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A STUDY ON PREVALENCE OF DIABETIC AND HYPERTENSIVE COMPLICATIONS IN A COMMUNITY SETUP

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Abstract

Hypertension and diabetes are the leading causes of morbidity and mortality worldwide and the major causes for the mortality is due to complications of the hypertension and diabetes and it is predicted that by 2025 the number of people suffering from hypertension will increase to 214 million and number of people suffering from diabetes will increase to 190 million. This study was intended to obtain information on prevalence of diabetic and hypertensive complications in a community setup and to provide patient counselling on the same which may help to improve their overall quality of life. A prospective observational study was carried out in and around the area of Bangalore through a series of health camps. The tentative duration of the study was 6 months. Free health camps were conducted where the screening of blood pressure and glucose were provided. Tests were done using digital sphygmomanometers and Accu-check. Data was collected based on Demographic details (Contact information, age, sex, etc.), past and present medical history was collected in a specially designed profile forms. A total of 319 subjects were enrolled in the study through a series of 3 health camps, out of which 112 subjects were suffering from Hypertension, 87 subjects were suffering from Diabetes, 43 were suffering from both Hypertension and Diabetes and 77 subjects were not diagnosed with any complications. Prevalence percentage of complications for particular factor was calculated which shows CHD(37.4%) , stroke (32.9%), heart failure (11.6%) prevalence percentage in hypertensive subjects and memory impairment (56.15%), cataract (51.5%), CHD (33.1%), retinopathy (20.7%) and neuropathy (10%) prevalence percentage in diabetic subjects. Hence we observed higher prevalence percentage of CHD (coronary heart disease) in hypertension and higher prevalence percentage of memory impairment in diabetes and also Diabetic and hypertensive complications were higher among the diabetic and hypertensive individuals in and around area of Bangalore, India.

Keywords: Hypertension, heart failure, diabetes, prevalence, retinopathy, community.

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INTRODUCTION

Hypertension (HTN or HT), also known as high blood pressure (HBP), is a long term medical condition in which the blood flows through the blood vessels with a force greater than normal, which is 120/80mmHg. When the heart beats, it pushes blood through the arteries to the rest of the body. When the blood pushes harder against the walls of the arteries, the blood pressure goes up. Long term high blood pressure, however, is a major risk factor for coronary artery disease, stroke, heart failure, peripheral vascular disease, vision loss, and chronic kidney disease. Having higher blood pressure for short amounts of time is normal, however, if the blood pressure stays high for most of the time, it can cause serious health problems such as straining the heart, damage blood vessels, increase the risk of heart attack, stroke, kidney problems and death. Hypertension is the leading cause of mortality worldwide. It nearly affects about 26% of the population worldwide. It is predicted that by 2025, 29% of the world's population will be affected with hypertension. In 2000, over 972 million adult populations were estimated to have hypertension. Indian population accounts for 66 million hypertensive patients in which 34 million are from urban areas and 32 million are from rural areas. In India, prevalence of hypertension is increasing rapidly, 25% in urban areas and 10% in rural areas. Uncontrolled blood pressure accounts for 7.1 million deaths worldwide each year as it doubles the risk of cardiovascular diseases including stroke, congestive heart failure, coronary heart disease and renal failure [1-3].

Stroke

A stroke is when poor blood flow to the brain and other parts of the body results in cell death. There are two main types of stroke: ischemic, due to lack of blood flow, and haemorrhagic, due to bleeding. Signs and symptoms of a stroke may include an inability to move or feel on one side of the body, problems understanding or speaking, feeling like the world is spinning, or loss of vision to one side. Signs and symptoms often appear soon after the stroke has occurred. If symptoms last less than one or two hours the main risk factor for stroke is high blood pressure. Other risk factors include tobacco smoking, obesity, high blood cholesterol, and diabetes mellitus [4].

Heart failure

Heart failure often referred to as congestive heart failure (CHF), occurs when the heart is unable to pump sufficiently to maintain blood flow to meet the body's needs. Signs and symptoms commonly include shortness of breath, excessive tiredness, and leg swelling. The shortness of breath is usually worse with exercise Common causes of heart failure include coronary artery

disease including a previous myocardial infarction (heart attack), high blood pressure, atrial fibrillation, excess alcohol use, infection, and cardiomyopathy of an unknown cause [5].

Coronary heart disease

Coronary heart disease, or CHD, plaque forms within the arteries of the heart, explains the National Heart, Lung, and Blood Institute. The plaque reduces the oxygen in the blood and causes additional heart problems, such as a heart attack or blood clot. Pressure or pain in the chest, back, abdomen, neck or other upper extremities; an increase in pain during physical activity; and weakness are symptoms of coronary heart disease, Symptoms vary by gender, age and previous health conditions. Some people do not experience any symptoms. Another common name for coronary heart disease is coronary artery disease Risk factors include: high blood pressure, smoking, diabetes, lack of exercise, obesity, high blood cholesterol, poor diet, and excessive alcohol [6].

Diabetes mellitus

Diabetes mellitus, commonly referred to as diabetes, is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period. Symptoms of high blood sugar include frequent urination, increased thirst, and increased hunger. If left untreated, diabetes can cause many complications. Acute complications can include diabetic ketoacidosis, nonketotic hyperosmolar coma, or death. Serious long-term complications include coronary heart disease, neuropathy, cataract, retinopathy, memory impairment, chronic kidney failure, foot ulcers. Prevention and treatment involve maintaining a healthy diet, regular physical exercise, a normal body weight, and avoiding use of tobacco. Control of blood pressure and maintaining proper foot care are important for people with the disease. Type-1 DM must be managed with insulin injections. Type-2 DM may be treated with medications with or without insulin. Insulin and some oral medications can cause low blood sugar.

Weight loss surgery in those with obesity is sometimes an effective measure in those with type 2 DM. Gestational diabetes usually resolves after the birth of the baby. As of 2015, an estimated 415 million people had diabetes worldwide, with type 2 DM making up about 90% of the cases.

This represents 8.3% of the adult population, with equal rates in both women and men. As of 2014, trends suggested the rate would continue to rise.

Diabetes at least doubles a person's risk of early death. People with diabetes can benefit from education about the disease and treatment, good nutrition to achieve a normal body weight, and

exercise, with the goal of keeping both short-term and long-term blood glucose levels within acceptable bounds [7-9].

Diabetic neuropathies

Diabetic neuropathies are nerve damaging disorders associated with diabetes mellitus. These conditions are thought to result from diabetic micro vascular injury involving small blood vessels that supply nerves in addition to macro vascular conditions that can culminate in diabetic neuropathy [10].

Retinopathy

Retinopathy is any damage to the retina of the eyes, which may cause vision impairment. Retinopathy often refers to retinal vascular disease, or damage to the retina caused by abnormal blood flow.

Age-related macular degeneration is technically included under the umbrella term retinopathy frequently; retinopathy is an ocular manifestation of systemic disease as seen in diabetes or hypertension. Diabetes is the most common cause of retinopathy [11].

Cataract

Cataract is a clouding of the lens in the eye which leads to a decrease in vision. Cataracts often develop slowly and can affect one or both eyes. Symptoms may include faded colours, blurry vision, and halos around light, trouble with bright lights, and trouble seeing at night. This may result in trouble driving, reading, or recognizing faces.

Poor vision caused by cataracts may also result in an increased risk of falling and depression. Cataracts are the cause of half of blindness and 33% of visual impairment worldwide. Risk factors include diabetes, smoking tobacco, prolonged exposure to sunlight, and alcohol [12].

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OBJECTIVES OF THE STUDY

Primary objective:

Monitor and document various complications in diabetic and hypertensive patients in a Community setup. Study prevalence of various diabetic and hypertensive complications in and around the area of Bangalore.

Secondary objective:

Clarify patient's doubts and provide counselling regarding the complications and their lifestyle modifications like diet and exercise which may help to improve their overall quality of life.

MATERIALS AND METHODS

METHODOLOGY

Study Design: Observational Study

Table 1: List of instruments used

SL. NO.	INSTRUMENTS	MANUFACTURER
1	Automatic blood pressure screening machines	OMRON (HEM-7120)
2	Digital Weighing machine	SAMSO
3	Diabetes screening machine, Piercing needles and Soft clix	ACCU-CHECK

Table 2: List of materials used

SL. NO.	MATERIALS
1	Registrations forms
2	Patient ID cards
3	Data collection forms
4	BP and Diabetes awareness pamphlets in English and Kannada
5	Feedback forms

Conduction of camps

A total of 3 health camps were conducted over the period of 6 months. The first health camp was conducted at PES College of Pharmacy, Srinagar, Bangalore-50, Second camp was conducted at SADALI, Karnataka and the third camp was conducted at LAL-BAGH JOGGERS PARK, Mavalli, Bengaluru-04. For advertising, over 200 pamphlets were designed which included the details of the camp-date, timings, venue and the services to be provided to the patients. Pamphlets were issued to all the volunteers and were distributed in and around the area where the camps were being conducted which mainly included parks, pharmacies, bus stops, restaurants, coffee/tea stalls, and other places where the crowd was huge.

To attract more number of subjects, free health camp flex banners were designed and arranged at different places. All the activities were performed 3 to 4 days prior to conduction of the camps. Prior permission was obtained from the regulatory authorities of study site.

Venue

The venue was set up to provide the best and satisfactory service to patient. Chairs, Counters, waiting area, mineral water and placards were arranged. Separate counters were setup each for BP, Blood glucose monitoring, data collection, patient counseling and collection of feedback. Patient information leaflet were distributed to all the participants in their language of choice. Volunteers were trained to provide assistance in English, Hindi, Kannada and Telugu. Essential tools like cotton, band aids, spirit, hand gloves, dustbins for disposal of used needles and other tools were arranged prior to initiation of the camp. Volunteers were also trained to assist the patients towards further counters for ensuring smooth functioning of the health camp. Waiting area was arranged for the participants to rest which helped us to record BP with minimal error due to physical activity incurred by the participant to reach the study site.

Inclusion criteria

All Hypertensive and Diabetic patients.

Exclusion criteria

Patients who are not willing to participate.

Registration

Registration of the patient's was done at the registration desk made available at the entrance of the venue where the demographic details like name, age, sex, weight and contact information of the patients were recorded by the volunteers in the Identity Cards provided to each of them, and were further guided to the waiting area to provide ample time for their heart rate to normalize as they have been indulged in physical activity like walking for reaching the venue.

Blood pressure screening

After the resting period in waiting area, the patients were then guided to the BP screening desk for the screening of the blood pressure using the advanced digital Sphygmomanometers and Automatic blood pressure screening machines. The values of their blood pressure and pulse were recorded in the patient ID cards provided to each of them.

Blood glucose screening

Blood glucose screening was done using ACCU-CHECK glucose monitor to provide accurate result with sophisticated screening, SOFTCLIX was used for the purpose of pricking to minimize

pain and to obtain sufficient quantity of blood droplet required for screening. Fresh needles were used for each patient and were disposed off with appropriate care and cotton swabs dipped in spirit were provided to the patient to cease the blood flow and reduce possible risk of infection. Data was recorded in the ID card specific to each patient.

Data collection

At the completion of screening, patients were guided to the next corresponding desk by the volunteers for the data collection. The data collection forms were specially designed to note details on past and present medical history, co-morbid conditions, family histories and presence of any other unusual symptoms pertaining to pre existing and existing complications and signed consent by the patient.

Patient counseling

Post data collection, they were guided to the patient counseling desk where the volunteers (trained by us), counseled the patients. Patient counseling was provided individually to every patient in different languages such as English, Hindi, Kannada and Telugu languages according to the comfort of the patient. The patients were educated regarding:

- High Blood pressure and Blood glucose,
- Risk Factors for various diabetic and hypertensive complications,
- Preventive measures,
- Life style modifications.

Patients were also counseled about various topics which may improve their overall quality of life like,

- Medication adherence
- Exercise and Dietary advices
- Lifestyle modifications
- Social habits which act as prevailing factors for Diabetes and Hypertension and their complications

Also, the patient's doubts regarding the same were clarified by our trained volunteers in their respective languages. For better convenience of the patients, specially designed pamphlets/brochures containing basic and necessary details about Hypertension and Diabetes their respective complications, dietary advice and lifestyle modification were handed to them.

Also, pictures were added to further simplify the details and improve better understanding for those who are not adequately educated.

Feedback collection

As the final step feedback was collected covering important aspects of camp, level of satisfaction and areas of interest and improvement. The main objective was providing more benefit and convenience to the patients as the primary goal of our study performed was to provide direct service to the patient.

RESULTS

Table 3: Total population details

Total number of Health camps conducted	3
Total number of subjects enrolled for the camp	319
Total number of subjects detected with Diabetes	87
Total number of subjects detected with Hypertension	112
Total number of subjects detected with Diabetes and Hypertension	43
Total number of subjects without any disease	77

Table 4: Prevalence of complications in hypertensive compared to that in non-hypertensive patients

Complication	Prevalence in hypertensive subjects	Prevalence in non-hypertensive subjects
Coronary heart disease	58	27
Stroke	51	12
Heart failure	18	04

Table 5: Prevalence of complications in Diabetic compared to that in Non-Diabetic patients

Complications	Prevalence in Diabetic	Prevalence in Non Diabetic
CHD	43	21
Retinopathy	27	34
Cataract	67	48
Neuropathy	13	1
Memory impairment	73	24

Table 6: Hypertension- Percentage prevalence

Complications	Prevalence
CHD	32.9%
Stroke	11.6%
Heart failure	37.4%

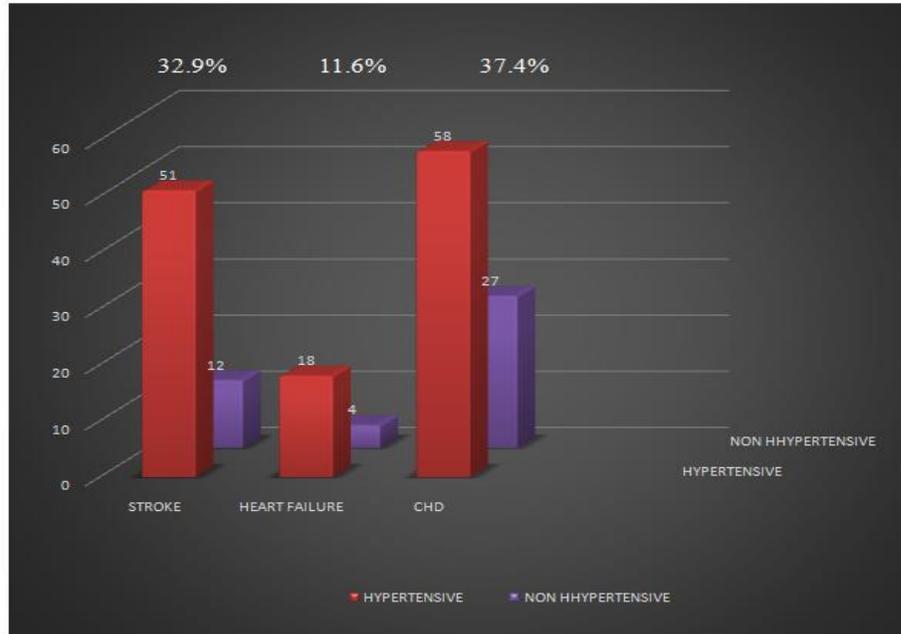


Fig. 1: Percentage prevalence – Hypertension

Table 7: Diabetes- Percentage prevalence

COMPLICATIONS	PREVALENCE
Memory Impairment	56.15%
CHD	33.1%
Cataract	51.5%
Retinopathy	20.7%
Neuropathy	10%



Fig. 2: Percentage prevalence – Diabetes

Table 8: Relative risk

COMPLICATION	RELATIVE RISK
HYPERTENSION	
Stroke	6.42
Heart failure	8.0
CHD	3.18
DIABETES	
Memory Impairment	6.91
CHD	4.45
Retinopathy	1.82
Cataract	3.08
Neuropathy	29.8

Table 9: Results of CHI - Square test

COMPLICATION	P VALUE
HYPERTENSION	
Stroke	< 0.00001
CHD	0.000302
Heart failure	< 0.00001
DIABETES	
Memory impairment	< 0.00001
CHD	< 0.00001
Retinopathy	0.08
Cataract	0.000142
Neuropathy	0.000195

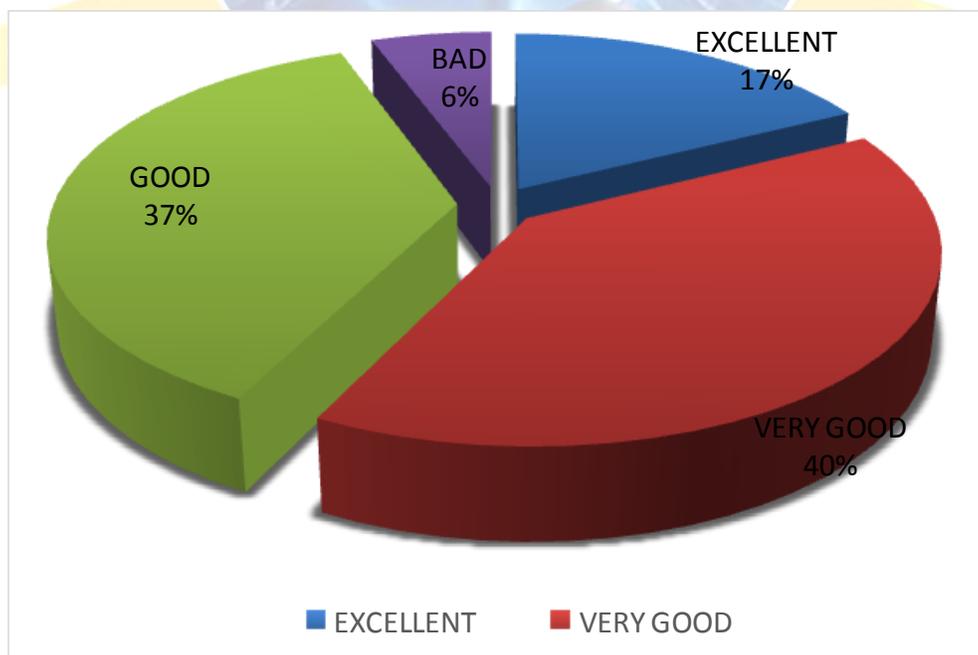


Fig. 3: Feedback

Area of Interest

Follow up, life style modifications and counselling.

Areas of improvement as suggested by patients

Regular camps with a monthly frequency.

DISCUSSION

We conducted a series of 3 health camps over a period of 6 months and the total numbers of subjects enrolled for camp were 319. Out of the 319 subjects who were included in the study, we observed that 112 subjects were suffering with hypertension or are hypertensive, 87 subjects are suffering with diabetes or are diabetic, 43 subjects were identified to have both hypertension and diabetes and 77 subjects were disease free. The present study showed a significant association between prevalence of complications and DM and HTN. The prevalence of associated Hypertensive complications has been shown in table 6. Among the hypertensives the prevalence of heart failure, CHD and Stroke were 37.4%, 32.9% and 11.6%. The various complications were found to be significantly associated with hypertension. The prevalence of Heart failure (37.4%) was higher among all hypertensive patients who participated in the study. The prevalence of associated Diabetic complications has been shown in table 7. Among the Diabetics the prevalence of memory impairment, Cataract, CHD, Retinopathy and Neuropathy were 56.15%, 51.5%, 33.1%, 20.7% and 10%. The prevalence of Memory impairment (56.15%) was higher among all Diabetic patients who participated in the study. In a South India, a similar high prevalence of CHD (30.3%) among the diabetics was revealed by Ramachandran *et al.* Yet in another study Ramachandran *et al.* reported a prevalence of 0.9% and 61.9% for stroke and neuropathy respectively among the diabetes and hypertensive subjects. Around 17.2% of diabetics had cataract as a complication in a study (Mohan V *et al*) carried out in Southern India. Rema M *et al* reported a retinopathy prevalence of 34.1% among diabetics, in South India. Relative risk was calculated for all complications and the complications were found to be significantly related with the disease (DM/HTN).

Chi-square test was performed individually for each complication for the conformation of the relation between a specific complication and the disease. *P*-values of all complications show that they are significantly related with the particular factors (hypertension and diabetes) expect for the complication retinopathy whose *p*-value is 0.08 and accepts null hypothesis indefinitely and shows that there is no significant relation with diabetes in our study.

If *P*- value is ≤ 0.05 then reject null hypothesis and accept alternate hypothesis,

If *P*- value is ≤ 0.01 then it is highly significant and rejects null hypothesis,

If *P*- value is ≥ 0.05 then accepts null hypothesis.

Where Null hypothesis states that there is no relation between a particular complication (ex. retinopathy) and its associated factor (Diabetes).

Whereas Alternate hypothesis states that there is a relation between a particular complication (ex. stroke) and its associated factor (Hypertension).

CONCLUSION

The study provides data on prevalence of diabetic and hypertensive complications from a community based setup. The prevalence of Heart Failure, CHD and stroke were higher among the Hypertensive patients and prevalence of memory impairment, Cataract, CHD and Retinopathy were higher among Diabetic patients in and around the area of Bangalore, India. Patient counselling was provided regarding the various complications and their lifestyle modifications like diet and exercise which may help to improve the overall quality of life of patient. All the complications observed need to be addressed in prevention and control strategies in the study area. Also, community awareness programmes need to be implemented to percolate the knowledge about the diabetic complications, the available screening facilities for their early detection, treatment and care in the rural population. Further research is needed to understand the cause for difference in prevalence of complications in males, taking in consideration factors like smoking, diet while also exploring the role of possible genetic predisposition. Research is also needed to develop evidence based practices through primary health care for the adequate management of Diabetes, Hypertension and their associated complications.

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