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1732 Indian Journal of Forensic Medicine & Toxicology, October-December 2019,DVOoIl. N13u,mNboe.r4: 10.5958/0973-9130.2019.00558.9 The Accuracy of the Treatment and the Incidence of Diabetic Coma Kiaonarni Ongko Waluyo1, Adin Muafiro1, Irine Christiany1, Nuris Fitria H1 1Health Polytechnic of Surabaya Abstract Acute complicationsof diabetes mellitus is diabetic coma which occurs in 2%-15% of patients with Type-2 diabetes mellitus (DM). The main cause of the crisis is hyperglycemia in patients with Type-2 DM due to an infection (20–55%). In Type-2 DM, crisis hyperglycemia often occurs because it stops injecting insulin or inadequate treatment therapy. This condition occurs in 20–40% of cases of diabetic ketoacidosis. The purpose of this study is to analyze the accuracy of the treatment factors that affect the incidence of diabetic coma at Bina Sehat Hospital, Jember. The research design was cross sectional. The subjects were 17 people, selected by accidental sampling. Data were collected using medical record (results of medical laboratory and diagnosis examination) and questionnaire, then analyzed using Fisher exact test. The highest incidence of diabetic coma in diabetic ketoacidosis was 65%. The incidence of diabetic coma is influenced by the accuracy of treatment as many as 53%. It is expected that patients who have long DM, should be more regular in controlling their treatment to reduce the incidence of diabetic coma. Keywords: accuracy, treatment, diabetic coma Background One of the acute complications of

patients with diabetes mellitus is diabetic coma which can occur in 2% to 15% of patients with diabetes mellitus (DM). Diabetic coma is a dangerous condition that can cause death and repeated attacks if not handled quickly and correctly. One type of diabetic coma is diabetic ketoacidosis and hyperosmolar hyperglycemic state (HHS).(1) The type of incidence of diabetic coma are diabetic ketoacidosis (DKA) and HHS. The most common type of diabetic coma is DKA. Whereas for the case of HHS little happened and more life threatening so that the average patient could not be helped before the first treatment at the hospital. (2) Based on the Basic Health Research of Indonesia in 2007, in East Java, prevalence of DM based on diagnosis by health personnel is 1.0% while the prevalence of DM Corresponding author: Kiaonarni Ongko Waluyo E-mail: kiaonarni@gmail.com Address: Pucangjajar Tengah Street-56, Surabaya, Indonesia is 1.3%. In Jember in 2009, there were 15,961 cases, an increase of 21,729 cases in 2010, then increased again in 2011 (26,613 cases).. The main causes of the crisis of hyperglycemia in Type-2 DM patients are due to the precipitating factors, including: infection (20–55%), acute vascular disease (10-15%), gastrointestinal abnormalities (15%) and the rest due to the use of good drugs diuretics, steroids and others. In Type-2 DM, the crisis of hyperglycemia often occurs because it stops injecting insulin or inadequate treatment therapy. This situation occurs in 20-40% of cases of DKA, while the rest is caused by psychological disorders such as stress due to chronic diseases, unhealthy eating patterns and lack of activity.(3) Insulin therapy with inadequate doses or discontinuation of insulin therapy is also a precipitating factor for the occurrence of DKA and HHS. Type -1 DM patients who are accompanied by psychological problems result in a stress disorder, eating appetite which is a trigger factor not adhering to dietary patterns resulting in recurrent ketoacidosis.(4) The most dangerous risks in the incidence of DKA and HHS are death, and the mortality rate is higher in Indian Journal of Forensic Medicine & Toxicology, October-December 2019, Vol. 13, No. 4 1733 some of the conditions that accompany DKA and HHS, such as sepsis, severe shock, extensive acute myocardial infarction, elderly patients, high initial blood glucose levels, uremia and low blood acidity. DKA clinical picture can be found in rapid and deep breathing (Kussmaul), various degrees of dehydration (reduced skin turgor, dry tongue and lips), and sometimes accompanied by hypovolemia and shock. The degree of awareness of patients can vary, ranging from compostmentis, delirium, or depression to coma. Clinical features in HHS, in physical examination found severe dehydration (heavier than DKA), hypotension, tachycardia, and decreased consciousness without Kussmaul's breathing. In addition, signs of focal neurological disorders (hemianopia and hemiparesis) and seizures (generalized or focal) can be found in HHS.(4) Initial treatment in DKA and HHS is important but prevention efforts are also important in the management of DKA and HHS patients. The occurrence of diabetic coma can be prevented by an educational program that emphasizes the patient not to stop insulin or oral hypoglycemia drugs and self-care, especially during illness, by monitoring blood glucose concentration and independent urine ketones. Health workers involved in care must also be given adequate education regarding the signs and symptoms of non-ketotic hyperosmolar hyperglycemia and the importance of adequate fluid intake and close monitoring.(5) The purpose of this study is to analyze the accuracy of the treatment that affect the incidence of diabetic coma Method The design of this research was cross sectional. The population in this study were all patients with diabetic coma who were treated at Bina Sehat Hospital, Jember, for 1 month, with the population size of 20 people. The sample size was 17 people, selected by accidental sampling. The instruments of data collection were questionnaire for the accuracy of treatment as well as medical diagnosis results to determine the type of coma diabetics. Data were analyzed by Fisher Exact test. Findings

Characteristics of Diabetic Coma Patients Table 1 shows that the majority of patients with Diabetic Coma were men (9%). In terms of age, as many as 6 (35%) patients with Diabetic Coma were aged 51- 58 years, with the most education being Senior High School totaling 6 (35%) patients with diabetes coma and in terms of employment as many as 6 (35%) patients with coma diabetics as housewives. Long suffering from DM, as many as 7 (41%) patients with Diabetic Coma for 6-10 years, then followed in terms of therapeutic therapy obtained, at most 4 (24%) patients with Diabetic Coma underwent combination drug therapy and Insulin namely Acarbose and Mixed Insulin. Table 1. Characteristics of Diabetic Coma Patients at Bina Sehat Hospital, Jember in July 2018 Characteristics of Patients Frequency Percentage Sex Male 9 53 Female 8 47 Total 17 100 Age (years) 43-50 4 24 51-58 6 35 59-66 3 17 ≥ 67 4 24 Total 17 100 Last Education Elementary School 2 12 Middle School 4 24 High School 6 35 Diploma/Bachelor 5 29 Total 17 100 Work Enterpreneur 4 24 Labor 2 12 Employee 2 12 Retired 3 17 Housewife 6 35 Total 17 100 Long suffering from diabetes 1 – 5 years 6 – 10 years 11 – 15 years ≥ 16 years Total 2 7 2 6 17 12 41 12 35 100 1734 Indian Journal of Forensic Medicine & Toxicology, October-December 2019, Vol. 13, No. 4 Characteristics of Patients Frequency Percentage Treatment Therapy Glimepiride Glimepiride + Metformin Acarbose + Long Acting Insulin Acarbose + Mixed Insulin Metformin + Long Acting Insulin Metformin + Short Acting Insulin Metformin + Mixed Insulin Total 1 1 3 4 3 2 3 17 6 6 17 24 17 12 17 100 The Factor Accuracy in Undergoing Treatment Therapy Table 2 shows that 9 (53%) patients with Diabetic Coma were not exactly in carrying out treatment therapy and 8 (47%) of patients with Diabetic Coma were exactly in consuming DM drugs. Table 2. The Factor Accuracy in Undergoing Treatment Therapy on Diabetic Coma Patients at Bina Sehat Hospital, Jember in July 2018 Accuracy of Treatment Frequency Percentage Not exactly 9 53 Exactly 8 47 Total 17 100 Incidence Of Diabetic Coma Table 3 shows 11 (65%) patients with Diabetic Coma experienced DKA and 6 (35%) patients with Diabetic Coma experienced HHS. Table 3. Incidence of Diabetic Coma on Diabetic Coma Patients at Bina Sehat Hospital, Jember in July 2018 Incidence of Diabetic Coma Frequency Percentage DKA 11 65 HHS 6 35 Total 17 100 Influence of Accuracy of Treatment on the Incidence of Diabetic Coma Table 4 shows that 8 (89%) patients with Diabetic Coma with DKA types got the appropriate treatment, while in the HHS group, found 5 (63%) Diabetic Coma patients who were not appropriate treatment and only 1 (11%) patients with Diabetic Coma who got the appropriate treatment. Table 4. Effect of Accuracy of Treatment on the Incidence of Diabetic Coma at Bina Sehat Hospital, Jember in July 2018 Accuracy in undergoing treatment Coma DKA Incidence of Diabetic HHS Total therapy f % f % f % Exactly 3 37 5 63 8 100 Not exactly 8 89 1 11 9 100 P-value = 0.04 Based on the Fisher Exact Test test results, the p-value was 0.04 (<0.05), so it can be concluded that there is a significant effect of the accuracy of treatment on the incidence of diabetic coma. Discussion Based on the results, 53% of patients with diabetic coma are not get the appropriate for treatment. This is due to the many types of drugs consumed and by means of different usage depending on the effects such as something taken before eating, after eating even in the middle of eating which often results in the patient feeling difficult and confused, so that it is not appropriate in: the type, amount, dosage, method and schedule of administration, which results in the drug not having the proper effect. According to WHO, the low level of medication adherence is influenced by several factors including treatment characteristics and disease (complexity of therapy, duration of illness and delivery of care), intrapersonal factors (age, gender, self esteem, self efficacy). Indian Journal of Forensic Medicine & Toxicology, October-December 2019, Vol. 13, No. 4 1735 Based on the results, 65% of patients with diabetic coma experienced DKA and a small proportion (35%) experienced HHS.

Sudoyo(2) stated that the most types of diabetic coma cases in general are DKA. Whereas for the case of HHS little happened and more life threatening so that the average patient could not be helped before the first treatment at the Hospital. DKA is a decompensated metabolic disorder characterized by triassic hyperglycemia, acidosis and ketosis, mainly due to absolute and relative insulin deficiency.(6),(7),(8) While HHS is a syndrome characterized by severe hyperglycemia, hyperosmolar, severe dehydration without marked ketosis, accompanied by decreased awareness, so typical in DKA is found a state of acidosis accompanied by ketosis while in SHH is not accompanied by ketosis.(2) Viewed in terms of length of time suffering from DM, the majority of patients with coma diabetics have suffered from DM for 5-10 years, making them more susceptible to the risk of DKA or HHS due to weakening of the immune system than patients with new suffering DM for 1-5 years. DKA or HHS types are mostly caused by a lack of knowledge about the early signs and symptoms and the cause of the incidence of diabetic coma so that the initial treatment of hyperglycemia is not fast enough to cause slow diabetic coma. This also relates to the existing culture, there are still many who think that if a person experiences cold, fever, sweating with a cough and flu can be treated with traditional medicines and do not need to check with medical personnel, even though these symptoms, if it occurs in people with DM and does not go away, it can be a sign and symptom of people affected by DKA or HHS which is the beginning of the incidence of diabetic coma if not treated quickly. Based on the results, the accuracy of treatment affects the incidence of diabetic coma. This is in accordance with the theory that the suitability of treatment therapy influences the incidence of diabetic coma which when the amount of insulin decreases, the amount of glucose entering the cell will decrease as well as the production of glucose by the liver becomes uncontrollable. Both of these factors cause hyperglycemia. In an effort to eliminate excessive glucose from the body, the kidneys excrete glucose together with water and electrolytes (such as sodium and potassium). Osmotic diuresis characterized by excessive urination (polyuri) will cause dehydration and electrolyte deformity.(10) The things that need to be considered in the use of oral hypoglycemic drugs are that the dosage must always be started with a low dose which is then increased gradually, it must be understood how it works, the length of work and the side effects of these drugs, if given with other drugs, the possibility of interaction drug, in the failure of secondary to oral hypoglycemic drugs, try to use another class of oral medication, if it fails again, just consider switching to insulin.(11) DM patients who are not right in carrying out treatment therapy, will affect blood sugar levels in the body that can occur at any time. The mechanism of the body that is accustomed to the presence of hypoglycemia drugs, if changed or not given will damage the process in the body such as the process of ketosis in the body. DM patients who are not right in carrying out treatment therapy can also be caused by having a less / low level of knowledge so that they will tend to consume drugs as they are known as if the drug runs out will buy itself without the doctor's knowledge while the administration of hypoglycemic and / or insulin injections is adjusted to levels blood sugar. Especially for patients who have had DM for a long time, who have undergone treatment therapy for a long time by taking oral medication and / or injecting insulin at one time will feel bored and bored to undergo treatment therapy, also affecting the level of accuracy in undergoing treatment therapy in the wrong direction, so that it can cause diabetic coma. The presence of several diabetic coma patients who are still fit to undergo treatment therapy but still exposed to hyperglycemia which causes a decrease in consciousness can be due to the influence of other factors such as the presence of infection or complications with other diseases, so that the suitability of treatment therapy for DM patients to stabilize blood sugar levels is needed in body, either through dosage,

amount, time and method of administration. Conclusion The highest incidence of diabetic coma is DKA. The incidence of diabetic coma is influenced by the accuracy of treatment. It is expected that patients who have long had DM, should be more regular in controlling their treatment to reduce the incidence of diabetic coma. For hospitals, should always be able to improve the quality of service in patients with diabetic coma in the prevention 1736 Indian Journal of Forensic Medicine & Toxicology, October-December 2019, Vol. 13, No. 4 and management of patients with DKA and HHS, United States. 2006:738–770 especially the treatment of patients with hyperglycemia of >500 mg / dL. 5. Soewondo, et al. The Text Book of Internal Medicine. Jakarta: Interna Publishing. 2009. Conflict of Interest- No 6. American Diabetes Association. Diagnosis and Source of Funding- Authors Classification of Diabetes Mellitus. Diabetes Care. 2010;34:S62–S69. Ethical Clearance- Yes 7. Chaithongdi. Diagnosis and Management of Hyperglycemic Emergencies [Internet]. Hormones. References 2011 [cited 2018 Jan 18]. Available from: http:// 1. Ananya. Cause of Diabetic Coma [Internet]. News www.hormones.gr/738/article/article.html. Medical. 2014 [cited 2018 Jan 27]. Available from: 8. Corwell B, Knight B, Olivieri L. Current Diagnosis https://www.news-medical.net/health/Cause-of- and Treatment of Hyperglycemic Emergencies. Diabetic-Coma.aspx. Emergency Medical Clinics. 2014;32:427–452. 2. Sudoyo. The Text Book of Internal Medicine. 9. American Diabetes Association. Standards Jakarta: Interna Publishing; 2009. of Medical Care in Diabetes. Diabetes Care. 3. Augusta L. Crisis of Hyperglycemia in Diabetes 2016;36:S11-S69. Mellitus. Journal of the Faculty of Medicine, 10. Hidayat AA. Nursing Research Method and Data UNPAD. 2010 analysis Technique. Jakarta: Salemba Medika; 4. Kitabchi AE, Fisher JN, Murphy MB, Rumbak 2009. MJ. Diabetic Ketoacidosis and The Hyperglycemic 11. Directorate General of Drug and Food Control, Hyperosmolar Non Ketotic State. In Joslin's MoH-RI. IONI (Informatics of Indonesian National Diabetes Mellitus. 13th ed. Kahn CR, Weir GC, Medicine). Jakarta: Directorate General of Drug Eds. Philadelphia, Lea & Febiger. New York: and Food Control, MoH-RI; 2000.