Diabetes & Metabolic Syndrome: Clinical Research & Reviews 13 (2019) 1209–1212

Contents lists available at ScienceDirect

Diabetes & Metabolic Syndrome: Clinical Research & Reviews

journal homepage: www.elsevier.com/locate/dsx

Original Article

Prevalence and association of co-morbidities in diabetic patients along with prescription patterns in Delhi-NCT, India

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ARTICLE INFO

Article history:
Received 7 December 2018
Accepted 14 January 2019

Keywords:
Diabetes
Co-morbidities
Prescription patterns

ABSTRACT

Background: Diabetes is rising at an alarming rate in India and the national capital forms a significant part of the nation's diabetic population. The metabolic disorder is no more a disease specific to the rich countries but has also markedly spread its roots in middle-income countries.
Objective: To ascertain the prevalence of associated co-morbidities in the diabetic population of Delhi, a metropolitan city in India. Moreover, this study was conducted to help with adding information to the limited shreds of evidence of diabetes prevalence in Delhi along with the usually preferred therapies.
Materials and methods: A cross-sectional, observational, survey-based study was conducted on people (n = 798) of different age groups (18 years and above) belonging to different regions of Delhi. All subjects were enrolled after obtaining oral consent. Detailed information about clinical, demographic and metabolic profiles was obtained with the help of a pre-structured, open-ended questionnaire. The data were analyzed, and the correlation between diabetes and several other fields was drawn.
Results: Out of the 798 diabetic patients 458 (57.39%) were males and 340 (42.60%) were females. The presence of diabetes was higher in the age group of 50–60 years irrespective of the gender.
Co-morbidities: 54.13% of patients suffered with additional co-morbidities which is significantly high. The associated co-morbidities found in the survey included Hypertension, Hypothyroidism, Dyslipidemia, Obesity, Coronary Artery Diseases etc. About 30.57% of patients suffered from hypertension making it the most commonly associated co-morbidity. The other diseases included hypothyroidism (11.52%), Dyslipidemia (10.27%), Obesity (9.27%) etc.
Medication: Majority of patients i.e about 60.65% received oral hypoglycemic agents (including patients receiving both insulin and oral hypoglycemic agents). About 19.92% of patients were prescribed with insulin. 14.16% of patients were found to be following diet control and yoga with about 3.13% more females the males. A small percentage of patients (5.25%) were also following alternative systems (Ayurvedic/Unani/Homeopathic) of treatment. Overall, amongst oral hypoglycemic agents, the combination of metformin and DPP4 inhibitors (Vildagliptin, Sitagliptin) was being prescribed majorly i.e 16.41%.
Conclusion: The number of diabetic population is high in Delhi. It was evident that a significant percentage of diabetic patients suffered from additional diseases that may lead to worsening of the health conditions. Thus, there is an urgent need to educate and spread awareness amongst the masses about the potential benefits of lifestyle modifications like the incorporation of a healthy diet and physical activities. Additionally, continuous and regular tests should be taken to avoid further complications.

1. Introduction

The WHO definition identifies diabetes as a chronic, metabolic disease characterized by elevated levels of blood glucose (or blood sugar), which leads over time to serious damage to the heart, blood vessels, eyes, kidneys, and nerves. The type 1 or insulin-dependent diabetes occurs when the pancreas produces insufficient or no amounts of insulin while type 2 or insulin-independent diabetes occurs when the body is unable to utilize the available insulin efficiently.

The WHO database indicates the presence of 422 million diabetic patients globally and about 1.6 million reported deaths due to diabetes every year [1].

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https://doi.org/10.1016/j.dsx.2019.01.007
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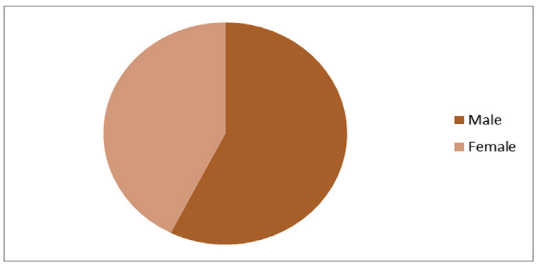


Graph 1. : Gender demographics.

According to the International Diabetes Federation (IDF), about 425 million people have diabetes worldwide out of which about 82 million people belong to the South East Asia region. It also quotes identification of over 72 million (72,946,000) cases of diabetes in India in 2017, with the prevalence of diabetes in adults being 8.8%. Furthermore, the population with Impaired Glucose Tolerance (IGT) currently rests at about 2.9%. This value is expected to increase rapidly by 2025 with the country's diabetic prevalence reaching about 11.4% and patients with IGT reaching 3.5% [2].

Similar conclusions were drawn by the Diabetes Foundation of India which estimates that the diabetic population of India would increase up to 80 million by 2025, making it the 'Diabetic capital' of the world [3]. Moreover, the National Family Health Survey-4 quotes that the overall incidence of diabetes was 20.3% and that of hypertension was 22.2% [4].

Multiple Chronic Co-morbidities (MCCs) are an issue gaining significant importance in diabetes. Diabetic people are more likely to have cardiovascular, renal and ophthalmic comorbidity than those without diabetes [5]. These may lead to worsening the health conditions; have a critical effect on the disease burden as well as treatment costs and also increase the chances of unwanted adverse reactions due to the administration of multiple drugs simultaneously. Studies have indicated that most medical costs incurred by diabetic patients are related to complications and co-morbidities [6].

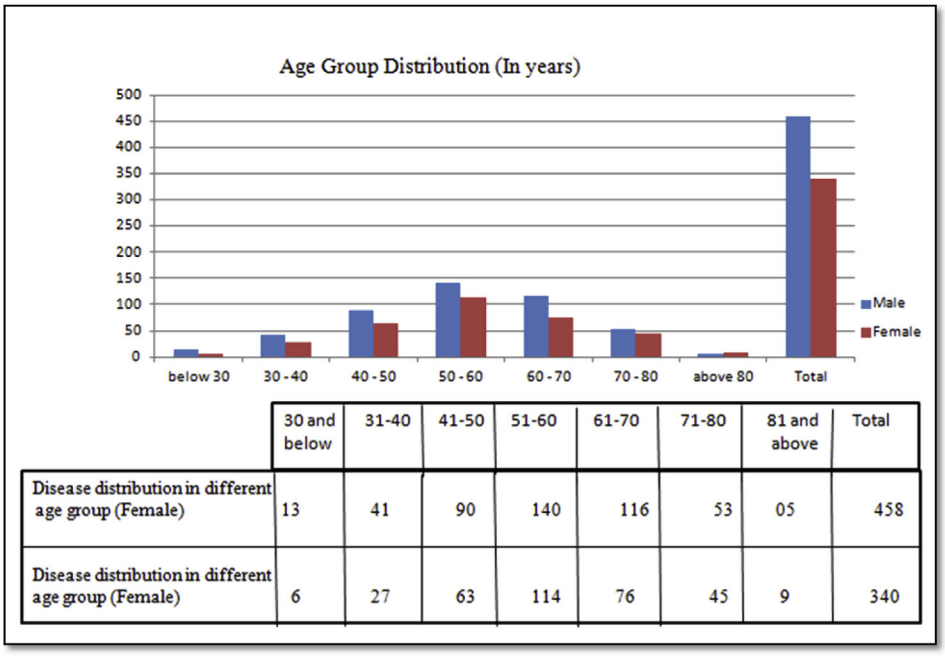
This study was designed to determine the prevalence and association of co-morbidities in diabetic patients belonging to different age groups residing in Delhi, a metropolitan city of India. Further, the current trends of prescribing patterns were also analyzed.

2. Materials and methods

A prospective questionnaire-based cross-sectional study was conducted among the people living in different areas and zones of Delhi to analyze the prevalence of diabetes along with details about the associated co-morbidities as well as the prescribing patterns. Oral consent was obtained from subjects before conducting the survey. A total of 798 patients were included in the survey belonging to the age group of ≥18. It was a community based survey. Data were collected by means of a questionnaire that consisted of following fields: age, gender, exercise, diet, occupation, concomitant diseases and medications. The data were collected between November 2017 and May 2018.

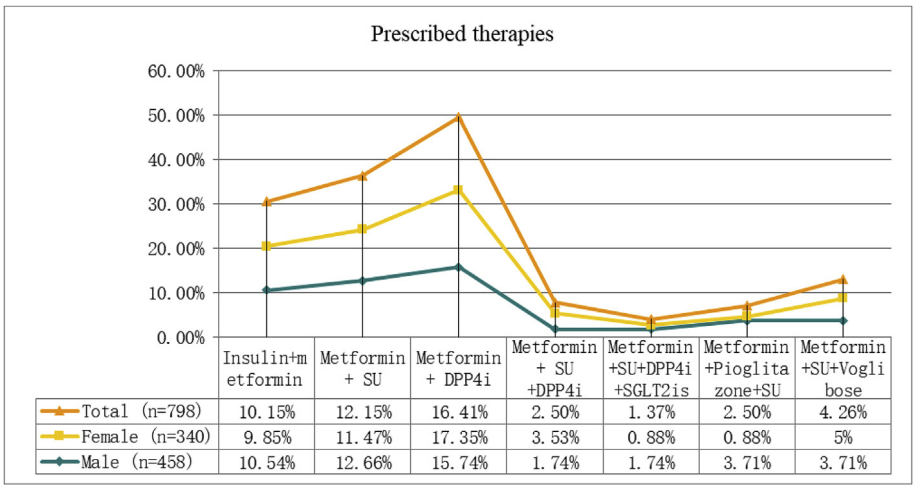
2.1. Study variables

a) Co-morbidities: Diabetic patients with known cases of any other additional disease were included in the survey.
b) Medication: It included all the medicines whether ayurvedic, homeopathic or allopathic (generic/branded) taken by the subject either for any disease or as nutritional supplements. Moreover, both OTC drugs as well as prescription drugs were taken into consideration.
c) Diet: The subjects were asked about the nature of food/diet they consumed (including vegetarian or non vegetarian foods). Additionally, they were also enquired about the number of times they consumed food in a single day.
d) Lifestyle: The subjects were enquired about their lifestyle based on which they were categorized as active or sedentary. Also, the subjects were enquired about the nature and frequency of physical activities and exercises they adopted.



	30 and below	31-40	41-50	51-60	61-70	71-80	81 and above	Total
Disease distribution in different age group (Female)	13	41	90	140	116	53	05	458
Disease distribution in different age group (Female)	6	27	63	114	76	45	9	340

Graph 2. : Gender based age group distribution.



	Insulin+metformin	Metformin + SU	Metformin + DPP4i	Metformin + SU +DPP4i	Metformin +SU+DPP4i +SGLT2is	Metformin +Pioglitazone+SU	Metformin +SU+Voglibose
Total (n=798)	10. 15%	12. 15%	16. 41%	2. 50%	1. 37%	2. 50%	4. 26%
Female (n=340)	9. 85%	11. 47%	17. 35%	3. 53%	0. 88%	0. 88%	5%
Male (n=458)	10. 54%	12. 66%	15. 74%	1. 74%	1. 74%	3. 71%	3. 71%

Graph 3. : Commonly prescribed therapies.

e) Family History: The enrolled subjects were enquired about the history of diseases in the family.

Inclusion Criteria: Patients with diabetes with age ≥18.
Exclusion Criteria: Pregnant or Lactating Females.

All enrolled subjects were categorized into different age groups (below 30, 31–40, 41–50, 51-60, 61–70, 71–80 and 81 and above). Each age group was further categorized on the basis of gender. The data obtained was further analyzed and transcribed into graphs and pie charts.

3. Results

Out of 798 diabetic patients 458(57.3%) were males and 340(42.6%) were females. The mean age of the population came out to be 56.05 ± 12.5 years. The individual male mean age was.

55.56 + 12.71 years and female mean age was 56.7 + 12.74 years.

It was also found that the frequency of diabetic patients was more in the age group of 50–60 in both male and female patients. The overall disease distribution in males was 14.79% more than females. (see Figs. 1 and 2).

Medication: The most commonly prescribed anti diabetic drug an oral hypoglycemic agent i.e 60.65% (including 10.15% patients who were on insulin as well as oral hypoglycemic agent therapy). Also, among the oral hypoglycemic agents, a combination metformin and DPP4 inhibitors (Vildagliptin, Sitagliptin) were prescribed.

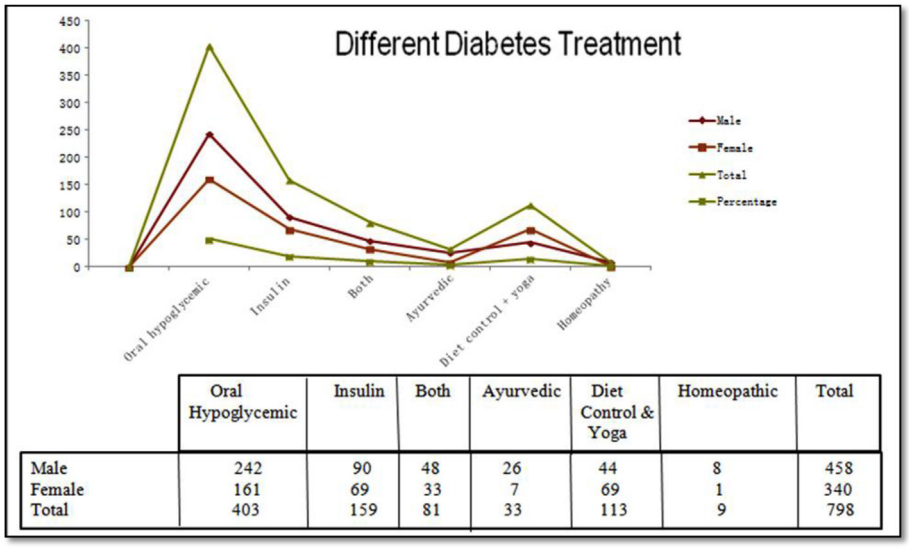
14.16% patients were found to be modifying their lifestyles by incorporating healthy diet and exercises in their daily routines. A small number of patients (5.25%) were also following alternate systems of medicine (Ayurvedic/Unani/Homeopathic) (see Figs. 3 and 4).

Co-morbodities: 432 diabetic patients (54.13%) were found to be suffering with additional co morbidities. The percentage of diabetic patients suffering with dyslipidemia, hypertension, hypothyroidism, gout, diabetic neuropathy, obesity, CAD, arthritis and gastritis were 10.27%, 30.57%, 11.52%, 5.63%, 1.87%, 9.27%, 8.02%, 3.88% and 1.87% respectively (see Fig. 5).

4. Conclusion

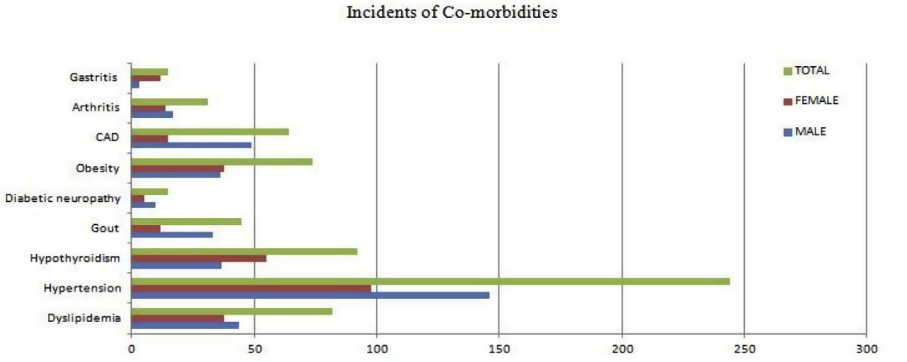
Prevalence of co-morbidities in diabetic patients was found to be alarmingly high.

Hypertension and hypothyroidism were most commonly



	Oral Hypoglycemic	Insulin	Both	Ayurvedic	Diet Control & Yoga	Homeopathic	Total
Male	242	90	48	26	44	8	458
Female	161	69	33	7	69	1	340
Total	403	159	81	33	113	9	798

Graph 4. : Various utilized diabetes treatments.



	Dyslipidemia	Hyper tension	Hypothyroidism	Gout	Diabetic neuropathy	Obesity	CAD	Arthritis	Gastritis	Total
Male	44	146	37	33	10	36	49	17	3	375
Female	38	98	55	12	5	38	15	14	12	287
Total	82	244	92	45	15	74	64	31	15	662

Graph 5. : Associated co-morbidities.

associated co-morbidities. Metformin and Sitagliptin were the most commonly prescribed anti-diabetic drugs.

Moreover, faulty lifestyles are considered as one of the most crucial factors behind causing/worsening diabetes. Improving the diet and including physical activities into the daily routine of the patient are therefore recommended to prevent or improve this condition. Several studies have suggested a positive correlation between rich carbohydrate and fat intake with diabetes. Therefore, high fiber foods with low calories and little fats should be given to diabetic patients. Also, existing evidence supports the fact that mild exercises like yoga, walking and running etc can significantly improve the complications associated with diabetes.

Conflict of interest

None.

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