Patient Preference and Adherence

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REVIEW

Diabetes Mellitus and Its Therapy in Brunei Darussalam – A Critical Revisit

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Introduction: Diabetes is becoming an increasingly common condition across the world including Brunei Darussalam. Bruneian population, although is relatively small, represents a miniature urban community of neighbouring Southeast Asian countries as they share similar dietary and ethnicity patterns. Thus, it would be valuable to examine the findings of studies conducted among Bruneians. This study aimed to identify and review research related to the practice of patients with DM in Brunei Darussalam in order to identify associated factors influencing diabetic medication knowledge and adherence.

Methods: This narrative review analyzed literature related to DM and its therapy in Brunei Darussalam. Other issues consisting of knowledge and adherence related to DM were also explored. Databases (Scopus, PubMed, and Google Scholar) were used to search literature published up to May 2022. Search terms "diabetes mellitus", "Brunei" combined using Boolean operator were used.

Results and Discussion: Conducting appropriate studies in Brunei Darussalam can benefit the government and policymakers to implement effective measures and programmes to combat the diabetes epidemic. Despite the government's efforts, additional relevant stakeholders must be included in order to work together and engage in these initiatives in order to increase diabetes awareness, give people the power to make healthy decisions, and ultimately reduce the prevalence of diabetes in Brunei Darussalam. Patients' medication knowledge proficiency plays a main component of ensuring appropriate and safe use of medication prescribed to them.

Conclusion: Relatively poor medication knowledge and inappropriate diabetes-related practices were observed in studies conducted in Brunei Darussalam. However, no study has been done which directly measures both medication awareness and compliance among Brunei Darussalam T2DM patients. Future studies can focus on the relation between these two factors in different geographical locations of the world that are characterized by different diabetes-related practices and culture.

Keywords: diabetes mellitus, cardiovascular risk factors, healthy lifestyle, education research, health system access

Introduction

Diabetes mellitus (DM) accounted for 10.1% of the total deaths in Brunei Darussalam in 2017. Since 2012, it is the third greatest cause of death in Brunei. It has been reported that the mortality rate from DM was 9.1% in 2016.[1] The largest diabetic population of diabetics live in Asia, among the 10 countries to have the most diabetic patients, four are in Asia ie China, India, Indonesia, and Japan. It is assumed that the rapid urbanisation, development and nutritional transition have resulted in Asia being the centre of the global epidemic of DM.[2,3] In 2016, diabetes prevalence was 9.7%.[1] The study reported it to be a non-communicable disease (NCDs) epidemic in the sultanate, including type 2 DM (T2DM).[1] However, it was reported that the prevalence of diabetes was lower in Brunei Darussalam as compared with two other Asian countries including Singapore (11%) and Malaysia (18%).

Furthermore, prevalence of obesity is 28%, which ranks highest amongst Southeast Asian countries and it is a major risk factor for T2DM. In Brunei, smoking and obesity were linked to risk of non-communicable diseases. The standardised methods used in this study are significant for public health interventions surveillance. It may give policymakers the

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opportunity to more accurately assess the needs of public health, establish priority settings, and create pertinent and appropriate goals. Due to the high prevalence of T2DM in the sultanate, the government has been implementing several initiatives to curtail the disease prevalence.[4] The rising obesity issue among youth in Brunei also triggered alarm to nip the problem in the bud before it leads to metabolic syndromes such as DM.[5,6]

These programmes use a variety of strategies, including health promotion and health education campaigns, in an effort to increase public knowledge of diabetes prevention. A government-run health programme called the Health Screening Effectiveness (3PK) Programme has been put in place for risk assessment and early identification of NCDs, including diabetes. Despite the government's efforts, additional important stakeholders must be included in order to work together and engage in these initiatives in order to increase diabetes awareness, provide people the power to make healthy decisions, and eventually reduce the prevalence of DM in Brunei Darussalam.[7] This review aimed to explore the current diabetes-related practices and associated factors among diabetes mellitus patients in Brunei Darussalam.

Methods

This narrative review focused on two aspects of DM; studies conducted in Brunei Darussalam and/or targeting the residents of Brunei Darussalam and related to its therapy. The published reports were searched through online databases: Scopus, and PubMed. Google Scholar was also used to find reports published in non-indexed journals from inception till 31 May 2022.

Search terms "diabetes mellitus" and "Brunei Darussalam" were used along with Boolean search strategy "AND." A total of 32 articles were found. After screening for relevance, only five articles were included in the review.

Results and Discussion

Diabetes Studies Done in Brunei Darussalam

Five relevant diabetes-related studies that had been conducted in Brunei Darussalam were found and these studies had several emphases as shown in Table 1.

The study done in Kg. Kapok area had evaluated the residents' knowledge on diabetes, which was generally poor, and introduced an intervention to improve their awareness on diabetes. Education and monthly income levels were considerably linked to knowledge about diabetes.[8,9] Researchers assessed knowledge, attitudes, and practices related to DM in a small sample. The issues surrounding DM were highlighted in small group discussions, and a talk was given. Participants' knowledge was assessed for any changes after the event through questionnaires.[8] In a more recently conducted study, patients attending a diabetes outpatient clinic of the main tertiary hospital of the capital city were also tested for knowledge of their condition, and the level of glycaemic control using Michigan Diabetes Knowledge Test and correlated with HbA1c.[9] However, this test has not been validated for assessing the diabetes knowledge in Brunei Darussalam.[9]

The findings of Khaing et al study draw our attention to an important issue related to clinical practices in Brunei Darussalam. They reported that almost half of sample population should be classified as diabetic were not properly diagnosed. Khaing et al reported that repeating fasting blood glucose test alone at patients' follow-up clinic visits is a gold standard test. Fasting blood glucose testing alone has its own inherent weakness because this method does not fully quantify the recommended diagnosis of T2DM and caused delay of treatment. However, the results should be interpreted with caution as the study was only done in one health-care centre with a small sample size.[10]

Another study examined the fasting of pattern of DM patients with Islamic faith in Brunei Darussalam, along with other information such as fasting activities and knowledge and practice in DM control. The study reported that 93.4% of the participants had observed fasting for about 24.1 days during the Islamic fasting month of Ramadan. Interestingly, those with age 55 years and above had observed significantly higher number of fasting days than the younger group ($p=0.010$), yet less than half of them had consulted the physician before fasting and performed home monitoring of blood glucose levels during the fasting month.[11] However, it must be noted that validation of the research instrument was not performed and there was also the possibility of potential recall bias.[11]

Meanwhile, the prevalence and related factors of DM in patients with tuberculosis (TB) in Brunei Darussalam were established in 2021. This retrospective study reviewed medication data of TB patients with DM up to 6 years and determined their prevalence and associated factors. However, the limitations of this study were that the researcher did not

Table 1 Summary of Diabetes Studies Done in Brunei Darussalam

Study	Location for Data Collection	Theme of Study	Methods	Population and Sample Size
Tan et al[8]	Kg. Kapok (a suburb housing area)	Diabetes awareness in residents of Kg.Kapok	DKQ and attitude survey	60 residents
Omar N et al[12]	National TB Coordinating Centre (NTCC), National TB Reference Laboratory (NTRL), and Brunei Darussalam Health Information and Management System (Bru-HIMS).	Prevalence and associated factors of diabetes mellitus among tuberculosis patients in Brunei Darussalam	Retrospective cohort study	1362 TB patients, 462 TBDM patients.
Mohidin et al[9]	RIPAS hospital	Health literacy among patients with diabetes	Cross-sectional study: Michigan Diabetes Knowledge Test questionnaire	118 T1DM and T2DM patients
Tan C et al[11]	RIPAS hospital	Fasting in Ramadan of Muslim patients with diabetes mellitus, and knowledge and practice in relation to diabetes control	Cross-sectional study that included 18 years and older, Muslim patients with diabetes Mellitus who attended the main Diabetes Centre	183 patients studied with sample size of 150 patients (11 T1DM patients, 39 T2DM patients and 130 uncertain of their diagnosed type)
Khaing Ak, Thu K, Hlaing Aa[10]	Seria Health Centre	Prevalence of impaired glucose tolerance and diabetes among patients with impaired fasting blood glucose	Retrospective data review Oral Glucose Tolerance Test results of 59 patients with impaired Fasting Plasma Glucose in Seria Health Centre during three-year period (1st Nov 2012–31st Oct 2015) were reviewed to determine the proportion of undiagnosed Diabetes Mellitus, Impaired Glucose Tolerance, pure Impaired Fasting Glucose and to find the factors associated with different degree of glucose tolerance	59 patients with impaired fasting plasma glucose

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check the exact duration of having DM for each TB case, status of DM management, missing data and inconvenience in gathering information on the etiology of deaths among TB patients.[12]

In Brunei Darussalam, patient medication counselling is a major contributor to medication knowledge.[13] The counselling is given by either a pharmacist or a dispenser who has been trained to conduct such medication counseling. There is no other known method of providing medication knowledge to patients. The set of facts a patient must have in order to utilise their drug correctly, including the therapeutic objective, dosage, time to take it, safety, and ways for preserving it, as well as any potential interactions and side effects, can be referred to as their knowledge of their medications.[14] Unexpected clinical outcomes, the onset of secondary health problems, misuse of medications, and adverse effects related to medications are all possible repercussions of inadequate medication knowledge.[15,16] Due to the high incidence, it is regarded as a significant public health issue.

Medication knowledge has been shown to be favourably connected with improved quality of life, treatment adherence, and accomplishment of desired pharmacological outcomes. As a result, medication knowledge is critical in illness management and reducing the occurrence of adverse drug responses.[17,18] Proper medication knowledge is one of the criteria for a patient's participation in decreasing medication mistakes.[19] Despite this, there is little research that examines drug awareness, particularly in T2DM patients and in hospital settings. Polypharmacy is used on a significant number of outpatients, which can increase the risk of other health complications such as drug interactions and toxicity.[20] Extant literature have generally demonstrated poor medication knowledge, especially with reference to potential side effects and how their medications work. Factors affecting medication knowledge include age, educational level, and number of medications taken daily.[21–24] As for age, those of younger age are associated with having better medication knowledge.[25,26] This is supported with studies published by Al-Qazaz et al,[27] McPherson et al[28] and Sweileh et al. These studies included patients with mean age older than 50 years, which may play a role in contributing to the general consensus of poor patient medication knowledge. Education level has also been thought to have a positive correlation with patient medication knowledge.[29] In comparison with study conducted outside Brunei Darussalam, Al-Qazaz et al[27] and Karaoui et al[29] have demonstrated the significance of educational level in patient medication knowledge and diabetes knowledge ($P < 0.05$ and $P < 0.01$).[27,30] However, studies by McPherson et al[28] and Gangwar et al[31] have shown no significant link between literacy and patient medication knowledge. Polypharmacy has been associated with poor patient medication knowledge. However, a study by McPherson et al[28] discovered that 9 out of 10 (90%) patients on 2 medications scored 5 and above on medication knowledge, but this was achieved in only 18 out of 34 (52.9%) patients on one medication.[26,32] The difference in the number of people on one or two medications is huge; therefore, the comparison should be evaluated with caution. McPherson et al had also revealed that patient medication knowledge had a significant inverse correlation with the patient's glycemic control ($r = -0.61$, $P < 0.01$).[28] Better knowledge on disease is associated with higher medication adherence as supported by Al-Qazaz et al in which the study had shown that higher diabetes knowledge was significantly linked to better adherence.[27,33,34] However, Karaoui et al had found that better diabetes knowledge was not significantly associated with better adherence ($r = 0.456$, $P < 0.01$).[30]

These studies have conveyed the significance of patient medication knowledge and its inverse association to glycemic control.[28] Conducting a study to assess the patient medication knowledge and medication adherence can contribute to a better understanding of the factors, which may affect a patient's medication adherence and their health outcomes. Furthermore, the prevalence of comorbidities is high in patients with T2DM, thus taking multiple medications is common in these patients.[35] Patient medication knowledge can play a significant role in ensuring appropriate and safe use of medications prescribed to patients.[36]

Conclusion

This review concludes that a relatively poor medication knowledge and inappropriate diabetes-related practices were observed among the findings of the studies conducted in Brunei Darussalam. Based on the theory that medication knowledge significantly correlates to medication adherence, it can be inferred that poor medication adherence also exists in T2DM patients in Brunei Darussalam. Studies that evaluated medication knowledge focussed on glycemic control and other factors, which may also influence medication knowledge and thus medication adherence. However, no study has reported both medication knowledge and medication adherence measurement among T2DM patients in Brunei Darussalam. Future studies can focus on the relationship between these two factors in different geographical locations of the world exhibiting different diabetes-related practices and culture.

Abbreviations

DM, Diabetes Mellitus; T2DM, Type II Diabetes Mellitus; T1DM, Type I Diabetes Mellitus; PKM, Patient's knowledge of their medications; NRM, Negative results related to medication; NCD, Non-communicable diseases.

Disclosure

The authors report no conflicts of interest in this work.

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