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Driving and diabetes mellitus in the Gulf Cooperation Council countries: Call for action

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ABSTRACT

The aim of the present article is to increase awareness concerning safe driving for patients with diabetes in the Gulf Cooperation Council (GCC) countries and to provide recommendations concerning the management of these patients. The cognitive, motor, and sensory skills required for driving can be adversely affected by diabetes as well as the side effects of anti-diabetic medications, particularly hypoglycemia. The prevalence of diabetes in the GCC countries is among the highest in the world. As the number of diabetic drivers in these countries continues to increase, the number at risk of having a motor vehicle accident is also expected to increase. We reviewed the available literature concerning driving and diabetes, particularly in relation to the current situation in the GGC countries. Unfortunately, very little published information is available addressing this issue in the GCC countries. Most of the GCC countries lack legislation on driving and diabetes. We have proposed recommendations to help diabetic drivers in the GCC countries as well as to provide guidance to health care professionals managing these patients.

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1. Introduction

The prevalence of diabetes in the Gulf Cooperation Council (GCC) countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates) is among the highest in the world [1,2]. Moreover, diabetes treatment guidelines are increasingly emphasizing more aggressive glycemic goals, which may be associated with increased hypoglycemia. These factors, together with the growing number of motorists in the GCC countries, are expected to result in an increase in the number of diabetic drivers in the region at higher risk of having a motor vehicle accident.

The authors collaborated to identify diabetic drivers in GCC countries at higher risk for motor vehicle accidents and to provide evidence-based recommendations to ensure safe driving by these patients. The present report summarizes the findings of this initiative.

2. Hypoglycemia and driving

The main issue impacting diabetic drivers in the GCC countries is the risk of clinically significant hypoglycemia occurring while driving.

2.1. *Hypoglycemia and motor vehicle accidents*

While there is no consistent evidence of notably higher motor vehicle accident rates among diabetic drivers compared with non-diabetic drivers, there is research indicating that hypoglycemia compromises driving performance [3,4].

2.2. *The impact of anti-diabetic medications*

While hypoglycemia can have a number of different causes in diabetic patients, it most commonly occurs as a side effect of anti-diabetic medication [5]. For patients with diabetes, insulins and sulfonylureas are the agents that pose the greatest risk for iatrogenic hypoglycemia, and insulin dose and regimen adjustment or substitution of sulfonylureas with other classes of antidiabetic agents should be considered in the event of troublesome hypoglycemia.

2.3. *Lack of awareness of hypoglycemia*

The association between the lack of awareness of hypoglycemia and an increased risk of motor vehicle accidents has been inconsistent [5]. In one study, 25% of the diabetic respondents thought it was safe to drive when blood glucose was <3.9 mmol/L (<70 mg/dL) [6,7].

2.4. *Fasting during Ramadan*

Most diabetic Muslims choose to fast during Ramadan [8]. The incidence of severe hypoglycemia increased 7.5-fold and the incidence of severe hyperglycemia increased 5-fold during Ramadan relative to preceding months in patients with type 2 diabetes [8]. These two complications may impact safe driving during this holy month.

3. Impact of diabetic complications and comorbidities on driving

In addition to hypoglycemia, specific diabetic complications and comorbidities may also adversely affect a diabetic patient's ability for safe driving and increase their risk for driving mishaps.

3.1. *Eye complications*

Drivers with diabetic retinopathy (DR) report more driving difficulties, especially at night [9], and driving was reported to be negatively affected over a 10-year follow up of patients with DR [10]. A survey done in the United Arab Emirates reported a prevalence rate for diabetic retinopathy (DR) in diabetic patients to be 54.2% [11].

3.2. *Peripheral neuropathy*

A recent study of 4097 diabetes patients attending outpatient clinics across the Middle East (including the GCC countries of Kuwait and the United Arab Emirates) reported that 53.7% of patients met the criteria for painful peripheral neuropathy [12]. Diabetic drivers with peripheral neuropathy may be unaware of how much pressure to apply to the pedals or how far to turn the steering wheel.

3.3. *Obstructive sleep apnea*

There is a high prevalence of obstructive sleep apnea in patients with type 2 diabetes [13]. Drivers with sleep apnea are at double the risk of being involved in a motor vehicle accident relative to drivers with no sleep apnea [14].

3.4. *Cognitive impairment*

Diabetes is associated with rapid fluctuations in blood glucose, and hyperglycemia is a frequent consequence of the relative or absolute insulin deficiency that is intrinsic to diabetes [15]. Dehydration due to the hot desert climate of the GCC countries can further exacerbate hyperglycemia. As with hypoglycemia, hyperglycemia can also impair cognitive, motor, and sensory functioning, and negatively impact driving ability [15–17].

4. Gulf status in relation to hypoglycemic incidence and car accidents

4.1. *Motor Vehicle Accidents in GCC Countries*

The Suraya Foundation reported that World Health Organization (WHO) data showed that residents of United Arab Emirates are 7 times more likely to die in a motor vehicle accident compared to those in the UK [18].

4.2. *Hypoglycemia in diabetic drivers in GCC countries*

A cross sectional survey in 104 patients with diabetes attending a single outpatient specialty clinic in United Arab