

## Case Report

# A 35-Year-Old Male with Virocid-Chemical Disinfectant Poisoning

Easnem Khanum<sup>1</sup>, Ashraful Islam<sup>2</sup>, Rahima Akter<sup>3</sup>, Kanti Mondol<sup>4</sup>, Md. Rezaul Hoque<sup>5</sup>

Received: January 15, 2019 Accepted: August 20, 2019

doi: <https://doi.org/10.3329/jemc.v9i3.43251>

### Abstract

*Virocid is a highly concentrated potent broad-spectrum disinfectant which is used in different sectors such as animal husbandry (poultry, pigs, cattle), agriculture, food processing, hospitals, horticulture, animal transport, feed storage, fish farming, personal hygiene etc. Here we report a case of a 35-year-old male poultry owner who attempted suicide following ingestion of about 10 mL of virocid (chemical disinfectant) and presented with severe burning sensation from throat to the epigastric region, abdominal pain, generalized muscle weakness, several episodes of vomiting and respiratory distress. The patient was treated conservatively along with mechanical ventilator support. After improving condition on 3<sup>rd</sup> day ventilator support was withdrawn and patient was shifted to step-down ICU. On 4<sup>th</sup> day the patient was transferred to general ward after consulting with psychiatrist and was discharged on the next day with an advice to follow-up every seven days interval. Two weeks later he was found quite normal.*

**Key words:** Poultry disinfectant; Virocid (chemical disinfectant) poisoning; Suicidal attempt

J Enam Med Col 2019; 9(3): 193–196

## Introduction

Nowadays poultry is a rising agro business in Bangladesh. With the vast expansion of the poultry rearing and farming<sup>1</sup>, it is considered as the great source of different types of disease organisms and food-borne illnesses<sup>2</sup> and usually found in a poultry farm at the end of a production cycle or after disease outbreak<sup>3</sup>. So it should be sterilized and disinfected by using different types of chemicals before hatching.<sup>4</sup> For this purpose several disinfectants are usually used, e.g., phenols, alcohols, iodine, chlorine,<sup>5</sup> deniskap (formaldehyde, glutaraldehyde, benzalkonium), GPC 8 TM (glutaraldehyde), TH4 (QAC), virocid (QAC), lysol (tar acid) etc.<sup>1</sup> Among all these disinfectants, virocid is a highly concentrated broad spectrum disinfectant which is two times more potent than other disinfectants and usually used in different sectors such as animal husbandry (poultry, pigs, cattle), agriculture, food processing, hospitals, horticulture, animal transport, feed storage, fish farming, personal

hygiene, hoof care products during footbath to prevent digital dermatitis etc.<sup>6,7</sup> The virocid can be used between 4 to 60 degrees and is readily biodegradable more than 90% after 28 days.<sup>6</sup> The maximum exposure limit for a human is in a dilution of 1: 200 (0.05%). It contains no carcinogenic formaldehyde and toxic phenolics, it has a pH of 5.7 in dilution of 1% and it is non-corrosive at 0.5% on surfaces commonly used in livestock industries and therefore can be used safely.<sup>6</sup>

Virocid is composed of 3 active ingredients –

- 1) Aldehyde (glutaraldehyde)
- 2) Quarteranary amonium compounds (benzalkonium chloride, ammonium chloride)
- 3) Alcohol (isopropanol)

Aldehyde (glutaraldehyde) strongly binds with the outer layers of the organisms and damages cell envelope and acts as a sporocidal. It is ten times

1. Associate Professor, Department of Anesthesiology & ICU, Enam Medical College & Hospital Savar, Dhaka

2. Associate Professor, Department of Anesthesiology & ICU, Enam Medical College & Hospital, Savar, Dhaka

3. Medical officer, Department of Anesthesiology & ICU, Enam Medical College & Hospital Savar, Dhaka

4. Medical officer, Department of Anesthesiology & ICU, Enam Medical College & Hospital, Savar, Dhaka

5. Professor, Department of Anesthesiology & ICU, Enam Medical College & Hospital, Savar, Dhaka

**Correspondence** Easnem Khanum, Email: [Easnem@gmail.com](mailto:Easnem@gmail.com)

more effective than formaldehyde and less toxic. QAC (quarternary ammonium compounds) acts as a cationic surfactant and causes disintegration and morphological changes on the cell membrane and cytoplasm of the microorganisms resulting in loss of infectivity, inhibition of the outgrowth of spores along with mycobacteriostatic action. Alcohol has a greater lipolytic properties which cause damage to cell membranes and rapid denaturation of proteins along with subsequent interference with metabolism and cell lysis.<sup>5,8,9</sup>

These three ingredients (aldehyde, QAC, alcohol) of virocid combinedly have a synergistic action against bacteria, virus, fungi, yeast and spores.<sup>9,10</sup> It has a long residual action and can be applied in a versatile way (spraying, fogging, foaming, both dips wheel dips etc).<sup>11</sup> Worldwide it accounts as a number one disinfectant. Its success rate is based on the unique synergism characteristics: hospital grade disinfectant, highly efficient to kill bacteria, spores, viruses and fungi, residual action, no resistance, very low dilution rate, extremely economical cost in use, versatile in usage, active at all temperatures, effective in presence of organic matter, safe for equipment and environment friendly.<sup>11</sup> It is amazingly effective at very low dilution 0.25–0.50% and able to reduce 100% cytotoxic effect produced by the African Swine fever virus (ASFV) Ba7IV even at high concentration of virus.<sup>12,13</sup>

Besides disinfectant virocid can also be used as a preservative in eye drops, ear drops, nasal drops or sprays. The side-effects of all constituting ingredients are irritation, restlessness, vomiting, allergic contact dermatitis, muscular weakness, paralysis of respiratory muscles, convulsion, coma, death etc.<sup>14</sup>

### Case report

A 35-year-old poultry owner hailing from Fulbaria, Savar, Dhaka was admitted to a local community clinic with the complaints of severe burning sensation from throat to the epigastric region, abdominal pain, several episodes of vomiting, generalized muscle weakness and respiratory distress for two hours with a history of ingestion of about 10 mL disinfectant virocid which was brought by patient's party. The patient also admitted about ingestion of this chemical for suicidal purpose. He was given primary management, but his condition deteriorated and he was shifted to Intensive Care Unit of Enam Medical College Hospital for

better care. On examination, pulse rate was 110 beats/minute, BP 110/60 mm of Hg, temperature 99°F and respiratory rate was 46 breaths/minute. Crepitations and rhonchi were present in both lungs fields. SpO<sub>2</sub> was 75% (with 10 liter O<sub>2</sub>) and GCS was 10/15. After admission initial respiratory care was given along with injection 3<sup>rd</sup> generation cephalosporin, fluoroquinolone, frusemide, ondansetron, pantoprazole, oral cytoprotective agents, nebulization with mixture of salbutamol and ipratropium but respiratory distress was not improved and ABG showed impending respiratory failure along with the decreased level of sensorium. Intubation was done and patient was put on a mechanical ventilator with control mode ventilation. On the next day ventilator mode was changed to SIMV, on day three CPAP to T-piece trial was given and extubation was done and respiration was maintained spontaneously. After extubation patient had hoarseness of voice. After consultation with ENT specialists and gastroenterologist, FOL and endoscopic examination were done. His investigation reports were as follows: Hb 16.6 g/dL, ESR 6 mm (1st hour), WBC 28,520/microL (N: 95%, L: 03%, M: 01%, E: 01%, B: 00%), RBCs 5.71 million/microL, platelets 4,09,000/microL, HCT/PCV 47%, MCV 82.8 fL, MCH 29.1 pg, MCHC 35.1 g/dL. Serum electrolytes: Na<sup>+</sup>: 133.3 mmol/L, K<sup>+</sup>: 3.61 mmol/L, Cl<sup>-</sup>: 100 mmol/L. Serum creatinine was 86 micromol/L, urine RME was normal. SGPT was 44 U/L, chest radiography showed bilateral congestion and ECG showed sinus tachycardia. FOL report: Erosion at anterolateral part of epiglottis and laryngeal edema. Endoscopy showed multiple erosions at the esophagus and upper part of the duodenum.

The patient was shifted to stepdown ICU and psychiatric consultation was sought. On 4<sup>th</sup> day the patient was transferred to the general ward and was discharged on next day with advice for follow-up with a psychiatrist. After seven days during follow-up visit his hoarseness was found improved, epigastric burning was still present and he was advised to continue proton pump inhibitor, liquid antacid and cytoprotective agent. After two weeks he was found normal.

### Discussion

Suicide is a common public health problem worldwide including Bangladesh. About one million people die each year worldwide with a global mortality rate of

16/100,000 and 39.6/100000 in Bangladesh.<sup>15</sup> The rate of suicidal attempt is increasing day by day in Bangladesh due to the lack of social and psychological support against mental trauma or familial stress.

In a study done by Hossain et al<sup>16</sup>, it was found that among all suicidal deaths in Bangladesh during the period of January to December 2009, 59% was due to hanging, 31% due to poisoning and 10% was due to burn.

Self-poisoning is a burden on the health system and is a risk factor for subsequent suicide.<sup>17</sup> Self-poisoning constitutes more than half of total poisoning cases admitted to hospitals in Bangladesh. Moreover, it has been asserted that a considerable number of deaths following poisoning is due to suicidal attempts.<sup>18</sup> The estimated rates of fatal and non-fatal suicide were 3.29 and 9.86 per 100,000 person-years (PY) observed, respectively. The risk of suicide was significantly higher by 6.31 times among 15–17-year-olds and 4.04 times among 18–24-year-olds compared to 25–64-year-olds. Married adolescents were 22 times more likely to commit suicide compared to never-married people.<sup>19</sup> Not only in Bangladesh, worldwide it causes a serious health problem. According to 2014 WHO Global Health estimate, there were about 803,900 suicide in 2012 representing 1.4% of the global burden of disease or over 39 million disability-adjusted life years (DALYs) lost.<sup>19</sup>

In the United States, more than 5000 cases were reported to US poison center following ingestions of cationic detergent/disinfectant compounds in each year with 200 cases reported with severe outcomes.<sup>20</sup> Spiller<sup>20</sup> published a case report of ingestion of about 240 mL of 10% BAC (a mixture of quaternary ammonium compounds of alkyl ammonium benzalkonium chlorides) by a 78-year-old male with a history of dementia, depression, coronary artery disease, diabetes, complaints of oral pain, nausea, vomiting, sialorrhea, spitting, coughing with erythema and swelling of oral cavity. After three hours he developed severe respiratory distress. His esophagoduodenoscopy showed sloughing of the mucosa in the posterior esophagus, multiple bleeding gastric ulcers, severe laryngeal edema, sloughing of laryngeal mucosa, tracheobronchomalacia with 75–90% collapse of distal trachea. The patient was treated in ICU along with mechanical ventilator

support but expired after 24 hours. In our case, the patient was admitted with almost the same complaints but our patient was successfully treated along with mechanical ventilation.

Exposure to self-induced corrosive chemical poisoning in an adult is rare. In 2014 Kelby et al<sup>21</sup> reported a case of a member of medical staff who ingested 10% benzalkonium chloride (chemical disinfectant) accidentally. The patient was treated conservatively.<sup>21</sup>

The National Institute of Occupational Safety & Health, CDC (The Centre for Disease Control & Prevention) monitors work-related asthma (WRA) in California, Massachusetts, Michigan and New Jersey. They found about 962 cases, of them 481 cases were found due to QAC related Asthma, in 2001–2009. The French National Network of Occupational Health Surveillance & Prevention reported that QAC is the only agent causing WRA.<sup>22</sup>

The common self-induced chemical poisoning is a pesticide, harpic, phenol, savlon, and detergent poisoning. Manjhi et al<sup>23</sup> reported a case of ingestion of floor cleaning agents with complaints of vomiting, burning sensation in chest, dyspnea, hematemesis and loss of consciousness after four hours. The patient died during the treatment period. Our case was also almost similar but survived after treatment in Intensive Care Unit.

Virocid poisoning is a rare type of poisoning. Our patient is a poultry owner and attempted suicide by ingestion of virocid stored in the poultry for disinfectant purposes. The cause of suicidal attempt was due to financial loss of his poultry business.

Nowadays agro-based chemical poisoning is a serious public health problem, especially in persons suffering from depressive illness. By providing strong familial support, awareness, psychosocial counseling suicidal attempt can be prevented, which ultimately reduces suicide-related disability, morbidity and mortality.

## References

1. Rumi N, Rahman M, Akter M, Fakruzzaman M, Hossain M. Evaluation of the effectiveness of commercially available disinfectants against Salmonellae isolated from internal organs of dead chickens. *Bang J Vet Med* 2011; 9(1): 43–52.
2. Pfunter A. Sanitizers and disinfectants: the chemicals

- of prevention, sanitation, August/September 2011. Food Safety Magazine. Available at: <https://www.foodsafetymagazine.com/magazine-archive1/augustseptember-2011/sanitizers-and-disinfectants-the-chemicals-of-prevention/>. Accessed November 2018.
3. Cleaning & disinfection of poultry farm. Food and Agriculture Organization of the United Nations cleaning and disinfection. Available at: <http://www.fao.org/docrep/014/a1876e/a187600.pdf>. Accessed November 2018.
  4. Olsen R, Kudrikiene E, Thofner I, Pors S, Karlsson P, Li L et al. Impact of egg disinfection of hatching eggshell microbiome and bacterial load. *NCBI. Poultry Science* 2017; 96(11): 3901–3911.
  5. Donnell G, Russel AD. Antiseptics and disinfectants: activity, action, and resistance. *Clin Microbiol Rev* 1999; 12(1): 147–179.
  6. Virocid: n°1 for a reason! Virocid About Virocid®. Available at: [www.virocid.com](http://www.virocid.com) > About Virocid. Accessed January 2019.
  7. Thomsen PT, Sorensen JT, Ersboll AK. Evaluation of three commercial hoof-care products used in footbaths in Danish dairy Herds. *Journal of Dairy Science ADSA* 2008; 91(4): 1361–1365.
  8. The Environmental Health & Safety Guideline, University of Colorado Boulder. Disinfectants and sterilization methods. Available at: <http://ehs.colorado.edu/resources/disinfectants-and-sterilization-methods/>. Accessed November 2018.
  9. Virocid-agroRM. CID LINES. Bioprotexion manual. Pds. Virocid. G. T. - version 01.16 eng. Available at: [www.agroRM.sk/storage/file/VIROCID\\_with\\_testsEN.pdf](http://www.agroRM.sk/storage/file/VIROCID_with_testsEN.pdf). Accessed January 2019.
  10. Virocid-N1 disinfectant in the world; Safety. Available at: <http://www.cidlines.com/safety>. Accessed December 2018.
  11. Virocid Disinfectant 1.33 Gallon. Farmer Boy AG. Available at: <http://www.farmerboyag.com/Virocid-Disinfectant-133>. Accessed January 2019.
  12. Virocid disinfectant: effective at low concentration. The poultry site. Available at: <http://www.thepoultrysite.com/poultrynews/31098/virocid>. Accessed January 2019.
  13. Gallardo C, Nieto R, Arias M. Evaluation of virocid disinfectant (CID Lines). Efficiency at manufactures recommended a concentration of 0.25% against African Swine fever virus. INIA (Institute National de Investigation Tecnologia Agrarian Allmentoría). Available at: [miproma.es/wp-content/uploads/2018/12/REPORT-2-VIROCID-URL-CISA-INIA\\_African-swine-Fever.pdf](http://miproma.es/wp-content/uploads/2018/12/REPORT-2-VIROCID-URL-CISA-INIA_African-swine-Fever.pdf). Accessed December 2018.
  14. Virocid liquid — uses, side-effects, reviews and precautions. Available at: [www.tabletwisecanada.com/virocid-liquid](http://www.tabletwisecanada.com/virocid-liquid). Accessed January 2019.
  15. Shah MMA, Ahmed S, Arafat SMY. Demography and risk factors of suicide in Bangladesh: a six-month paper content analysis abstract. *Hindawi, Psychiatry Journal Volume 2017, Article ID 3047025: 1–6*. doi: <https://doi.org/10.1155/2017/3047025>.
  16. Hossain MN, Rahman Z, Akhter S. Suicidal death autopsy analysis at Dhaka Medical College. *Bangladesh Med J* 2011; 40(1): 18–21.
  17. Pillan PI, Pages CB, Ilango S, Kashchuk A, Sbister GI. Self-poisoning by older Australians: a cohort study. *MJA* 2017; 206(4): 164–169.
  18. Sarker DN, Shaheduzzaman M, Hossain MI, Ahmed M, Ahmed M, Basher MN. Spectrum of acute pharmaceutical and chemical poisoning in Northern Bangladesh. *Asia Pacific Journal of Medical Toxicology (APJMT)* 2013; 2(1): 2–5.
  19. Salam SS, Alonge O, Haque DME, Wadhvaniya S, Kamran ul Baset M et al. Burden of suicide in rural Bangladesh: magnitude & risk factors. *Int J Environ Res Health* 2017; 14(9): 1032: 1–16.
  20. Spiller HA. A case of fatal ingestion of a 10% benzalkonium chloride solution. *Journal of Forensic Toxicology & Pharmacology* 2014; 3(1): 1–SciTechnol.
  21. Kelbay H, Cevic ES, Vural Z. A case of accidental benzalkonium chloride (10%) ingestion. *TJFMPC* 2014; 8(4): 129–132.
  22. QAC in cleaning products: health & safety information for professional bellevue/ nyu occupational & environmental medicine clinic. Mount Sinai. Available at: <https://med.nyu.edu/files/pophealth>. Accessed December 2018.
  23. Manjhi SN, Bukter SB, Mukherjee BB, Faruqui JM. Suicidal death due to floor cleaning material: a case report. *Paravara Med Rev* 2015; 7(1): 25–28.