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Psychosis in Poorly Controlled Diabetes Mellitus. A Case Study

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Abstract

The processes through which patients in hyperglycaemic state among diabetes manifest psychosis is unclear; and it is not uncommon for clinicians to expose them to antipsychotics, when in fact, the psychosis can resolve with anti-diabetic control measures. The first case was a 67-year-old diabetic patient who was non-compliant with his medications and presented with 2 weeks history of irrational speech, poor sleep, and commanding auditory hallucination. Systemic examinations were not remarkable, laboratory tests were normal except urgent random blood glucose = 412 mg/dl. Fasting blood glucose values during the first 3 days of admission were 197mg/dl, 202mg/dl and 180mg/dl respectively. The second case was a 49-year-old widow, with poorly controlled diabetes, who presented with 3 days history of aggressive behaviour, disorientation, restlessness, visual hallucination, poor attention/concentration, and impaired memory. Other systemic examinations were essentially normal, and the only significant laboratory investigation was random blood glucose of 380mg/dl. Fasting blood glucose during the first 3 days of admission was 210 mg/dl, 197mg/dl and 170mg/dl respectively. Both cases resolved without use of antipsychotic drugs. Control of elevated blood glucose is crucial in treatment of diabetes with psychosis. Further research to elucidate the pathophysiology of psychosis in hyperglycaemia among diabetics is paramount.

Key words: Psychosis, Diabetes, Mellitus.

INTRODUCTION

Difficulties in coping with diabetes among other factors like genetics, chronic psychosocial problems and drugs may contribute to the risk of developing psychiatric disorders. What may be considered a mild mental condition in an otherwise normal individual may present greater clinical difficulties when it coexists with a physical disorder given the associated behavioural, management and physical outcome. A previous study reported that the prevalence of diabetes among patients with schizophrenia and affective disorders was 1.5-2 times higher than is found in general population (American Diabetes Association, American Psychiatric Association, American Association of Clinical Endocrinologists 2004). Depression with or without anxiety disorder is most common, occurring in about 50% of young people with poorly controlled type I diabetes (Orr et al. 1983). Other psychiatric disorders include eating disorders, psychosexual problems, alcohol and substance abuse, phobic disorder, delirium, obsessive and compulsive disorder, and panic disorder. Among diabetic patients with psychiatric diagnosis, those with type 2 or type1 diabetes subtype are in a ratio of 7:3 respectively (Coclami et al. 2011).

Diabetes mellitus is a group of metabolic disorder characterized by hyperglycaemia due to impairment in insulin secretion and insulin action or both (Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003). The pathophysiologic mechanisms involved in development of diabetes range from autoimmune destruction of the pancreatic β-cells that result in insulin deficiency to the deficient action of insulin on target organs (Shoback et al. 2011). Coupled with the reduction in the net effective action of circulating insulin is the concomitant elevation of counter-regulatory hormones, such as nsated

glucagon, catecholamines, cortisol, and growth hormone. These hormonal alterations usually result in elevated hepatic and renal glucose production and impaired glucose utilization in the peripheral tissues, culminating in hyperglycaemia (Polonsky et al. 1994). Hyperglycaemia can alter physiological processes in the body resulting in polyuria, polydipsia, polyphagia, dehydration, weakness, vomiting, altered sensorium and eventually coma. A constellation of electrolyte disturbances ranging from potassium, magnesium and phosphate depletion also frequently develops especially in decompensated patients presenting in non-ketotic hyperglyceamic hyperosmolar states (Liamis et al. 2014). The mortality is about 15% while in diabetic ketoacidosis, mortality is about 2-5% (Umpierrez et al. 2002). The two most important metabolic complications of diabetes mellitus are the diabetic ketoacidosis (DKA) and hyperglycaemic hyperosmolar state (HHS) which can occur in both type 1 and type 2 diabetes mellitus (Beigelman, 1971).

When evidence of brain damage occurs, episodes of hypoglycaemia, diabetic coma or atherosclerosis may be incriminated. Diabetes with both microvascular and macrovascular disease, and in type 1 diabetes, the risk of additional exposure to intermittent severe hypoglycaemia may play a role in the development of brain damage. The symptoms are caused by neuroglycopenia, i.e. shortage of glucose in the neurons (Anthony et al. 2009). Pathological changes following acute hypoglycaemia may show brain oedema and vascular congestion, while survival after prolonged hypoglycaemic coma may be associated with ventricular dilatation, cortical atrophy and hippocampal atrophy. Neurones show ischaemic changes and associated gliosis (Brierley, 1981). It has also been suggested that intensive glycemic control therapy in patients with diabetes can lead to neuroglycopenia and precipitate psychosis (Roos et al. 1984; Singh et al. 1994).

In HHS, there is profound dehydration, osmolality and glucose level are extremely high. It typically occurs in elderly patients who become hyperglycaemic due to infection or other complications. The onset may be insidious, sometimes developing over several days or weeks. The presenting features may be of increasing lethargy, impairment of consciousness, seizures and focal neurological signs. Sometimes the condition may be misdiagnosed as acute stroke, exhibiting features like hemiparesis, aphasia, simple or complex hallucination (Guisado et al. 1975). Unlike hypoglycaemia and its associated neuroglycopenia, a major obstacle to the investigation of the effects of hyperglycaemia on the brain is the absence of clear physiological mechanism through which hyperglycaemia negatively affects the brain function that may lead to psychosis. However, research suggests possible mechanisms (McCall et al. 1997) like: blood brain-barrier microvascular dysfunction during transient hyperglycaemia (Mooradian, 1997); altered uptake or synthesis of monoamine neurotransmitters as a result of the defective availability of precursors and insulin to the brain (Figlewicz et al. 1996; Wurtman, 1998), complex effect on peptide neurotransmitters can result from uncontrolled diabetes (Sipols et al. 1995; Havel 2000). It is not concluded how any one of these mechanisms or a combination of them result in the manifestation of neuropsychiatric signs and symptoms. In a case series of six patients who developed new onset diabetes mellitus following an acute psychosis without any other identifiable aetiology, the researchers reported that the lack of glucose control in these patients may have contributed to the development of the psychotic disorder (Bauer et al. 2011).

Numerous researches have been done on the influence of hypoglycaemia on the brain and its associated neuropsychiatric manifestations but, only little is known about the pathophysiological mechanisms and the nature of mental health problems arising in diabetic patients in the hyperglycaemic hyperosmolar state. This case report attempts to highlight the occurrence of psychiatric symptoms in the hyperglycaemic state in people with diabetes mellitus, and the need for caution by the clinicians to avoid unnecessary exposure of diabetic patients to antipsychotic medications.

CASE 1:

A -67- year old man, a known diabetic patient, non-compliant with medications

presented at Enugu State University Teaching Hospital (ESUTH) with 2 weeks history of irrational speech, poor sleep at night and hearing strange voices in clear consciousness. The voices were commanding him to leave his house because the environment was not safe. He usually obeyed these voices and became restless, uncooperative and attempted severally to run away from his house. There was no associated history of fever, head injury or seizures. He was not a known hypertensive (blood pressure at presentation was 130/86mmHg) and has never had a similar illness in the past. On physical examination, there was no evidence of neurological deficit and all the other systems were essentially normal. Urgent random blood glucose done at the accident and emergency department demonstrated elevated value of 412 mg/dl. Fasting blood glucose values during the first 3 days of admission were 197mg/dl, 202mg/dl and 180mg/dl respectively. Other laboratory investigations like full blood count (FBC), serum urea, electrolyte and creatinine (SU&Cr), liver function test (LFT), detected no abnormality. However the patient made a remarkable improvement as the blood glucose normalized, and he was discharged on the oral hypoglycaemic agent (Metformin) after 13 days of admission.

CASE 2

A 49-year-old widow, a known diabetic with a history of poorly controlled blood glucose, presented with 3 days history of aggressive behaviour, disorientation, restlessness and seeing strange things other people could not see in clear consciousness. She was accusing her sons and daughters to be planning to harm her. At several occasions she was pointing at unseen persons, shouting that they have come to kidnap her, hence wanted to run away. Attempts made to restrain her usually led to violence to the relatives and health workers. There was no history of fever, head injury or psychoactive substance use. She was not a known epileptic or hypertensive (blood pressure on presentation was 126/68mmHg). This was the first episode of mental disorder. There was no significant finding in the systemic examinations except disorientation, poor attention/concentration, and impaired memory. Laboratory investigations (like FBC, SU&Cr, LFT) were also normal except random blood glucose which was elevated (380mg/dl). Fasting blood glucose during the first 3 days of admission at ESUTH was 210 mg/dl, 197mg/dl and 170mg/dl respectively. While aggression was controlled by physical restraint and low dose Benzodiazepine, the effort was geared towards controlling the blood glucose. All the symptoms resolved without antipsychotics when the blood glucose became normal. After counseling, she was discharged on an oral hypoglycaemic agents after 14 days of admission.

DISCUSSION

The 2 cases represented patients in a non-kitotic hyperglycaemic hyperosmolar state due to poorly controlled type 2 diabetes mellitus and florid psychotic symptoms characterized by hallucination, irrational speech, aggression and suspiciousness. A similar case of hyperglycaemia and psychosis has been reported by (Swapnajeet et al. 2016) describing a 36 year old woman with type 1 diabetes who developed recurrent psychosis following poor adherence to insulin therapy. Also in a case series of 6 patients diagnosed newly with diabetes following acute psychotic episode without any other identifiable risk factors, the authors posited that hyperglycaemia may have contributed to the manifestation of psychosis (Leah et al. 2011). Diabetes mellitus either type 1 or type 2 is a psychologically challenging illness, and hence becomes a risk factor for manifestation of the above psychiatric features. Distress accompanying diagnosis of diabetes include: adjustment to the disease, adherence to treatment regimen and psychosocial difficulties both at individual and interpersonal levels (Havel, 2000; Bauer et al. 2011). Stress, poor social support and negative attitudes towards diabetes can impact on self-care and glycaemic control (Peyrot et al. 2005; Goebel-Fabbri et al. 2008; Fisher, 2007; Malik et al. 2009; Zhang et al. 2009; Hampson et al. 2010; Luyckx et al. 2010). It is a well known fact that both acute and chronic stress are associated with psychosis, hence the same factors (stress) that contribute to the development of hyperglycaemia may have resulted in psychotic disorder.

Due to the prominent psychiatric

symptoms like aggression, hallucinations, suspiciousness/delusion, many physicians may quickly commence antipsychotic drugs without delay. It was worth noting the gradual resolution of the psychotic symptoms with the introduction of intravenous fluid and hypoglceamic medications. This underscores the need to always tackle physical problems detected in patients first before the psychiatric diagnosis since many medical disorders present with features mimicking mental disorders, and it is these untreated physical illnesses that usually lead to death of the patients.

It is common knowledge that patients with primary or secondary brain lesions or insult can present with a barrage of psychological symptoms and signs that may result in the misdiagnosis of psychological syndromes like schizophrenia, delusional disorder, affective disorder etc. It should also be highlighted that patients 1 and 2 were not known hypertensive patients, or have any features suggestive of end organ disease or have developed complications of diabetes like impaired vision, severe chronic pain, leg ulcer/gangrene/amputation. Even though further investigation like brain imaging to exclude possible intracranial lesions was not done, one can infer that the primary cause of psychosis in these patients may be hyperglycaemia since the symptoms abated when the elevated blood glucose was brought under control.

CONCLUSION

Bearing in mind the associated social stigma of having a psychiatric diagnosis and the extra-pyramidal side effect profile of antipsychotic therapy, antipsychotics should be commenced as the last option in treatment of patients with raised blood glucose and psychosis. This report underlines the importance of a more rigorous research to elucidate the pathophysiological mechanism of psychosis in hyperglycaemic hyperosmolar state in poorly controlled diabetes mellitus, and the prudent use of antipsychotic medication in presence of organic aetiology.

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