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Original Research Article

To Study the Status of Diabetic Control in Older Patients According to Health Status (Robust, Vulnerable, Frail)

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Abstract

Background: Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Metabolic abnormalities in carbohydrates, lipids, and proteins result from the importance of insulin as an anabolic hormone. The major proportion of DM increase will mostly occur in developing countries of the world where the disorder predominantly affects younger adults in the economically productive age group.

Methods: This cross-sectional study was carried out at a tertiary care hospital, in central Rajasthan among 200 patients was studied in JLN Medical College and Hospital, Ajmer during the period of JAN 2020 to NOV 2021, after prior written and informed consent. Ethical approval was obtained from the Ethical Committee of this institution.

Result: Among 200 patients involved in the current study, 20% patients were on target in the frail group and 80% patients were over treated. 45.5% patients were on target in robust group and 55.6% patients were on target in vulnerable group. There is significant difference in patients who are on target, over and under target among 3 groups. The HbA1c ranged from 5.1 to 14.8%. The overall mean HBA1c was 8.1±2.53%. The mean HBA1c was more in vulnerable patients compared to robust and frail patients. It was least in frail patients. There is significant difference in HBA1c in between 3 groups.

Conclusion: As Frail group will be having multiple comorbidities, this group is most susceptible to complications of overtreatment (Hypoglycemia) and under treatment. So a less strict HbA1c target (8-8.5%) should be followed in this group.

Keywords: DM, HbA1C, Old Age, Robust, Vulnerable, Frail.

Introduction

Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Metabolic abnormalities in carbohydrates, lipids, and proteins result from the importance of insulin as an anabolic hormone. Low levels of insulin to achieve adequate response and/or insulin resistance of target tissues, mainly skeletal muscles, adipose tissue, and to a lesser extent, liver, at the level of insulin receptors, signal transduction system, and/or effectors enzymes or genes are responsible for these metabolic abnormalities. The severity of symptoms is due to the type and duration of diabetes [1].

Although hypoglycemia in older people (>75 years) with diabetes is common, its recognition can sometimes be difficult making diagnosis in this age group hesitant. For example, due to the predominance of neurological rather than autonomic symptoms, hypoglycemia may present with symptoms such as dizziness or visual fracas consequential in misdiagnosis [2].

DM prevalence, in general, is mounting worldwide, and is becoming an epidemic and endemic problem with the social and economic burden. However, its prevalence and its co-morbidities and mortality are advanced in elderly than in young people. According to Caspersen *et al*. diagnosed and/or undiagnosed. For the same authors, almost 8 from 10 old people have some form of dysglycemia according to different tests. This allows epidemiologists to classify DM with its complications as the most startling health problem of the current century in middle-aged people and elderly [3].

DM definition in old people is similar to the one of other people, which means fasting glycaemia ≥1.26 g/l (7.0 mmol/L) or glycemia after glucoseloading (75 g) ≥2 g/l (11.11 mmol/L). People with postprandial or post loading glycemia between the 1.40 and 1.99 g/l (7.78–11.06 mmol/L) suffer from a reduction in glucose tolerance [3].

There is ample proof of the economic, social, and health burden of diabetes in the elderly population. Despite this recognition, diabetes care of older people has been relatively neglected in the medical literature, with few reports oflarge randomized clinical trials in older patients [4].

The etiology of diabetes in India is multifactorial and also includes genetic factors coupled with environmental influences such as obesity associated with rising living standards, steady urban migration, and lifestyle changes and quality of living [5].

The major proportion of DM increase will mostly occur in developing countries of the world where the disorder predominantly affects younger adults in the economically productive age group [6].

Material and Methods

Study centre - The present study was conducted in tertiary care center Ajmer, after approval from ethical committee considering inclusion and exclusion criteria.

Sample Size:

For 95% confidence level (alpha=0.05), desired sample size is estimatedas under:

n=pq(Z/d)2

n= sample size needed

p= prevalence rate from earlier studies q=(1-p)

z=the value from the table of probabilities of standard normal distribution for desired level of confidence

d=allowable error

pacing values-

n= (0.30) x (0.70) x (1.96/0.07)2 = 164

Methods of collection of data

200 patients were studied in JLN Medical College and Hospital, Ajmer during the period of JAN 2020 to NOV 2021 or till sample size completed considering inclusion and exclusion criteria.

Inclusion criteria

All elderly Diabetic patients of age >60 years

Exclusion criteria

1. Patient who refuses to give consent.
2. Patient of <60 year
3. Newly diagnosed diabetic patients

Methodology

Elderly Diabetic patients was divided into 3 groups according to health status defined under guidelines of American Diabetic Association. There HbA1C Level is estimated and grouped under over treated or undertreatedor on target [1].

Group (11)	Definition	Over treatment	On target	Under treatment
A Robust	Healthy (nil or *few coexisting chronic illnesses orintact cognitive and functional status-MMSE>25)	<7%	7-7.5%	>7.5%
B Vulnerable	Complex/intermediate (**multiple coexisting chronic illness or mild to moderate cognitive impairment MMSE 18-24)	<7.5%	7.5-8%	>8%
C Frail	Very complex/Poor health (***end stage chronic illnessor moderate to severe cognitive impairment MMSE <18)	<8%	8-8.5%	>8.5%

* Coexisting chronic illness are conditions serious enough to require medications or lifestyle management and may include arthritis, cancer,congestive heart failure, depression, emphysema, falls, hypertension, incontinence, myocardial infarction, and stroke.

** Multiple means at least three

*** A single End Stage chronic illness such as Stage 3/4 congestive heart failure, chronic kidney disease requiring dialysis (estimated by GFR), Oxygen dependent Lung Diseases, Uncontrolled metastatic cancer, cirrhosis of liver

1. Information was collected through a preformed Performa from each patient after taking consent from patient and / or relative.
2. Qualifying patient was undergoing detailed history, clinical examination, routine investigation, special investigation.

Routine Investigation

1. CBC, ESR
2. Renal function test

3. Fasting & post prandial plasma glucose (glucose peroxidase method)
4. Serum electrolytes – Na, K, Cl
5. Urine complete
6. Lipid profile
7. ECG
8. X-ray chest PA view
9. Liver function test - serum bilirubin, SGOT, SGPT, ALP, serumalbumin, serum globulin
10. USG abdomen
11. Ophthalmoscopic examination
12. Other investigations (whenever required) like CT scan, MRI, Microbiological investigations like blood, urine culture, Serological inv,2D Echocardiography, NCV Study, Venous and arterial Doppler,Endoscopy)

Special investigations

1. HbA1C Level (HPLC)
2. Mini-mental scale examination

Statistics and data

Selected patients were divided into 3 groups who was undergo history, clinical examination followed by systemic examination. They were evaluated for various clinical profiles, routine investigation, special inv- HbA1C Level Based on the report of HbA_1C Patient was included under overtreatment or under treatment. The data was expressed in terms of median, rates, ratios and percentages.

Results

Table 1: R/V/F And Over/On /Under Over on Target Under Total

R/V/F	**Robust**	**N**	**22**	**62**	**70**	**154**
		%	14.30%	40.30%	45.50%	100.00%
	Vulnerable	N	6	10	20	36
		%	16.70%	27.80%	55.60%	100.00%
	Frail	N	8	2	0	10
		%	80.00%	20.00%	0.00%	100.00%
Total		N	28	82	90	200
		%	14.00%	41.00%	45.00%	100.00%

P Value=0.002 (S)

Among 200 patients involved in the current study, 20% patients were on target in the frail group and 80% patients were over treated. 45.5% patients were on target in robust group and 55.6% patients were on target in vulnerable group. There is significant difference in patients who are on target, over and under target among 3 groups.

Table 2: R/V/F And Hba1c

R/V/F	N	Mean	Std. Deviation	Minimum	Maximum	P-Value
Robust	154	8.05	2.24	5.1	14.7	0.005(S)
Vulnerable	36	8.92	2.53	5.9	14.8	
Frail	10	6.8	2.31	5.6	8.2	
Total	200	8.12	2.29	5.1	14.8	

Among 200 patients involved in the current study, the HbA1c ranged from 5.1 to 14.8%. The overall mean HBA1C was 8.1±2.53%. The mean HBA1C was more in vulnerable patients compared to robust and frail patients. It was least in frail patients. There is significant difference in HBA1C in between 3 groups.

Discussion

In Kasiukiewicz *et al*'s study [7], overall, 61.5% had an HbA1c level of less than7%. 32.2% had an HbA1c level of 7% to 8.9% and 6% had an HbA1c level of 9% or greater.

There were no significant differences in number of patients who attained tight control (HbA1c level, <7%), moderate (HbA1c level, 7%–8.9%) control, or poor (HbA1c level, ≥9%) glycemic control across three mentioned health status categories (*P* = .43)

In Iliana *et al* study [8], among study patients, the mean Hba1c was 6.9%. 66,341 (61.1%) patients had strict glycaemic control (below 7%) and 42,279 (38.9%) had conservative glycaemic control based on HbA1c levels (7.1– 8.5%).

In study done by Wojszel *et al*study[9] Two hundred thirteen patients were included (77.5% women; 49.3% 80+ year-old). 65.3% received sulfonylurea, 39,4%- metformin, 32.9%- insulin, and 4.2%- acarbose (in 61.5% as monotherapy, and in 38.5% combination therapy). We identified 130 patients (60%) as the denominator for the primary outcome measure; 73.1% had a HbA1C value ≤7.0% [53.3 mmol/mol], but 55.4% ≤6,5% [48.8 mmol/mol], and 40.8% ≤6.0% [42 mmol/mol].The results show a very high rate of tight glycemic control in older patients admitted to the geriatric ward, for whom higher HbA1C targets are recommended. This indicates the high probability of diabetes overtreatment in this group, associated with a high risk of recurrent hypoglycemia.

In Martial *et al* study, the mean HbA1c values ranged from 6.5% to 6.9% in the three cohorts. The overall mean HBA1C was 6.85%. The mean Hba1c in robust patients was 6.75%, 6.79% in vulnerable group and 6.93% in frail group.The mean Hba1c was 6.8% in Frail group, 8% in robust group, 8.92% in vulnerable group. The mean HBA1C was more in vulnerable patients compared to robust and frail patients. It was least in frail patients. There is significant difference in HBA1C in between 3 groups. (P=0.005) in the current study.

In the study by Libiseller *et al* (2021) [10], 444 patients were classified as overtreated (HbA1c ≤ 7.5%), on target (HbA1c ≥7.5 to ≤9%), or undertreated (HbA1c > 9%). Overtreatment and undertreatment were found in 60.5% and 12.6% of the study participants. In our study overtreatment was mainly seen in frail group, undertreatment in vulnerable group. Overall undertreatment andovertreatment was found in 45% and 14% in study participants which is almost similar to the above study.

In the current study 20% patients were ‑on target‖ in the frail group and 80% patients were over treated. 45.5% patients were on target in robust group and 55.6% patients were on target in vulnerable group. There is significant difference in patients who are on target, over and under target among 3 groups inthe current study. (p=0.002)

Conclusion

As Frail group will be having multiple comorbidities, this group is most susceptible to complications of overtreatment (Hypoglycemia) and under treatment. So, a less strict HbA1c target (8-8.5%) should be followed in this group. Also, Advice regarding regular follow up, physical activity and SMBG should be given.

Also, the data from the study proposes targeting different HbA1c inolder age group according to their health status.

However, further larger studies are needed to assess the target HbA1c in different age group populations.

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