she found that several members of her family have died during the exposure to chemical gases. Among the dead people were her parents, two brothers, husband and son, in addition to other second and third degree relatives. Since that time she has suffered from repeated attacks of cough and SOB and wheezing that were increased by exertion and exposure to cold. The attacks were more severe with time and the SOB has interfered with her daily activity and more recently she was suffering from SOB at rest and during sleep that made her unable to sleep lying down. Moreover she was suffering from

severe depression since that time for which she consulted several doctors but without improvement.

In the end of 2001, she suffered from sever cough and Hemoptysis associated with anorexia and loss of weight. She consulted our center for this purpose and we asked for medical care for her. Available haematological and radiological investigations were done for her showing a preliminary diagnosis of non-small cell lung cancer. She was sent for further investigations and treatment, but since then she had disappeared and no more information was recorded about her situation.

On the 17th of March 2009 I visited the area which were exposed to chemical weapon in 1987. In Balisan I asked about a woman called Badriya Saed Khidir and they showed me her grave saying she had passed away several weeks before. She died while her eyes were filled with tears crying for the fate of her son, her parents, her two brothers and her lovely husband.

Another victim was a baby girl. Her family named her Chemia (Chemist) because she was borne on 16th April 1987 on the day of the attack in Sheikhwasan. She died after three months from the exposure to chemical attack.

These are two examples of the many who suffered from the effect of chemical weapons in Kurdistan of Iraq.

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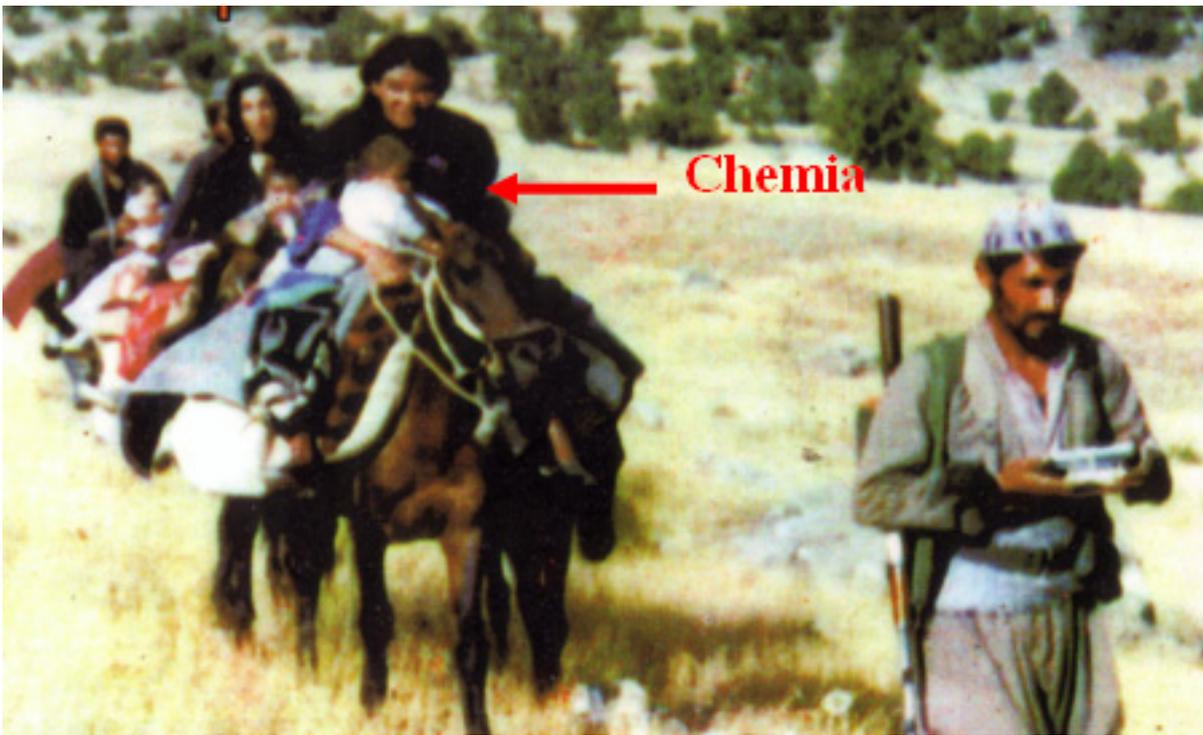
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**Figure 6: Grave of Badriya Saed Khidir**



**Figure 7: The author visiting the grave of Badriya Saed Khidir**



**Figure 8: A family escaping from area exposed to chemical weapon in Balisan Vale**

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