

PREVALENCE, OTHER BIOCHEMICAL LIPID PARAMETRES AND GLYCAEMIC CONTROL STATUS AMONG TYPE 2 DIABETIC 35 YEARS AND ABOVE URBAN POPULATION OF BURAIDAH CITY

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ABSTRACT

Background: The prevalence of type 2 diabetes is rapidly rising all over the world and challenging health problems of the 21st century. Among the diabetic population glycaemic control and lipid abnormalities plays very important role in quality of life of the Diabetic population. **Objectives:** To find the prevalence, glycaemic control and biochemical lipid parametres among the type 2 Diabetic population in Primary health care centres of Buraidah city. **Materials & Methods:** A cross sectional institutional based record review study conducted at 10 primary health centres of Buraidah from December 2017 to May 2018 among the 35 years and above age group individuals of 300 sample. Simple random method was used for the selection of primary health care centres, after getting institutional

ethical committee clearance. Data entered in SPSS 21.0 Version and necessary statistical tests like simple proportions, chi square tests were applied. **Results:** Average prevalence of type 2 Diabetes mellitus in all the 10 primary health care centres of Buraidah city above 35 years age group was 16.02%. There was 25.6% (77/300) were having abnormal cholesterol level in the study sample. In the study population, there was 75.6% (227/300) were having abnormal glycosylated haemoglobin level. **Conclusions:** Based on the results, on the whole, Prevalence of type 2 diabetes was not high comparatively other studies reported in the kingdom. High

level of glycosylated haemoglobin levels noticed in the study population. There is a need to identify the risk factors before onset of diabetes through screening programs and also after onset of the diabetes, there is a stringent control and periodical regular monitoring is required to provide good quality of life to the individual.

KEYWORDS: Prevalence, Glycaemic control, Serum Cholesterol, Serum Triglycerides.

INTRODUCTION

Type 2 Diabetes Mellitus problem has become major public health problem in developed world as well as developing countries. Over the last two decades, the Saudi population seen as an increase in the expenses in healthcare and treatment of diabetes. In 2014, the health care budget was 180 billion (Saudi Riyal) of which 17 billion was spent on all Saudis, with an approximate 25 billion on the entire Saudi diabetic population. This implies that the direct expense of diabetes is costing Saudi Arabia around 13.9% of the total health expenditure^[1].

Globally as of 2013, an estimated 382 million people or 8.3% of adults, are estimated to have diabetes, out of which about 46% were undiagnosed. About 80% live in low and middle income countries. This will raise the global burden of diabetes mellitus to above 592 million by 2035. The largest increase of the cases will take place in the regions where developing economies are predominant with greatest number of cases being expected in India and China.^[2,3]

Diabetes is leading cause of death, disability and economic loss throughout the world and it is predicted to become the seventh leading cause of death in the world by the year 2030. Diabetes and its complications are major causes of early death in most countries. Cardiovascular disease is one of the leading causes of death among people with diabetes. It can account for 50% or more of deaths due to diabetes in some populations. Close to half (48%) of deaths due to diabetes are in people under the age of 60. The highest number of deaths due to diabetes occurred in countries with the largest numbers of people with the disease: China, India, USA, and the Russian Federation.^[2,4]

The prevalence of diabetes is rising all over the world due to population growth, ageing, urbanization, industrialization, mechanization, dietary habits, increase of obesity, physical inactivity and sedentary lifestyles, stress at work place and home and many other factors. Diabetes imposes a large economic burden on individuals and families, national health

systems, and countries. Health spending on diabetes accounted for 10.8% of total health expenditure worldwide in 2013. Global health spending to treat diabetes and manage complications totalled at least USD 548 billion in 2013. By 2035, this number is projected to exceed USD 627 billion.^[2]

Just knowing about disease and its treatment is not sufficient, thorough knowledge about follow up steps like glycaemic control and its effect on disease. Similarly lipid profile status and its importance and consequences of the disease and therapy economics and quality of life importance among the diabetics need to educate from the health care professional side and same time patient also must realize the gravity of consequences of the disease and its effects on quality of life of individual and health economics and should feel like a individual responsibility.

In view of the above findings the present study was undertaken to know the prevalence, glycaemic control and biochemical lipid parametres among type 2 diabetes mellitus patients at Primary Health Care Centres of Urban Area of Buraidah city, Al Qassim province in Kingdom of Saudi Arabia.

AIMS AND OBJECTIVES

1. To find out the prevalence of type 2 diabetes mellitus among 35 years and above adults in urban population of Buraidah.
2. To determine the glycaemic control and biochemical lipid parametres among the study population.
3. To find the health education session and annual health checkups status in the study population.

MATERIALSAND METHODS

Study Design and Setting

This was a record based cross sectional study was carried out in 10 selected PHCC in Buraidah city, out of 44 PHC centers functioning under of Ministry of Health. These records are a well established medical record system, having health data of each and every patient in the form of file.

Study period

This study was conducted during the period of 6 months from 1st December to May 2018.

Target Population: All diabetic type 2 patients above 35 years old age registered in the primary health care centers in Buraidah city.

Sample Size

Sample size was calculated based on the previous prevalence studies in Saudi Arabia. prevalence of the previous study taken as 25% and by using following appropriate sample size calculation method.

Meta-analysis of prevalence of Diabetes Mellitus in Saudi Arabia was 25 per cent. This prevalence is considered to find out the sample size.

The formula used for the calculation of the sample size

$$N = 4PQ / L^2$$
$$N = 300$$

Using the above formula, the sample size estimate was 300.

Sampling method: 10 primary health centres were selected randomly out of 44 PHCC functioning in the Buraidah. Hence sampling method was Simple random sampling method.

Systematic random sampling method was used for the collection of sample in this study. Sampling interval was calculated by dividing the sample frame population with required sample size, so every Nth individual was taken in to the study from the available records.

Sampling procedure

After selection of concerned Primary health care centre, visited to director health care centre, in charge of record room in Primary health care centre. Explained about study importance and objectives. After getting formal consent, visited too file room, above 35 yrs files from the Type 2 Diabetes Mellitus files were segregated both male and female sections. After that requirement of sample in each PHCC was about 30. Based on the availability of files and requirement of sample, systematic random sample was used for the individual files till the requirement of sample files. Systematic random sampling method was used for the collection of sample in this study. Sampling interval was calculated by dividing the sample frame population with required sample size, so every 2th individual, some PHCC every 3rd or 4th was taken in to the study from the available records and also depends upon the number of required sample availability.

Diagnosed and registered diabetic type 2 patients, aged more than or equal to 35 years in the respective PHC centers, during six months data collection period i.e from December 2017 to May 2018 were selected for the study.

Exclusion criteria

Diabetic patients with type 1 and all patients aged below 35 years old were excluded from the study.

Inclusion Criteria: All the type 2 Diabetes Mellitus above 35 years age group people who registered in the Primary Health care centres.

Ethical clearance

Institutional Ethical Committee (IEC) certificate was obtained from the Regional Ethics committee, Al Qassim region.

Lipid profile: Lipid profile was recorded only for triglyceride and cholesterol levels in mmol/dl and later converted to value in mg/dl.

HbA1c: HbA1c was recorded in percent %.

Health education: was recorded based on if the patient received health education or not.

Annual screening: was recorded based on if the patient been screened annually or not.

The prevalence rate is defined as number of patients with Type 2 diabetes Mellitus among 35 years and above divided by number of visitors at same age group to the primary health care centers selected in this study.

Number of patients with Type 2 diabetes Mellitus among 35 years and above

$$\text{Prevalence rate (\%)} = \frac{\text{Number of patients with Type 2 diabetes Mellitus among 35 years and above}}{\text{number of visitors at same age group to the primary health care centers selected in this study}} \times 100$$

number of visitors at same age group to the primary health care centers selected in this study

Data analysis: Statistical analysis was done by using the statistical software spss -21.0 version. Necessary statistical tests like simple proportions and chi square tests were applied at 95% confidence limits.

RESULTS

1. Prevalence of type 2 Diabetes Mellitus in different PHCC of Buraidah city.

PHC name	Number visited	Number of diabetic population	Prevalence
Hayal Akhdar, PHC	2207	405	18.35%
Faiziah, PHC	1844	340	18.4%
Rafea, PHC	3067	560	18.2%
Khudera, PHC	1420	179	12.6%
Saddah, PHC	3976	445	11.19%
Rayan East, PHC	3600	810	22.5%
Al Dhahi, PHC	3000	550	18.3%
Eskan, PHC	4296	443	10.31 %
Salmia, PHC	1873	252	13.4%
Safa, PHC	1064	239	22.4%
Total	26347	4223	16.02%

Table 1 revealed that in the present study, about 10 primary health centres data collection done in relation to number of Diabetic patients above 35 years age group were visited to the concerned PHCC during the period from December to May 2018 period. All the information taken from the records maintenance room of concerned PHCC.

Highest prevalence of type 2 diabetes mellitus among 35 years age group was reported from the Rayan east, Primary health care centre, which was 22.5% and lowest prevalence of type 2 diabetes mellitus among 35 years age group was reported from the Eskan, Primary health care centre, which was 10.31%. Average prevalence of type 2 Diabetes mellitus in all the 10 primary health care centres of Buraidah city was 16.02%.

2. Triglycerides status in diabetes study population

Triglycerides	Diabetes without complications	Diabetes with complications	Total
Normal	194 (92.3%)	16 (7.7%)	210 (100%)
Abnormal	85 (94.4%)	5 (5.6%)	90 (100%)
Total	279 (93%)	21 (7%)	300 (100%)

$\chi^2=0.412$, 1df, P=0.52.

Table 2 depicts that there was 30% (90/300) were having abnormal triglycerides level. Of which, 5.6% were having diabetes complications. As the Diabetes complications number itself is less.

3. Serum cholesterol status in diabetes study population at PHCC records

Serum cholesterol	Diabetes without complications	Diabetes with complications	Total
Normal	205 (91.9%)	18 (8.1%)	223 (100%)
Abnormal	74 (96.1%)	3 (3.9%)	77 (100%)
Total	279 (93%)	21 (7%)	300 (100%)

χ^2 -1.53, 1df, P-0.21.

Table 3 highlighted that there was 25.6% (77/300) were having abnormal cholesterol level. Of which, 3.9% were having diabetes complications.

4. Glycosylated haemoglobin (HBA1C) status in diabetes study population.

Glycosylated haemoglobin	Diabetes without complications	Diabetes with complications	Total
Normal	66 (90.4%)	7 (9.6%)	73 (100%)
Abnormal	213 (93.8%)	14 (6.2%)	227 (100%)
Total	279 (93%)	21 (7%)	300 (100%)

χ^2 -0.99, 1df, P-0.31.

Table 4 revealed that there was 75.6% (227/300) were having abnormal glycosylated haemoglobin level. Of which, 6.2% were having diabetes complications.

5. Health education versus diabetes mellitus.

Health education	Diabetes without complications	Diabetes with complications	Total
Yes	270 (92.7%)	21 (7.3%)	291 (100%)
No	9 (100%)	0 (0%)	9 (100%)
Total	279 (93%)	21 (7%)	300 (100%)

χ^2 -0.69, 1df, P-0.40.

Table 5 stated that there was 97% (291/300) were receiving health education regarding diabetes. Of which, 7.3% were having diabetes complications.

6. Annual health Check up versus diabetes mellitus.

Annual health Check up	Diabetes without complications	Diabetes with complications	Total
Yes	222 (92.1%)	19 (7.9%)	241 (100%)
No	57 (96.6%)	2 (3.4%)	59 (100%)
Total	279 (93%)	21 (7%)	300 (100%)

χ^2 -1.47, 1df, P-0.22.

Table 6 revealed that there was 80.3% (241/300) were receiving annual health check up regarding diabetes. Of which, 7.9% were having diabetes complications.

DISCUSSION

The present study was a Primary health Care centre based cross sectional record review study conducted during the period from December 2017 to May 2018, aimed at identifying the prevalence of type 2 diabetes mellitus and other health related factors like lipid profile status associations with Type 2 Diabetes Mellitus.

In the present study, Average prevalence of type 2 Diabetes mellitus in all the 10 primary health care centres of Buraidah city was 16.02%. Mustafa N, Kushwaha S et al.^[5] (2012) in a study among 20 years and above people in jabalpur revealed a prevalence of 18%. Gupta R et al (2007) found the prevalence in their study in jaipur as 18%. According to Bai PV et al^[6] the prevalence was found to be 17.4% in Chennai Urban Population. Kutty VR, Soman CR et al^[7] reported a prevalence of 16.3 per cent in Thiruvananthapuram in Kerala State. Wesk SK et al^[8] found the prevalence of type 2 diabetes mellitus was 21.4% in Mexican-American population. Butler JV, Whittington JE et al^[9] conducted a study in UK and the prevalence was found to be 25%. More prevalence of Diabetes mellitus was observed in the study conducted among patients attending a primary care clinic in June 2009 by Khalid A. Alqurashi, Khalid S. Aljabri, and Samia A. Bokhari et al^[10] in Saudi Arabia revealed as Prevalence of diabetes mellitus 34.1% in males and 27.6% in females ($P < .0001$).

Similar findings were observed in the study done by Ramachandran A, Snehalatha C et al (2001)^[11] conducted the National Urban Diabetes Survey (NUDS) investigated prevalence of diabetes in 6 large metropolitan cities (“metros”) of India in 2001. The National Urban Diabetes Survey (NUDS), a population based study was conducted in six metropolitan cities across India reported that the age standardized prevalence of type 2 diabetes was 12.1 per cent. This study also revealed that the prevalence in the southern part of India to be higher- 13.5 per cent in Chennai, 12.4 per cent, in Bangalore, and 16.6 per cent Hyderabad; compared to eastern India (Kolkatta), 11.7 per cent; northern India (New Delhi), 11.6 per cent; and western India (Mumbai), 9.3 per cent. Study conducted in Saudi Arabia by Khalid A. Alqurashi, Khalid S. Aljabri, and Samia A. Bokhari et al revealed that among 6024 patients in primary health centres in the year 2009 and revealed the prevalence of Diabetes mellitus as 30%.^[11]

On the other hand some researchers have observed lower prevalence. Mohan V et al (2009) observed a prevalence of 5.6%. The population based study of Zarger et al^[12] in Kashmir valley, the prevalence was found to be 6.1%. The differences of prevalence observed in the

above studies were conducted in different parts of world and considerable variations may be due to socio cultural, ethnic, genetic, life style and environmental changes.

In the study population, there was 30% (90/300) were having abnormal triglycerides level. In the present study, there was 25.6% (77/300) were having abnormal cholesterol level. In the study population, there was 75.6% (227/300) were having abnormal glycosylated haemoglobin level. In the current study, sample size is less and also diabetes complications people were also very less and due to this insignificant association was found.

Significant associations were found between serum cholesterol, triglycerides and glycaemic status control versus diabetes mellitus in the following study conducted by Khalid S. Aljabri, Samia A. Bokhari and Ahmad Akl et al^[14] conducted a study among Saudi adults as the relation between Plasma Lipids in Saudi Adults with Type 2 Diabetes. A cross sectional study was conducted at the Primary Health Care Clinics at King Fahad Armed Forces Hospital, Jeddah, Saudi Arabia. Patients were subjected to investigations of glycosylated hemoglobin (HbA1c) and fasting serum lipids. The diabetic patients were older, had higher Serum triglyceride and HbA1c values were significantly higher when compared to non-diabetic subjects. Whereas, total cholesterol, LDL and HDL were significantly lower in diabetics. The prevalence of high HDL cholesterol levels in men and women with diabetes mellitus (25% and 27%, respectively) did not differ significantly ($p=0.7$) from the rates in non diabetic men and women (23% and 25%, respectively). By contrast, the prevalence of high plasma triglyceride levels in individuals with diabetes mellitus (30% in men and 32% in women) was significantly higher than in those without diabetes mellitus (21% of men and 16% of women), $p=0.02$. The study revealed that dyslipidemia was high among diabetic patients and required special attention. This can be done through health education at the primary care level and the diabetic clinics.

In the study population based on the records, there was 97% were receiving health education regarding diabetes. Other study conducted in Saudi Arabia by Abdullah M. Al-Shahrani, Asim Hassan, Khalid A. Al-Rubeaan, Ahmad H. Al Sharqawi, Najlaa A. Ahmad et al^[15] conducted a study as Effects of diabetes education program on metabolic control among Saudi type 2 diabetic patients. This study concluded that intensive education program provided by a trained professional healthcare team is an effective approach and reinforces the need for implementing such education program as an essential part for metabolic control among diabetic patients.

In the present study, there was 80.3% were receiving annual health check up regarding diabetes. Study done by Thamer A. Alsulaiman, Hejab A. Al-Ajmi, Saeed M. Al-Qahtani, Intisar M. Fadlallah, Nashwa E. Nawar, Reem E. Shukerallah, Tamer M. Kolib et al conducted a study in Saudi Arabia^[16] Control of type 2 diabetes in King Abdulaziz Housing City (Iskan) population, Saudi Arabia to assess the level of control and prevalence of type 2 diabetes in relation to annual health check up at King Abdulaziz Housing City (Iskan) population of Saudi Arabia. The rate of uncontrolled diabetes was 59.3%. Males were more likely to have uncontrolled diabetes. This study concluded that the overall prevalence of type 2 diabetes in our community seems lower than the previously reported national figures. An alarming number of diabetics in our population have an uncontrolled disease. More stringent diabetes annual review and recall program is needed to control diabetes and reduce complications.

Another study done in India by Mehrotra R, Bajaj S et al^[17] conducted a population based study in Allahabad (UP) to assess the importance of education and occupation in relation to knowledge about good control of diabetes. A positive impact of education on overall knowledge levels was observed. However, they have given an impression of knowledge regarding self-care of diabetes in all educational and occupational categories. This calls for an urgent need to create greater public awareness. This study may serve as a guideline for developing an educational package for different subsections of the community. At the outset our study was record based study, small sample size and number of people having diabetes complications were less and making statistical associations not appropriate. But, sometimes record based studies will give some insight about recording system and that itself helpful for maintaining good record system for further improvement.

CONCLUSIONS

Based on the study results, prevalence was not high comparatively other studies reported in the Kingdom of Saudi Arabia. Majority of the study population was not having adequate glycaemic control and also high dyslipidaemia was noticed among type 2 Diabetic population. In spite of receiving annual check up and health education sessions at the primary health care centres. Hence, need to take it as a challenge to improve the good glycaemic control and it also depends upon the patient motivation and health care team responsibility. As our sample is less, secondly we can compare with normal population would be best option rather than comparing with diabetes complications individuals as complications reported

number itself is less and also reliability of complications identified by basic physician need to be ratified. Need large sample similar studies are required to substantiate present study findings in the general population. Periodical reorientation program about the approach to the care of the diabetic patient and data management and complications of Diabetes identification by the medical officers in the primary health care centres to be encouraged and continued provided adequate training of Diabetes management.

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REFERENCES

1. Robert AA, Al Dawish MA, Braham R, Musallam MA, Al Hayek AA, Al Kahtany NH. Type 2 Diabetes Mellitus in Saudi Arabia: Major Challenges and Possible Solutions. *Curr Diabetes Rev.*, 2017; 13(1): 59-64.
2. International Diabetes Federation. IDF Diabetes Atlas, 6th ed. & 4th ed. Brussels, Belgium: International Diabetes Federation, 2013.
3. Zimmet PZ. Diabetes Epidemiology as a tool to trigger diabetes research and care. *Diabetologia*, 1999; 42: 499-518.
4. Roglic G, Unwin N. Mortality attributable to diabetes: estimates for the year 2010. *Diabetes Res Clin Pract*, 2010; 87(1): 15-19.
5. Mustafa, Nusra, and Sandeep Kushwaha et al, "Prevalence of Diabetes mellitus in the urban population of Jabalpur district, India." *Current Biotica*, 2012; 6.3: 364-369.
6. Bai PV, Murthy BN, Chellamariappan M, Gupte MD, Krishnaswami CV et al, Prevalence of known diabetes in Chennai City. *J Assoc Physicians India*, 2000; 49: 974-81. 15.
7. Kutty VR, Soman Cr et al, Random capillary blood sugar and coronary risk factors in a south Kerala population. *J Cardiovasc Risk*, Dec, 2002; 9(6): 361-7.
8. SK West, B Munoz, R Klein, AT Broman et al, Risk factors for type ii diabetes and diabetic retinopathy in a mexican-american population, 2002.
9. Butler, J. V., Whittington, J. E., Holland, A. J., Boer, H., Clarke, D., & Webb, T. Prevalence of, and risk factors for, physical ill-health in people with Prader-Willi syndrome: a population-based study. *Developmental medicine and child neurology*, 2002; 44(4): 248-255.

10. Khalid A. Alqurashi, Khalid S. Aljabri, and Samia A. Bokhari, Prevalence of diabetes mellitus in a Saudi community. *Annals of Saudi Medicine*, 2011; 31(1): 19.
11. Ramachandran A Snehalatha C et al National Urban diabetes survey, *Diabetologia*, 2001; 44: 1999–101.
12. Zargar, Abdul Hamid, et al. "Prevalence of type 2 diabetes mellitus and impaired glucose tolerance in the Kashmir Valley of the Indian subcontinent." *Diabetes research and clinical practice*, 2000; 47.2: 135-146.
13. Ramachandran A. (Chennai), Epidemiology of type 2 diabetes in Indians. *J Indian Med Assoc*, Jul, 2002; 100(7): 425-7.
14. Khalid S Aljabri, J, Samia A. Bokhari, and Ahmad Akl. "The relation between overweight, obesity and plasma lipids in Saudi adults with type 2 diabetes." *Journal of Health Specialties*", 2016; 4.2: 140.
15. Abdullah M. Al-Shahrani¹, Asim Hassan², Khalid A. Al-Rubeaan³, Ahmad H. Al Sharqawi⁴, Najlaa A. Ahmad⁵, Effects of diabetes education program on metabolic control among Saudi type 2 diabetic patients; *Pak J Med Sciences*, 2012; 28(5): 925-930.
16. Thamer A, Alsulaiman,., et al. "Control of type 2 diabetes in King Abdulaziz Housing City (Iskan) population, Saudi Arabia." *Journal of family & community medicine*, 2016; 23.1: 1.
17. Mehrotra R, Bajaj S et al Influence of education and occupation on knowledge about diabetes control. *Natl Med J India*, Nov-Dec, 2000; 13(6): 293-6.