

## A Retrospective Review of Anti-Diabetic Regimens in Geriatric Emirati Patients with Type 2 Diabetes and Its Relation to Glycemic Control: A Dubai Hospital Outpatient Clinic Experience

Ishma Aijazi<sup>1</sup>, Beyla Jamil Zuberi<sup>1</sup>, Hina Zia Mirza<sup>1</sup>, Mayank Vats<sup>2\*</sup>, Asadullah Nawazani<sup>1</sup> and Mohammad Kamal Mahgoub<sup>1</sup>

<sup>1</sup>Department of internal medicine, Dubai hospital, Dubai, UAE

<sup>2</sup>Department of Respiratory and Sleep medicine, Rashid hospital, Dubai, UAE

\*Corresponding author: Mayank Vats, Department of Respiratory and Sleep medicine, Rashid hospital, Dubai, UAE, Tel: 971558825307; E-mail: drmayankvats@gmail.com

Received date: February 27, 2017; Accepted date: June 06, 2017; Published date: June 13, 2017

Copyright: © 2017 Aijazi I, et al. This is an open-access article distributed under the terms of the creative commons attribution license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

### Abstract

Geriatric population is a special subset of adult population with different needs as there are physiological changes that occur with aging, that lead to a decline in patient's overall performance functional disabilities and, cognitive impairment,

We reviewed the various anti diabetic regimes in Emirati geriatric patients with type 2 diabetes following outpatient medical clinics. In a view to find optimum anti-diabetic regime which is more suitable and acceptable to the patients with minimum side effects. We believe that patients following in government hospitals would be a true representation of whole subset of Emirati geriatric population and hence any results obtained could be a reflection of entire Emirati geriatric population. Medical records of 350 Emirati type 2 diabetic patients age above 65 were reviewed. HBAIC at the clinic visit was noted and they were retrospectively followed up as to see which anti diabetic regime these patients were on for the preceding 3 months. Patients were divided accordingly into 4 groups namely. a) Those on oral hypoglycemic, b) oral hypoglycemic plus basal insulin, c) premix insulin and d) basal insulin bolus. Mean HBAIC was compared amongst the various age groups.

### Conclusion

350 patients were following medical clinics, 16 patients were excluded. Out of the remaining 334 patients 224 were females and 110 were males. Patients were divided into 2 groups according to age. Patients less than 70 years of age were 121 (36.2%) and patients greater than 70 years of age were 213 (63.8%).

Patients in both these age groups had uncontrolled blood sugars. HBAIC 8.1% vs. HBAIC 7.76% in patients less than 70 year's vs. patients greater than 70 years age). In higher age groups HBAIC was better controlled as compared to lesser age groups reflecting better care of elderly in the Emirati society.

Most patients were on oral hypoglycemic as compared to insulin (60.5% vs. 21.6%). Both males and females were better controlled on oral medication as compared to insulin (HBAIC 7.58% males and HBAIC 7.69% in females on oral medications). Sulfonyl urea and metformin being the most popular oral medications used. Only 21.6% were on insulin reflecting increase needle phobia in the elderly age groups.

**Keywords** Diabetes in elderly; Geriatrics; Emirati population

### Introduction

The number of elderly patients with type 2 diabetes is continuously growing and is approximately 20% in people above age of 75 years [1,2]. The number of U.A.E local patients (Emirati) over 60 has increased by 22 per cent in last five years, from 32,400 in 2005 to about 39,400 in 2010, and the Ministry of Health expects it to pass 47,000 by 2020.

Elderly diabetics have a much higher risk of micro and macro vascular complications as compared to their younger counterparts including higher prevalence of cardiovascular disease [3,4]. Also they have increased morbidity and mortality compared with elderly non-

diabetics [5]. In addition, they have more functional disabilities, and hypoglycemia risk, cognitive impairment, depression [6-8], urinary incontinence, persistent pain [9] and risk of falls. Diabetic complications which are more common to this age group include, pain ful diabetic neuropathy, cachexia, muscle wasting malignant otitis externa, renal papillary necrosis and osteoporosis.

Due to the above-mentioned issues, choosing the optimal anti-diabetic medications can be extremely challenging because there may be multiple drug interactions, increase risk of hypoglycemia and different degree of frailty.

This study is unique in the sense that there are only few previous studies available, which are solely focusing on geriatric population in UAE. There is also in sufficient data available on type 2 diabetics who are greater than 75 years of age. Till now there is no consensus as to

which is the ideal anti diabetic regimen for elderly diabetics. A few studies have been done in western world, but we need to focus on the local population of UAE because of different social, cultural, psychological makeup and dietary habits [10].

## Objective

The objective of this study is to review the different regimens used for management of type 2 diabetes in Geriatric Emirati population attending Medical and endocrine clinics at Dubai Hospital. These patients have been followed up for a period of 3 months to assess the glycemic control in various age groups

## Methods

We screened the medical records of 350 Emirati patients with type 2 diabetes who were above the age of 65 years and had attended medical clinics between June 2016 till December 2016.

This is a retrospective direct observational study. The data was collected on excel sheet. It included age, sex, HbA1c, the most recent fasting and random blood sugars of the patient done at the clinic visit. It also included patient's current medications namely Aspirin, Angiotensin receptor blockers/Angiotensin converting enzyme inhibitor or Statin and the current anti diabetic regime used. .

These patients were retrospectively followed up as to which anti diabetic regime they were on for the preceding three months. The anti-diabetic regimes were divided into 4 sub-groups namely. a) those on oral hypoglycemic, b) oral hypoglycemic plus basal insulin, c) premix insulin and d) basal bolus.

Type 2 diabetics with end stage kidney disease requiring dialysis, diabetes only controlled on diet were also excluded. Those diabetics who had changed or stopped their anti-diabetic medications within 3 months of initiation due to intolerance or development of adverse effects were also not taken into consideration

Data was recorded on excel sheet and SPSS VS 18 was used for analyses [11].

All HbA1c was measured in Dubai Hospital biochemistry lab using "Turbidimetric inhibition immune assay method". Fasting blood sugar and random blood sugar was measured using "synchron system".

## Results

Total 350 patients were recruited out of which 16 patients were excluded because they had stopped or changed the anti-diabetic medications within 3 months of initiation. Out of the remaining 334 patients, 224 were females and 110 were males (Table 1).

Patients less than 70 yrs. of age were 121 (36.2%). Mean age in this age group was 63 years. 29 (24%) patients had HbA1c less than 7, while 92 (76%) had HbA1c greater than 7%. The mean HbA1c in this age group was 8.1.

Patients above 70 years of age were 213 (63.8%). Mean age in this group was 77.6 years. In patients above 70 years of age, HbA1c of less than 7 was noted in 74 (34.7%) while 139(65.3%) had HbA1c more than 7%. Mean HbA1c was 7.76% in this age group.

In patients less than 70, mean fasting blood sugars and random blood sugars were 140 mg/dl and 175 mg/dl respectively [12]. While in

the greater than 70 years age group the average fasting blood sugar 135 mg/dl and average random blood sugar 169 mg/dl.

Total no of patients	350	Percentage s
Total No of Patients (fulfilling the inclusion/exclusion criteria)	334	
Female	224	[67.1]
Male	110	[32.8]
Age >70 Years	213	63.8%
Age <70 Years	121	36.2%
Patients on Oral Hypoglycemics	202	60.20%
Patients on Sulfonyl Urea	151	74.80%
PATIENTS ON TZD (Thiazolidinedione, TZD Group)	122	60.30%
Patients on Metformin	163	80.70%
Total No of Patients on Insulin	72	
Total No : of Patients on Premix Insulin	31	44%
Total No: of Patients on Basal Bolus Regime	41	57%
Total No: of Patients on Oral + Basal Insulin	19	26%
Concurrent Medications		
Aspirin	141	42%
ARB/ACE*	251	74.90%
Statins	311	92.80%
Average Hba1c **	MALE	FEMALE
Oral Medications	7.58%	7.69%
Insulin	8.90%	8.69%
Premix	8.64%	8.46%
Basal Bolus	8.16%	8.39%
Oral + Basal	7.9%	8.03%
*Angiotensin receptor blockers/Angiotensin converting enzyme inhibitor		

**Table 1:** Patient demographics.

202 patients (60.5%) were only on oral medication. Total number of patients on insulin was 72 (21.6%). Out of those patients 31 were on premix and 41 on basal bolus while 19 patients were on oral agents and basal insulin.

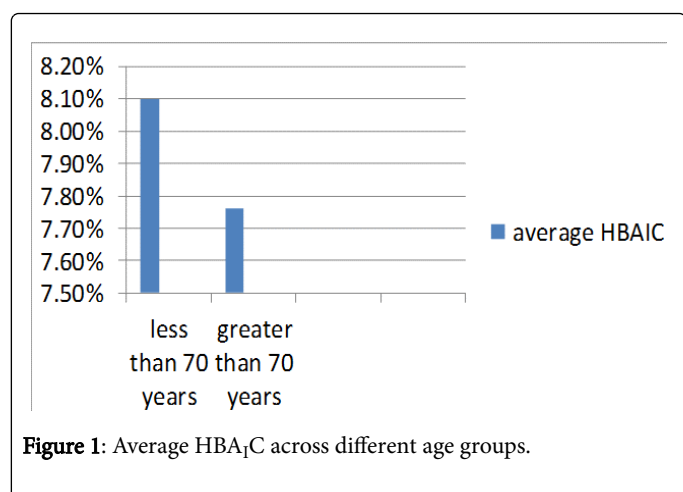
141(42.2%) patients were on Aspirin, 251(75%) on ARB/ ACEI while 311(93%) on statins.

Average HbA1c on oral medication was 7.58 in males and 7.69 in females. On all insulin regimens, average HbA1c was 8.90 in males and 8.69 in females [13]. On premix insulin HbA1c is 8.64 in males and 8.46 in females, on basal bolus regimen average HbA1c was 8.16 in males and 8.39 in females, while average HbA1c on oral + basal is 7.9 in males and females 8.03.

## Discussion

In our study more than half of our population (63.8%) is of age greater than 70 years this study shows that there is significant differences in the glycemic control in terms of HbA1c in the two age groups. In both age groups, it is observed that a large proportion of patients were not controlled to target. They had HbA1c >7% in the less than 70 year age group 92 (76%) had HbA1c greater than 7%, while in greater than 70 age group, 139 (65.3%) had HbA1c >7. It seems that a large number of patients 60.2% are on oral medications only and the best glycemic control obtained is on oral medications both in males and in females ( HbA1c 7.58% vs. HbA1c of 7.69%). In our study, it is to be noted that more than half of our population (63.8%) is very elderly (>70 years of age) [14].

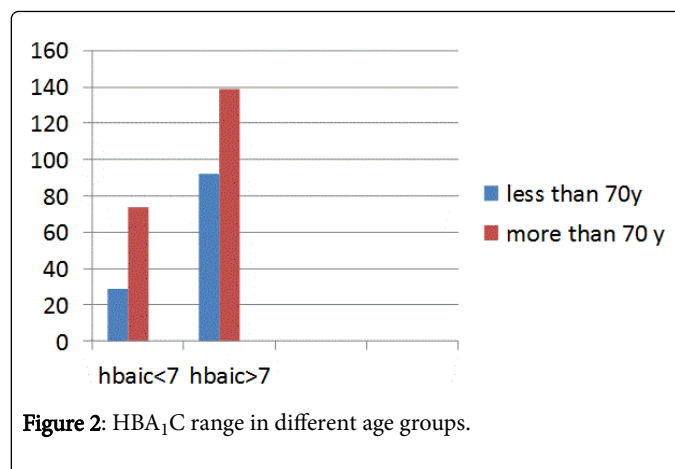
This is important because there is very limited data on management of type 2 diabetics in very elderly. Our data reveals an average HbA1c of 8.1 in diabetics less than 70 years of age while in Diabetics greater than 70 years the average is HbA1c 7.7 (Figure 1). This is in accordance with the recommendations of American Geriatric society guidelines, which recommends an HbA1c of 7-7.9. But recent studies have shown that in very elderly diabetics who are community dwellers (nursing home eligible) it is seen that HbA1c of 8-8.9% has better clinical outcomes than HbA1c targets of less than 8 [15]. In a retrospective cohort study on 71,092 patients with Diabetes aged more than 60 years conducted in USA, a U-shaped relationship was found between A1c and mortality. It concluded that HbA1c of <6 is associated with increased mortality in elderly as compared to target HbA1c of >8 [16].



**Figure 1:** Average HbA<sub>1c</sub> across different age groups.

Our data also shows that in the very elderly sub group, 34.7% had HbA1c less than 7. This control of diabetes is too tight for this frail and functionally dependent population.

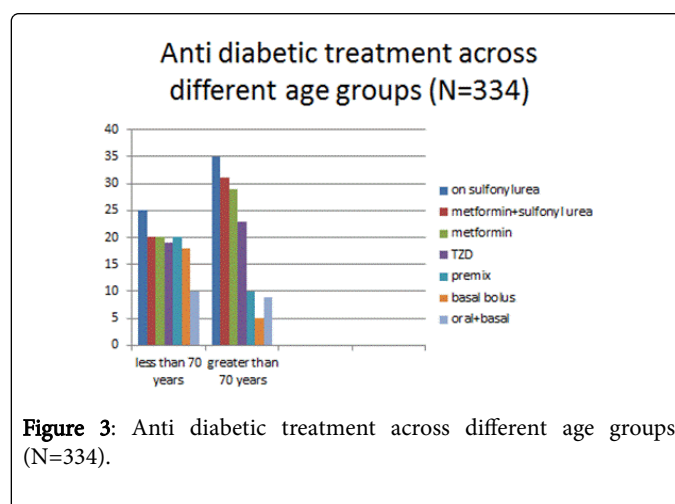
This is a strong reflection of Emirati cultural practices and traditions. The most elderly group i.e. >70 years of age have more care and support system at home (Figure 2). Even the demented and bedridden patients are being taken care of at home. They are treated with frequent blood sugar monitoring and multiple injection (Insulin) doses by home care givers so their blood glucose is well controlled. Secondly, because of the improved health care systems there is an increase in average life expectancy of the Emirati population. Hence, in very elderly and frail the anti-diabetic treatment should be adjusted to keep a higher HbA1c and also they should not be prescribed a diabetic diet since this would be of no benefit for glycemic control and impinge on the quality of life [17].



**Figure 2:** HbA<sub>1c</sub> range in different age groups.

In our data set, majority of the patients are on oral hypoglycemic (60.20%) This reflects a relative apprehension in elderly people to start any injectable treatment. Most elderly diabetics do not like to be shifted to insulin so they continue on oral hypoglycemic even on high HbA1c. Only 21.5% of our patient population was on insulin. It is seen that Insulin is underutilized in elderly diabetics due of fear of injection. Although, since the long acting insulins have become available, more patients can be put on long acting insulins as monotherapy or as addition to oral hypoglycemic.

Of the patients who are on oral hypoglycemic, 80.7% are on metformin and 74.8% on sulfonylureas. Sulfonylureas have an increased risk of hypoglycemia and hence should be avoided in elderly diabetics except second generation of sulfonylureas that have been associated with lower rates of hypoglycemia, because of shorter half-life [18]. Metformin is safe to use in the elderly up to 70 years of age [19], however literature review reveals that metformin should be avoided in patients greater than 80-year-old or in frail since it produces anorexia [20] and because these patients are at higher risk of developing protein energy mal nutrition. There should be vigilant monitoring for weight loss and serum albumin levels. Repaglinide can be a better alternative as they are short acting and has less hypoglycemia but needs multiple dosing because of erratic eating schedules and has cost issues (Figure 3) [20].



**Figure 3:** Anti diabetic treatment across different age groups (N=334).

DPP-4 inhibitors however, are weight neutral and do not cause hypoglycemia. Many studies have shown that DPP4 inhibitors are a

very good choice in elderly population [21], however long-term safety effects are still unknown. They are relatively expensive and most of them are excreted by the kidneys and require dose adjustment for renal impairment [22]

We know that elderly diabetics have a greater degree of physical disability, cognitive impairment and poor functional reserve. Hence treatment of type 2 diabetic in this population is a unique challenge. Our study is only one of the very few studies done in this age group, and also in the Emirati population which have different social and cultural practices as compared to the western population. Hypoglycemia is one of the most important problem, in this age group, its incidence increases with age and it is associated with an increase in mortality and increase in length of hospital stay. In our study we did not document hypoglycemic episodes which patients had on each regime.

Other shortcoming of our study was that the weight and body mass index of these patients were not recorded which was needed because with increasing age there is a constant decline of physiological reserves of multiple organs (known as frailty). Clinically this leads to increase vulnerability to environmental and internal stress. The life expectancy in the frail elderly is limited and there is increased risk of hypoglycemia in diabetics, therefore a less aggressive approach to glucose control is warranted.

There is increase insulin resistance with advancing age, impaired insulin secretion, elevated amylin which in turn is associated with delayed return of glucose to base line. There is age related decline in pancreatic function and decrease in islet cell capacity to proliferate. Together with this there is age related decline in renal function tests. All these are additional factors that contribute to an impaired glucose control, leading to higher fasting and post prandial glucose as in our patients. Poly pharmacy, multiple interactions, erratic nutritional habits all makes elderly more prone to hyper and hypoglycemic episodes.

Also in our study baseline HBAIC at which the different anti diabetic regime were started was not recorded so we cannot compare that which anti diabetic regime proves to be most efficient.

## Conclusion

In conclusion Oral hypoglycemic are more popular in elderly diabetics, because of fear of injection. Metformin and sulfonyl urea seems to be the most popular medication in use despite the introduction of the newer anti diabetic agents like DPP4 inhibitors and SGLT2 analogues.

We need to change the trend and educate the elderly diabetics more about these medications so that they are ready to accept a change and to make them disregard the "old is gold" idiom about the time tested metformin and sulfonylureas. Also keeping in mind the concept of frailty and cognitive decline, the control of blood sugar should be more flexible, medication should be minimized to avoid hypoglycemic episodes and the issue about compliance should be kept in mind. Although there is no consensus on a preferred treatment, but the above mentioned principles of management should be kept in mind. Aggressive dietary management strategies should be avoided in the very frail and a comprehensive diabetic education program should be instituted in the very elderly population in which home care providers are included.

Hence, we feel that more research is needed to fully understand the impact of diabetes on this expanding complex population segment.

## Acknowledgement

We sincerely convey our thanks and appreciation to Mr. Raja Kathamuthu, Dubai hospital for providing help in this research study.

## References

1. Cowie CC, Rust KF, Ford ES, Eberhardt MS, Byrd-Holt DD, et al. (2009) Full accounting of diabetes and pre-diabetes in the U.S. population in 1988-1994 and 2005-2006. *Diabetes Care* 32: 287-294.
2. Zhang X, Decker FH, Luo H, Geiss LS, Pearson WS, et al. (2010) Trends in the prevalence and comorbidities of diabetes mellitus in nursing home residents in the United States: 1995-2004. *J Am Geriatr Soc* 58: 724-730.
3. Ligthelm RJ, Kaiser M, Vora J, Yale JF (2012) Insulin use in elderly adults: risk of hypoglycemia and strategies for care. *J Am Geriatr Soc* 60: 1564-1570.
4. Mooradian AD, Perryman K, Fitten J, Kavonian GD, Morley JE (1988) Cortical function in elderly non-insulin dependent diabetic patients. Behavioral and electrophysiologic studies. *Arch Intern Med* 148: 2369.
5. Bethel MA, Sloan FA, Belsky D, Feinglos MN (2007) Longitudinal incidence and prevalence of adverse outcomes of diabetes mellitus in elderly patients. *Arch Intern Med* 167: 921-927.
6. Kelsey JL, Browner WS, Seeley DG, Nevitt MC, Cummings SR (1992) Risk factors for fractures of the distal forearm and proximal humerus. The Study of Osteoporotic Fractures Research Group. *Am J Epidemiol* 135: 477-489.
7. Morley JE (1998) The elderly Type 2 diabetic patient: special considerations. *Diabet Med* 15 Suppl 4: S41-46.
8. Schwartz AV, Sellmeyer DE, Ensrud KE, Cauley JA, Tabor HK, et al. (2001) Older women with diabetes have an increased risk of fracture: a prospective study. *J Clin Endocrinol Metab* 86: 32-38.
9. Kirkman MS, Briscoe VJ, Clark N, Florez H, Haas LB, et al. (2012) Diabetes in older adults: a consensus report. *J Am Geriatr Soc* 60: 2342-2356.
10. Wachtel TJ (1990) The diabetic hyperosmolar state. *Clin Geriatr Med* 6: 797-806.
11. Turchin A, Matheny ME, Shubina M, Scanlon JV, Greenwood B, et al. (2009) Hypoglycemia and clinical outcomes in patients with diabetes hospitalized in the general ward. *Diabetes Care* 32: 1153-1157.
12. Topinková E (2008) Aging, disability and frailty. *Ann Nutr Metab* 52 Suppl 1: 6-11.
13. Canadian diabetes association (2008) Clinical practice guidelines for Prevention and Management of Diabetes in Canada. *Can j Diabetes* 32: pS1-201.
14. Migdal A, Yarandi SS, Smiley D, Umpierrez GE (2011) Update on diabetes in the elderly and in nursing home residents. *J Am Med Dir Assoc* 12: 627-632.
15. Yau CK, Eng C, Cenzer IS, Boscardin WJ, Rice-Trumble KLee SJ (2012) Glycosylated hemoglobin and functional decline in community dwelling nursing home-eligible elderly adults with diabetes mellitus. *J Am Geriatr Soc* 60: 1215-1221.
16. Huang ES, Liu JY, Moffet HH, John PM, Karter AJ (2011) Glycemic control, complications, and death in older diabetic patients: the diabetes and aging study. *Diabetes Care* 34: 1329-1336.
17. Coulston AM, Mandelbaum D, Reaven GM (1990) Dietary management of nursing home residents with non-insulin dependent diabetes mellitus. *Am J Clin Nutr* 51: 67-71.
18. Shorr RI, Ray WA, Daugherty JR, Griffin MR (1996) Individual sulfonylureas and serious hypoglycemia in older people. *J Am Geriatr Soc* 44: 751-755.

- 
19. Lee A, Morley JE (1998) Metformin decreases food consumption and induces weight loss in subjects with obesity with type II non-insulin-dependent diabetes. *Obes Res* 6: 47-53.
  20. Kirkman MS, Briscoe VJ, Clark N, Florez H, Haas LB, et al. (2012) Diabetes in older adults: a consensus report. *J Am Geriatr Soc* 60: 2342-2356.
  21. Brazilai N, Guo H, Mahoney EM, Caporossi S, Gregory T, et al. (2011) Efficacy and tolerability of Sitagliptin monotherapy in elderly patients with type2 diabetes: a randomized, double blind, placebo controlled trial. *Curr Med Res Opinion* 27: 1049-1058.
  22. Demuth HU, McIntosh CH, Pederson RA (2005) Type 2 diabetes--therapy with dipeptidyl peptidase IV inhibitors. *Biochim Biophys Acta* 1751: 33-44.