

Analysis of prevalence and incidence trends of diabetes mellitus in Majmaah city, Riyadh Region, Saudi Arabia: A trend of 3 years retrospective study (2017-2019)



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ARTICLE INFO

Article history:

Received 21 November 2020

Received in revised form

31 January 2021

Accepted 5 February 2021

Keywords:

Diabetes mellitus

Epidemiology

Majmaah

Public health

Health informatics

ABSTRACT

Diabetes Mellitus (DM) remains a global disease and prevalent among 415 million people. Saudi Arabia is the second-highest country in the Middle East region and the seventh in the world in its prevalence rate. Population-based prevalence and incidence data are ultimate to evaluate the effects of prevention strategies for diabetes and such relevant studies in Saudi Arabia are scarce. Quantification of prevalence and incidence of DM is significant in rural-based populations to allow for clinical resource management. Therefore, this study is designed to determine the prevalence of diabetes among the population of Majmaah city, in the Riyadh region of Saudi Arabia in the past three years (2017-2019) and compare them with prevalence and incidence rates in Saudi Arabia. The data of patients with DM for the past three years were collected from archives of King Khaled hospital in Majmaah city and analyzed with different statistical methods frequency distribution using SAS software. DM's annual incidence (AI), incidence rate (IR), and average annual incidence (AAI) with confidence intervals of 95% are reported. It was found that incidence rates of both type 1 and type 2 DM of all age groups have increased in the last three years. The incidence rate of type 1 DM patients has increased by 20.23% while in type 2 DM has increased by 9.31%. Finally, this study suggested that DM trends among the population in Majmaah city are consistently increasing year by year and it is also in line with the trend of the whole Saudi Arabia irrespective of gender and age.

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1. Introduction

Diabetes mellitus (DM) is a chronic disease in the human body that occurs when the pancreas is no longer able to make insulin, or when the body cannot make good use of the insulin it produces. Blood glucose is an essential energy source for human cells to build muscles and tissues and it must be regulated and maintained by insulin. If the human pancreas is not able to produce enough insulin or the human body is not able to use that insulin, this would lead to DM (WHO, 2020; MOH, 2018a; 2018b; MFMER, 2020). The causes of DM are varying from one type to another. There are two main types of DM including; type 1 DM, known as insulin-dependent, and type 2 DM, known as non-insulin-dependent

(WHO, 2020; 2016). The exact cause of type 1 DM is unknown. However, it usually results from a deficiency in insulin production. When the body produces the insulin but cannot use it, the result would be type 2 DM (MOH, 2018a; 2018b).

In general, DM can be developed at any age. Symptoms of DM include; fatigue, frequent urination, slow-healing sores, increased thirst, blurred vision, extreme hunger, and frequent infections (MFMER, 2020). DM remains a global health crisis (Mohiudein et al., 2011; Hjelm et al., 2003). Globally, the number of people with DM has been increased from 108 million to 422 million in 25 years (WHO, 2020; 2016). In 2030, this number is estimated to exceed 552 million (Alotaibi et al., 2017). DM is considered the fifth causative reason for death in the world (Caliskan et al., 2006). Over the past few decades, the prevalence of DM in developed and developing countries has risen substantially, making diabetes a key health priority globally. Examination of trends in the total burden of diabetes is an essential part of the monitoring of this health priority area.

Since Saudi Arabia is one of the fast-developing countries and it undergoes a change of lifestyle in its

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<https://doi.org/10.21833/ijaas.2021.05.010>

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people in the last 30 years. It is important to note that the prevalence of DM has increased these years (Ammari, 2004). Presently, DM prevalence has been increased by 23.7% (Alwakeel et al., 2009). According to the World Health Organization (WHO), Saudi Arabia is the second-highest country in the Middle East region and the seventh in the world in the prevalence rate of DM (AlDawish et al., 2016). In Saudi Arabia, there are around 7 million patients with DM (AlDawish et al., 2016).

According to many Saudi studies and research, DM is increased every year in Saudi Arabia (Alqurashi et al., 2011; Naeem, 2015; Alwin et al., 2017; 2018; El-Hazmi et al., 1996; Al-Rubeaan et al., 2014; Al-Nozha et al., 2004; Meo, 2016). However, according to the Ministry of Health (MOH), the number of reported cases of DM in its hospitals and medical centers in 2016 was 485,754 and this number has been increased to 730,775 in 2018 (MOH, 2016; 2018a; 2018b). This is very high in the short span of two years. As disease complications increase, patients with DM are at higher risk to have the possibility of life-threatening diseases such as stroke, blindness, heart disease, kidney disease, dental disease, and high blood pressure (Akinci et al., 2003). Awareness of DM including risk factors, complications, and management is important to have a better health-related quality of life (Angeles-Llerenas et al., 2005; Wild et al., 2004). In fact, there is a huge effort to educate the public about DM through various forms of media (Wee et al., 2002).

Therefore, this study is a descriptive retrospective study to determine the prevalence and incidence trends of reported follower's cases of diabetes mellitus in Majmaah city, Riyadh, Saudi Arabia in the past three years (2017-2019). Then, comparing the prevalence and incidence rates of these reported follower's cases with national prevalence and incidence rates of reported follower's cases of diabetes mellitus in Saudi Arabia.

2. Materials and methods

This cross-sectional study was carried out on all patients who are registered from January 1, 2017, to 31 December 2019 with King Khaled Hospital, Majmaah city (180 Kilometer towards north from capital Riyadh) located in the Riyadh region of Saudi

Arabia. Majmaah is surrounded by many villages and has an estimated population of 143,089 people (GAS, 2020). King Khaled hospital is the only major hospital in Majmaah city and all medical laboratory records as well as from health records of patients with diabetes mellitus (DM) in this study were registered in this hospital and its data archives from 2017 to 2019 were considered for this study and the classification of DM types and registration was completed by a health practitioner.

This study was permitted by the Ministry of Health in Saudi Arabia and the author has the bioethics certificate from King Abdulaziz City for Science and Technology. All patients' data and information were highly secured and protected. The raw data includes the patient's details such as; types of DM, patient's age, and patient's gender. So, after collecting the data by Excel software, these data were cleaned, edited, and analyzed by using different analytical methods through Statistical Analysis System software (SAS version 9.4). So, starting with the descriptive statistical analysis to get a general picture and the inferential statistical analysis. To examine the time trends of DM incidence, the average annual percentage change in incidence was calculated in a multivariable Poisson regression model. Meanwhile, within the model, the calendar year was treated as a continuous variable and the statistical significance of the regression coefficient was tested. P-value <.05 indicated significances.

3. Results

Prevalence refers to the proportion of persons who have a condition at or during a particular time period, whereas incidence refers to the proportion or rate of persons who develop a condition during a particular time period. In 2017, there were a total of 1472 cases of diabetes mellitus (DM) reported at King Khaled Hospital, Majmaah city. However, this reported number has been increased in 2018 to be 1523 cases and 1644 cases in 2019 (Fig. 1).

During the past three years (2017-2019) reported follower's cases of DM in Majmaah city has increased including both type 1 and type 2. Age-wise and gender-wise prevalence of DM types in Majmaah city demographic characteristics in the last three years (2017-2019) is shown in Table 1.

Table 1: Age-wise and gender-wise Prevalence of diabetes mellitus (DM) types in Majmaah city demographic characteristics in the last three years (2017-2019)

Demographic Characteristics		Cases of Diabetes Mellitus (DM)											
		2017			2018			2019			Total of All (2017-2019)		
		Type 1	Type 2	Total	Type 1	Type 2	Total	Type 1	Type 2	Total	Type 1	Type 2	Total
Gender	Male	64	634	698	73	647	720	86	666	752	223	1,947	2,170
	Female	74	700	774	79	724	803	87	805	892	240	2,229	2,469
Age	≤18	3	33	36	5	39	44	5	43	48	13	115	128
	19-30	8	48	56	10	53	63	10	65	75	28	166	194
	31-40	13	82	95	13	87	100	15	94	109	41	263	304
	41-50	24	237	261	26	249	275	30	266	296	80	752	832
	51-60	49	429	478	53	431	484	59	450	509	161	1,310	1471
	61-70	28	286	314	32	288	320	39	319	358	99	893	992
	≥71	13	219	232	13	224	237	15	234	249	41	677	718
Total of Cases		138	1,334	1,472	152	1,371	1,523	173	1,471	1,644	463	4,176	4,639
Mean of Age: Type 1 DM (45)/Type 2 DM (55) Data are mean (SD) or number (%)													

Mean of Age: Type 1 DM (45)/Type 2 DM (55) Data are mean (SD) or number (%)

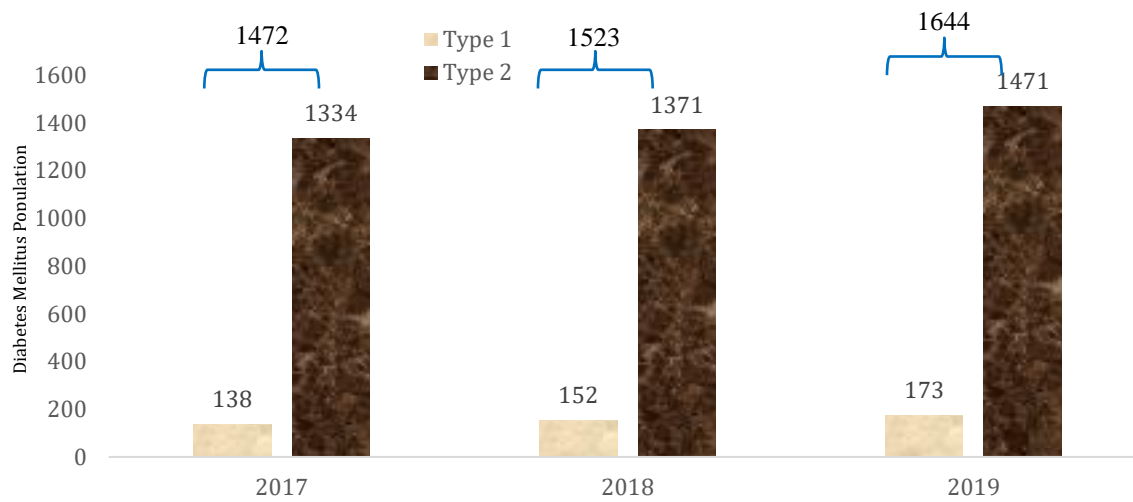


Fig. 1: Prevalence of diabetes mellitus types in Majmaah city (2017-2019)

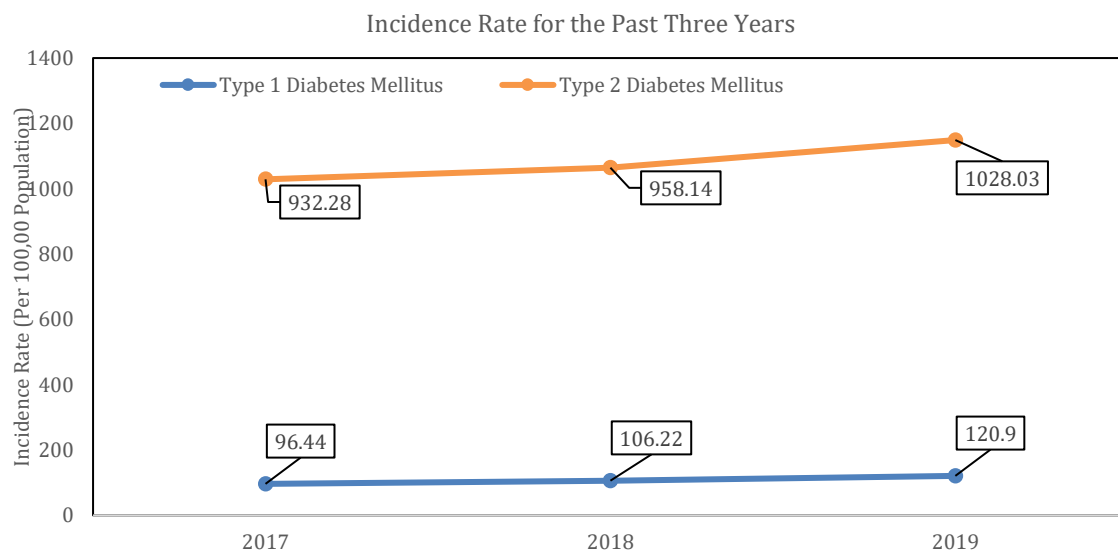


Fig. 2: Incidence rates of different types of DM in Majmaah in the last three years (2017-2019)

The incidence rates for different DMs during the past three years (2017-2019) in Majmaah city are shown in Fig. 2.

4. Discussion

Majmaah city is considered as one of the fastest-growing cities in the Riyadh region in Saudi Arabia and diseases like diabetes mellitus of two types are considered as an important issue in such population. So, measuring the prevalence and incidence rates of this disease in a city with a population of 143,089 people would be very necessary for medical facilities in that city.

The prevalence and incidence of a disease are considered as the basic measures in epidemiology (Ward, 2013). Prevalence is a measure of a specific disease in a specific population at a specific location and a specific time. Prevalence can not only measure the number of people affected but also the survival of these affected people (Ward, 2013).

However, in etiology studies, measuring incidence rates is more helpful than the measure of prevalence. The incidence rate is a measure of new cases of a specific disease among a specific population in a specific location and over a specific period of time (Ward, 2013). So, comparing the differences of rates among different subgroups or with different exposures is the primary value of incidence rates in studies of any disease etiology (Ward, 2013).

According to many Saudi studies and research, DM is increased every year in Saudi Arabia (Alqurashi et al., 2011; Naeem, 2015; Alwin et al., 2017; 2018; El-Hazmi et al., 1996; Al-Rubeaan et al., 2014; Al-Nozha et al., 2004; Meo, 2016). Therefore, the purpose of this study is to determine the prevalence and incidence trends of reported follower's cases of diabetes mellitus in Majmaah City for the past three years (2017-2019) and comparing them with national prevalence and incidence rates of reported follower's cases of diabetes mellitus in Saudi Arabia.

In general, during the past three years (2017-2019), there was a total of 4,639 reported follower's cases of diabetes mellitus (DM) in Majmaah City. 46.77% of these cases are males and 53.23% are females. Of those, 2.75% were from the age group ≤ 18 or fewer years. The age groups (19-30), (31-40), (41- 50), (51-60), (61-70) and 71 or more years constituted 4.18%, 6.55%, 17.93%, 31.07%, 21.38%, and 15.47% respectively. 90.01% of the cases were type 2 DM while type 1 DM is 9.991% (Table 1).

According to the Ministry of Health in Saudi Arabia (MOH), Saudi Arabia is facing increased incidence rates of DM. In the past three years in Saudi Arabia, the reported number of follower cases of DM increased from 485,754 in 2016 to be 730,775 in 2018 (MOH, 2016; 2018a; 2018b).

In the past three years in Majmaah, the reported number of follower cases of DM increased from 1,472 in 2017 to be 1,644 in 2019 (Table 1). These trends occur in the past three years in Majmaah irrespective of gender with both type 1 and type 2 DM. Also, in Majmaah, the same trend appears which is in line with the Saudi trend of increased incidence rates of DM year by year.

The reported number of male patients with type 1 DM in the past three years in Majmaah has been increased by 29.33% while female patients with type 1 DM have been increased by 16.14%. Also, the reported number of male patients with type 2 DM in the past three years in Majmaah has been increased by 4.92% while female patients with type 2 DM have been increased by 13.95% (Table 1).

The reported number of type 1 DM patients with different age group ≤ 18 , 19-30, 31-40, 41-50, 51-60, 61-70 and 71 has been by 40%, 20%, 13.33%, 20%, 16.94%, 28.20%, and 13.33% respectively. The reported number of type 2 DM patients with different age group ≤ 18 , 19-30, 31-40, 41-50, 51-60, 61-70 and 71 has been increased by 23.25%, 26.15%, 12.76%, 10.90%, 4.66%, 10.34%, and 6.41% respectively (Table 1).

Finally, as the main goal of this study, the awareness of prevalence and incidence of a disease such as diabetes mellitus in a faster-growing community in Saudi Arabia is an important issue in such a population. However, limitations of this study, which can be investigated in the future, including studying the risk factors, complications, and management of diabetes mellitus in the population of Majmaah city.

5. Conclusion

This study was designed to determine the prevalence and incidence of diabetes mellitus (DM) among the population of Majmaah, in the Riyadh region of Saudi Arabia in the past three years (2017-2019). The trends show that both types of DM in Majmaah in the last three years have increased. The incidence rate of type 1 DM patients has been increased by 20.23% while in type 2 DM patients have been increased by 9.31%. Therefore, the trends

of DM among the population of Majmaah city are consistent with DM trends in Saudi Arabia.

Acknowledgment

The author would like to thank all the staff of King Khalid Hospital in Majmaah for their cooperation.

Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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