



CASUISTIC PAPER

Agnieszka Radzka ¹(ABDFG), Krystian Ciechański ¹(ABDFG), Jędrzej Tkaczyk ¹(ABDFG),
Klaudia Brożyna ¹(ABDFG), Michał Tchórz ²(ABDFG)

Comparison of two suicide attempts with long-acting insulin – The rare way to commit suicide

¹ Student's Scientific Group at the Toxicology Clinic of Medical University of Lublin, Lublin, Poland

² Toxicology Clinic of Medical University of Lublin Lublin, Poland

ABSTRACT

Introduction. In previous years, the number of suicide attempts has increased in Europe. Intoxication with hypoglycemic drugs, including insulin is a rare a tool for attempting suicide that may lead to a severe patient status.

Aim. The aim of the study was to assess the severity of insulin poisoning with examples of two patients.

Methods. The analysis of clinical history of patients and review of available literature.

Results. A 22-year-old patient was hospitalized in the Department of Toxicology and Cardiology due to a suicide attempt in the way of insulin poisoning; time of poisoning was unknown, and the level of glucose was indeterminable. The patient was treated with intensive specific pharmacotherapy. After hospitalization, which lasted 5 months, the patient's condition had been stabilized but with no verbal contact and quadriplegic paralysis. Another patient was a 41-year-old woman hospitalized two times in the Department of Toxicology and Cardiology due to the insulin poisonings. In each case of hospitalization of this woman, severe recurrent hypoglycemia was observed up to 25 mg% until the fifth day of hospitalization and the treatment used improved the patient's condition and there was no development of serious complications.

Conclusion. Normally effective treatment at the right time can recover the patient completely.

Keywords. suicide attempt, insulin, intoxication, toxicology

Introduction

Diabetes is a chronic disease that occurs when the pancreas does not make enough insulin or when the body cannot use the insulin despite effective production. Insulin is a hormone that regulates blood sugar. The lack of successive insulin production leads to excessive amounts of glucose in the blood. Hyperglycemia, along with the duration of the disease, leads to serious damage

to many systems of the human organism, especially the nervous and cardiovascular systems. Hypoglycemia is as dangerous as hyperglycemia. Early symptoms of hypoglycaemia are: anxiety, nervousness, weakness, pallor of the coatings, and increased sweating. In the later stage, following the insufficient supply of central nervous system glucose, symptoms such as orientation disorders, confusion, amnesia, convulsions and even coma occurs.

Corresponding author: Agnieszka Radzka, e-mail: radzka.agnieszka@gmail.com

Participation of co-authors: A – Author of the concept and objectives of paper; B – collection of data; C – implementation of research; D – elaborate, analysis and interpretation of data; E – statistical analysis; F – preparation of a manuscript; G – working out the literature; H – obtaining funds

Received: 21.04.2018 | Accepted: 22.05.2018

Publication date: June 2018

The WHO report from 2014 indicates that in the above year 422 million people had diabetes and the number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014.¹ The increase in people suffering from diabetes and those who treat it can result in increase in the number of poisonings with hypoglycemic agents. Accidental overdose of insulin is much more common than intentional poisoning.² Non-accidental suicidal insulin overdose is rare among people who are not treated due to diabetes. There are described cases, which show that it seems to be more common among people working in medical professions.³ In recent years, we have seen an increase in the number of suicide attempts and the suicide rate death is much higher in Poland than the European average (15.51 vs. 11.25 – data from Eurostat in 2014).⁴ In 2016 there were 9,861 suicide attempts and 5,405 people took their own lives (data from Polish Central Statistical Office).⁵ The problem concerns young people – most suicide attempts in 2016 were taken by people aged 30-49.⁵ Intoxication is a rare tool for attempting suicide – it takes 11th place of types of the ways of suicides.⁶ Rarely poisoning, but often with severe patient status, is intoxication with hypoglycemic drugs, including insulin. Since 2013, there have been 22 patients documented with that type of poisoning in the Department of Toxicology and Cardiology in Lublin. Patients with diabetes (type 1 and also type 2) have about twice a higher risk of depression as the general population.⁷ There are publications which show the relation between diabetes and depression.^{8,9,10} For example, a meta-analysis from 2001 showed that in patients with diabetes, depression co-occurred with a frequency of 28.5% throughout life.¹¹ The higher rate of depression in diabetic patients may be due to an increased occurrence of depression in diabetic patients or an increased incidence of diabetes in patients with depression. There are data suggesting that this relationship is indeed two-way.¹² Therefore, patients with diabetes are at higher risk for suicide.¹³ However, in diabetic patients who have access to insulin, it has been shown that only less than 5% of suicide attempts were made with insulin.¹⁴

Case reports

First case report: 22-year-old patient was hospitalized in the Department of Toxicology and Cardiology due to suicide attempt in the way of insulin poisoning. He was found unconscious in his room with 10 empty vials for insulin with a farewell letter. Unfortunately, the time that had passed since the poisoning was unknown. From the medical history, it is known that the patient was not treated for diabetes. The first glucose measurement showed that the level was indeterminable. Patient was treated with intensive pharmacotherapy, including concentrated glucose solutions and glucagon and glycaemia was 3 mg/dl. The patient had respiratory failure

and could not breathe himself, therefore he was intubated. During intensive treatment we could observe large fluctuations in glucose concentration (from 3 mg/dl up to 400 mg/dl). Due to the features of brain edema and its consequences, the patient was consulted neurologically. Although the cerebral edema receded, hypoxia-ischemic lesions were visualized within the caudate and lenticular nuclei. In the MRI, the features of the broad white leiomiosis of the periventricular white matter, cortical and subcortical atrophy of the brain, corresponding to severe changes in the nature of hypoglycemic brain damage in the chronic phase were visualized. He required gastric consultation due to bleeding from the gastrointestinal tract. In the first days of hospitalization, the patient also had arrhythmia and high blood pressure. After the hospitalization which lasted 5 months, the patient was discharged from the hospital in a stable state, he was conscious, with preserved circadian rhythm, but with no verbal contact, with quadriplegic paralysis and he was fed by gastrostomy. Patient was referred for further care and convalescence.

Second case report: Second case of patient was a 41-year-old woman with depression in medical history, who was hospitalized two times in the Department of Toxicology and Cardiology due to suicide attempts by insulin poisoning. During the first hospitalization, she was treated due to intoxication with an analog of long-acting insulin 900 IU and 60 tablets of glimepiride (3 mg). During admission to the hospital she was unconscious, with glycaemia 25 mg/dl. Two years later, the patient was admitted to the Department of Toxicology and Cardiology because of another suicide attempt by injection of 1800 IU of long-acting insulin. She was in a medium-heavy state, conscious. She admitted that she took insulin to draw attention to herself. Interestingly, the patient was not treated for diabetes and her medicines belonged to her husband. The patient required intensive pharmacotherapy, including a specific antidote – glucagon, concentrated glucose solutions and steroid therapy. In each case, severe recurrent hypoglycemia was observed up to 25 mg% until the fifth day of hospitalization. Despite recurrent hypoglycemia, the patient's condition improved due to effective medical intervention and there was no development of any serious complications. Probably the most important thing was that the medical intervention was applied on the same day. In response to interviews, the patient was referred for further psychiatric treatment after each hospitalization.

Discussion

Diabetes is a civilization disease and many people are treated with hypoglycemic drugs. Intentional poisonings are usually associated with the intake of much

higher doses of insulin than during accidental poisoning and therefore they are linked with a worse prognosis also due to lack of seeking medical help.¹⁵ The patients who are exposed to long-lasting and severe hypoglycemia are also linked with worse prognosis, due to the risk of neuroglycopenia.¹⁶ Another risk factor is the implementation of treatment above six hours after poisoning, because it is known as appropriate time to respond to insulin poisoning.¹⁵ In studies of insulin-induced hypoglycemia in monkeys, 5–6 hours of blood glucose concentrations of less than 1.1 mmol/l (20 mg/dl) were associated with neurological damage and it caused brain death.¹⁷ Some researchers also believe that the duration of hypoglycemia depends more on the dose of insulin that has been taken and period of action of insulin is not so much important, because even short-acting insulin can work extremely long.^{18,19} Therefore, patients who have received a high dose of insulin are in the group of high risk. We can see in the case of 41-year old patient who recovered completely after two intoxications because of treatment which was used in the suitable time. The 22-year old patient did not get medical care at the right time and treatment was started too late and it caused many complications after a toxic dose of insulin. It should be remembered that there are always exceptions in medicine and, for example Thewjitcharoen et al. presented in 2008 a clinical case describing an 80-year-old non-diabetic patient who survived with any complications a suicide attempt by giving himself 16,000 U of insulin (10,000 U of Humulin R and 6,000 U of Humulin N) probably due to consumption of many chocolate bars and high-carbohydrate drinks prior to the attempt.²⁰ However, it should be remembered that these are only exceptions and, in general, insulin poisoning can have a severe course and irreversible effect.

Summary

Diabetes is a civilization disease (422 million people have diabetes). Most of them are treated with hypoglycaemic drugs. Consequently the number of poisonings is increasing in both directions: accidental and suicide attempts. Insulin poisoning can be severe, because of neuroglycopenia, but due to effective treatment at the right time, patients can recover completely.

Conclusion

In conclusion, insulin is a toxic agent that people may have access to at work, such as medical professionals, that may be used it for attempting suicide. Other people using this as a suicide measure are family members of people with type 2 diabetes and diabetics who suffers from depression. Depression sufferers should be covered by treatment and psychiatric care to prevent such incidents.

References

1. Roglic G. WHO Global Report on Diabetes: A summary. *Int J Non-Commun Dis.* 2016 1:3-8.
2. Spiller HA. Management of antidiabetic medications in overdose. *Drug Saf.* 1998;19(5):411-24.
3. Efrimescu CI, Yagoub E, Doyle R. Intentional Insulin Overdose Associated with Minimal Hypoglycemic Symptoms in a Non-Diabetic Patient. *Maedica.* 2013;8(4):365-369.
4. Death due to suicide, by sex. Eurostat Website. <http://epp.eurostat.ec.europa.eu/tgm/table.do?pcode=t-ps00122&language=en>. Updated May 8, 2018. Accessed May 20, 2018.
5. Zamachy samobójcze w 2016 r. Główny Urząd Statystyczny Website. <https://stat.gov.pl/obszary-tematyczne/ludnosc/statystyka-przyczyn-zgonow/zamachy-samobojcze-w-2016-r-,5,1.html>. Published September 9, 2017. Accessed May 20, 2018.
6. Zamachy samobójcze zakończone zgonem - sposób popełnienia, powód popełnienia - 2013 - 2016. Statystyka Policja Webstie. <http://www.statystyka.policja.pl/>. Accessed May 20, 2018.
7. Rush WA, Whitebird RR, Rush MR, Solberg LI, O'Connor PJ. Depression in patients with diabetes: does it impact clinical goals? *J Am Board Fam Med.* 2008; 21(5):392-7.
8. Katon WJ. The comorbidity of diabetes mellitus and depression. *Am J Med.* 2008;121(11,2):8-15.
9. Holt RIG, de Groot M, Golden SH. Diabetes and Depression. *Current diabetes reports.* 2014;14(6):491.
10. Bădescu S, Tătaru C, Kobylinska L, et al. The association between Diabetes mellitus and Depression. *Journal of Medicine and Life.* 2016;9(2):120-125.
11. Anderson RJ, Freedland KE, Clouse RE, Lustman PJ. The prevalence of comorbid depression in adults with diabetes: a meta-analysis. *Diabetes Care.* 2001; 24(6):1069-78.
12. Golden SH, Lazo M, Carnethon M, et al. Examining a bidirectional association between depressive symptoms and diabetes. *JAMA.* 2008;18,299(23):2751-9.
13. Russel KS, Stevns JR, Stern TA. Insulin Overdose Among Patients With Diabetes: A Readily Available Means of Suicide. *Prim Care Companion J Clin Psychiatry.* 2009; 11(5): 258–262.
14. Jefferys DB, Volans GN. Self poisoning in diabetic patients. *Hum Toxicol.* 1983; 2: 345-348.
15. Mégarbane B, Deye N, Bloch V, et al. Intentional overdose with insulin: prognostic factors and toxicokinetic/toxicodynamic profiles. *Critical Care.* 2007;11(5):R115. doi:10.1186/cc6168.
16. Cryer PE. Hypoglycemia, functional brain failure, and brain death. *Journal of Clinical Investigation.* 2007;117(4):868-870.
17. Kahn KJ, Myers RE. 1971. Insulin-induced hypoglycaemia in the non-human primate. I. Clinical consequences. In: *Brain hypoxia.* Brierly JB, Meldrum BS, ed. William Heinemann Medical Books Ltd. London, United Kingdom, 1971: 185–194.

18. Ohyama T, Saisho Y, Muraki A, Kawai T, Itoh H. Prediction of recovery time from hypoglycemia in patients with insulin overdose. *Endocr J*. 2011;58(7):607-11.
19. Mudaliar S, Mohideen P, Deutsch R, et al. Intravenous glargine and regular insulin have similar effects on endogenous glucose output and peripheral activation/deactivation kinetic profiles. *Diabetes Care*. 2002;25(9):1597-602.
20. Thewjitcharoen Y, Lekpittaya N, Himathongkam T. Attempted suicide by massive insulin injection: a case report and review of the literature. *J Med Assoc Thai*. 2008; 91 (12): 1920–4.