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EPIDEMIOLOGICAL SCREENING AND ROLE OF PHARMACIST IN EARLY DETECTION AND PREVENTION OF DIABETES AND HYPERTENSION BY PATIENT COUNSELING IN RURAL AREA OF TELANGANA

M S NIKHIL S[1*], RAVEENDRA BABU K[2], HEMANTH KUMAR A[2], AZHARUDDIN MD[3] AND CHINNAESWARAIAH M[4]

1, 2, 3: Department of Pharmacy Practice, Anurag Pharmacy College, Kodad, Telangana

4: Professor and Principal, Anurag Pharmacy College, Kodad, Telangana

*Corresponding Author: Dr. Mani Santhosh Nikhil: E Mail: sms.nikhil123@gmail.com

ABSTRACT

The aim of this study is to detect undiagnosed hypertension and diabetes people in rural area of South Indian state and monitor the existing cases for assessing health outcomes. This is a prospective observational and interventional study, conducted over a period of 6 months. The blood pressure and capillary blood glucose of the study subjects who are willing for screening were recorded. A total of 1000 individuals were subjected for screening majority were females (63%), males were (37%) and between the age group of 40 to 80 years, having the educational qualification ranging from primary school to postgraduates and majority of the females were housewives. The newly detected cases found were 16.9% with the incidence of hypertension is 39.29% and diabetes with 5.18%.

Keywords: Hypertension, diabetes, epidemiology, screening

INTRODUCTION:

Epidemiological screening is defined as the systematic collection, analysis and interpretation of general public health data. This includes measures of risk factors, health behaviours, and non-health determinants such as socioeconomic status. The information collected by surveys is used by public health officials to plan, conduct and evaluate

programmes, and by researchers to understand the health status of the population.

The impact of pharmacist on early detection and prevention of diabetes and hypertension is very high because they are lifestyle diseases which can be regulated and controlled by proper lifestyle modification. The role of pharmacist is to detect new cases in a population who are unaware of their current problem and to prevent the complications. In many developed countries, including some developing countries like India pharmacist are now also actively involved in many facets of health care system ensuring safe and quality use of medicines, promoting public health, providing primary health care services and palliative care. Pharmacists can contribute by screening, monitoring and counselling non-communicable diseases, patient counselling had great impact on medication adherence which gives positive outcomes, by these strategies pharmacist can improve quality of life and prevent complications.

A chronic condition develops slowly and may get worsen over time months to years. The most common types of diseases are hypertension and diabetes. In many countries chronic diseases were the leading cause of death and disability. Globally more than 70% of deaths are due to chronic diseases **[1]**.

Hypertension:

The current definition of hypertension (HTN) is systolic blood pressure (SBP) values of 130mmHg or more and/or diastolic blood pressure (DBP) more than 80 mmHg. HTN ranks among the most common chronic medical condition characterized by a persistent elevation in the arterial pressure. Hypertension has been among the most studied topics of the previous century and has been one of the most significant comorbidities contributing to the development of stroke, myocardial infarction, heart failure, and renal failure. The definition and categories of hypertension have been evolving over the years, but there is a consensus that persistent BP readings of 140/90mmHg or more should undergo treatment with the usual therapeutic target of 130/80mmHg or less. Many patients are unaware of the HTN symptoms which lead to serious complications. High blood pressure can easily detected by using sphygmomanometer. Blood pressure measurement includes systolic and diastolic components.

- Systolic pressure is the amount of pressure in the arteries during the contraction of heart muscle.
- Diastolic pressure is the amount of pressure in the arteries during the relaxation of heart muscle.

Types of hypertensions:

Primary (essential) Hypertension: is also known as essential hypertension. Most adults with hypertension are in this category. Despite years of research on hypertension, a specific cause isn't known. It's thought to be a combination of genetics, diet, lifestyle, and age.

Lifestyle factors include smoking, drinking too much alcohol, stress, being overweight, eating too much salt, and not getting enough exercise.

Changes in your diet and lifestyle can lower your blood pressure and risk of complications from hypertension.

Secondary Hypertension: Secondary hypertension is when there's an identifiable— and potentially reversible— cause of your hypertension. Only about 5 to 10 percent of hypertension is the secondary type. It's more prevalent in younger people. An estimated 30 percent of those ages 18 to 40 with hypertension have secondary hypertension **[2]**.

Causes of Secondary hypertension:

➢ Obstructive sleep apnoea

➢ Kidney problems

➢ Adrenal gland tumours

➢ Thyroid problems

➢ Certain medications such as birth control pills, decongestants, NSAIDS and some prescription drugs.

According to JNC 8th classification of blood pressure is:

Table 1: Classification of blood pressure in adults (age≥18 years)

Classification	Systolic B.P (mm Hg)	Diastolic B.P (mm Hg)
Normal	<120	<80
Pre-HTN	120-139	80-89
Stage 1 HTN	140-159	90-99
Stage 2 HTN	≥ 160	≥ 100

Advantages of Blood pressure screening:

➢ Early detection of the hypertension in a population who are unaware of their current problem.

➢ Prevents the unexpected complaints.

➢ Increase adherence to the therapy and can improve quality of life.

Complications of HTN:

Untreated and undiagnosed HTN causes: cardiovascular complications like: Coronary artery disease, heart failure, stroke, transient ischemic attack, dementia, mild cognitive impairment, kidney failure, and retinopathy **[3].**

Diabetes: Diabetes mellitus (DM) is a disease of inadequate control of blood glucose levels. It has many sub classifications, including type 1, type 2, maturity-onset diabetes of the young (MODY), gestational diabetes, neonatal diabetes, and steroid-induced diabetes. Type 1

and 2 DM are the main subtypes, each with different pathophysiology, presentation, and management, but both have a potential for hyperglycemia **[4].**

Globally, 1 in 11 adults have diabetes (90% having T2DM). The onset of T1DM gradually increases from birth and peaks at ages 4 to 6 years and then again from 10 to 14 years. Approximately 45% of children present before age of ten years. The prevalence in people under age 20 is about 2.3 per 1000. While most autoimmune diseases are more common in females, there are no apparent gender differences in the incidence of childhood T1DM.

Analysis of rural population reveals an increase in diabetes prevalence at a rate of 2.02 per 1000 population per year. The rate of increase was high in males (3.33 per 1000 per year) as compared to females (0.88 per 1000 per year) **[5]**.

The American Diabetes Association has made several recommendations regarding the medical nutrition therapy of diabetes; this will prevent or minimize macrovascular and micro vascular complications. Four types of diets were reviewed for their effects on diabetes: the Mediterranean diet, a low-carbohydrate/ high-protein diet, a vegan diet and a vegetarian diet. Each of the four types of diet has been shown to improve metabolic conditions, but the degree of improvement varies from patient to patient.

As the part of patient counseling healthcare professional should provide tailor-made diet plan, wherever possible in order to maximize the efficacy of the diet on reducing diabetes symptoms and to encourage patient adherence.

Types of diabetes:-

1. **Type 1 Diabetes (T1DM):** T1DM is characterized by the destruction of beta cells in the pancreas, typically secondary to an autoimmune process. The result is the absolute destruction of beta cells, and consequentially, insulin is absent or extremely low.

2. **Type 2 Diabetes (T2DM):** T2DM involves a more complex interplay between genetics and lifestyle. There is clear evidence suggesting that T2DM is has a stronger hereditary profile as compared to T1DM. The majority of patients with the disease have at least one parent with T2DM **[6]**.

Table: 2 Criteria for diagnosis of Diabetes Mellitus:

Fasting blood sugar	**≥126mg/dl**
2hrs plasma glucose	**≥200mg/dl during an OGTT**
Random plasma glucose concentration	**≥200mg/dl**

These kind of preliminary screening surveys are helpful in identifying diseases in people who are unaware who do not yet have any signs or symptoms of it. In screening survey the collection of the individual health data and detection of new cases in a population with high epidemic of given disease typically by means of affordable, comprehensive, reliable, inexpensive, flexible tests.

MATERIALS & METHODS:

The study is a prospective observational and interventional study conducted in rural areas at Laxmipuram and Ananthagiri in Suryapet district of Telangana over a period of 6 months

Inclusion Criteria: Individuals above 40 years of age who are willing for screening.

Exclusion Criteria: Individuals who are not willing for screening, mentally ill patients, below 35 years age population.

Source of data

Data was collected from study participants and their caregivers in a designed data collection form which includes patients demographic details, educational qualification, social habits, socio-economic status, patient preexisting clinical conditions, past medication history and family history.

Study Procedure:

The blood pressure and capillary blood glucose of person, who is willing to undergo the respective screening services, was recorded. Those who were found to be normal were counselled about balanced diet and healthy life style modifications based upon their daily routine activity and food habits. If the subject was found to be had elevated blood pressure or abnormal blood glucose level, that value was noted in a follow up form designed for the study. The subjects were advised regarding appropriate life style modifications to normalise their blood pressure and blood glucose levels and two more follow ups were conducted. If the subject still had elevated values of blood pressure or abnormal blood glucose levels they were asked to visit their General Physician. Specialised tailor made patient counselling material was provided to improve their health conditions and quality of life.

Patient Counselling Material:

Table 3: Calorie Consumption per hour

Activity	Energy Expenditure in Kcal/hr
Driving	204
Teaching	204
Writing (sitting)	102
Badminton (singles)	312
Badminton (doubles)	270
Hill climbing	534
Running (11 km/hr)	624

Swimming (medium)	480
Yoga	204
Cooking	165
Eating	84
Sitting quietly	72
Sitting & talking	90
Sleeping	60
Waiting in a queue	90
Watching TV	78

Table 4: Nutritive value of some common foods

Food (100 gm)	Protein in gm	Fat in gm	Carbohydrate in gm	Energy in Kcal
Ragi	7.3	1	72.0	328
Rice (parboiled)	6.4	0.4	79.0	346
Rice raw	6.8	0.5	78.2	345
Wheat flour	12.1	1.7	69.4	341
Bengal gram dhal	20.8	5.6	59.8	372
Black gram dhal	24.0	1.4	59.6	347
Green gram dhal	24.4	1.4	59.9	348
Peas	19.7	1.1	56.5	315
Soyabean	43.2	19.5	20.9	432
Amaranthus	3.0	0.3	7.0	43
Cabbage	1.8	0.1	4.6	27
Drumstick leaves	6.7	1.7	12.0	92
Methi leaves	4.4	0.9	6.0	49
Carrot	0.9	0.2	10.6	48
Onion	1.8	0.1	12.6	59
Potato	1.6	0.1	22.6	97
Sweet potato	1.2	0.3	28.2	120
Brinjal	1.4	0.3	4.0	24
Cauliflower	2.6	0.4	4.0	30
Cucumber	0.4	0.1	2.5	13
Ladies finder	1.9	0.2	6.4	35
Amla	0.5	0.1	13.7	58
Apple	0.2	0.5	13.4	59
Banana	1.2	0.3	27.2	116
Dates	2.5	0.4	75.8	317
Guava	0.9	0.3	11.2	51
Mango ripe	0.6	0.4	16.9	74
Papaya - ripe	0.6	0.1	7.2	32
Tomato ripe	0.9	0.2	3.6	20
Water melon	0.2	0.2	3.3	16
Groundnut	25.3	40.1	26.1	567
Cashewnut	21.2	46.9	22.3	596
Almond	20.8	58.9	10.5	655
Milk - buffalo	4.3	8.8	5.0	117
Milk - cow	3.2	4.1	4.4	67
Cheese	24.1	25.1	6.3	348
Crab (muscle)	8.9	1.1	3.3	59
Hilsa	21.8	19.4	2.9	273
Prawn	19.1	1.0	0.8	89
Sardine	21.0	1.9	-	101
Shrimp	68.1	8.5	-	349

RESULTS & DISCUSSION:

Laxmipuram and Ananthagiri in Suryapet district of Telangana are the small villages that come under Suryapet district. The total population of these villages is around 3000 members; about 450 houses were visited and covered 2000 individuals. Among them, 740

(37%) were males and 1260 (63%) were females, as depicted in **Figure 1**.

The findings among the participants in the study show that there are 222 males and 630 females in the age group of 40–49, 111 males and 252 females in the age group of 50–59, 333 males and 189 females in the age group of 60–69, and 74 males and 189 females in the age group of 70–79. As seen in **Figure 2**. Our study revealed that most of the females in the age group of 40–49 are housewives who have a higher risk of developing diabetes.

Education information for study participants shows that, out of 2000 patients, 30% are primary school dropouts, 20% are secondary school, 20% are intermediate, 10% are undergrad degree holders, and 20% are illiterates as shown in **Figure 3**. Most of the patients are primary school students and illiterates who had zero knowledge on lifestyle modification and complications of diabetes. This shows the importance of early screening in rural areas of India, especially south India, where most people eat rice and salt-based stored pickles daily, which causes patients to develop hyperglycemia, hypertension, and its complications. When we told them about the diet chart for HTN and diabetes, they were keen to know about the benefits of a healthy diet chart.

The study participants' occupation information was quite interesting. The majority of women are stay-at-home moms, who are very susceptible to lifestyle problems. We discovered an intriguing fact regarding the eating habits of daily wage employees when we asked questions about their way of life: majority of them consume rice and rice-based foods three times per day, which has a high glycaemic load. They frequently consume pickles made of salt because, as they explained, they don't have time to prepare curries. Males in the business occupation, who are more likely to develop diabetes than women, led sedentary lifestyles, and we found 5 new cases of diabetes among the 50 males in the business group. This shows that 10% of the population has a diabetes risk **(Figure 4)**.

The preexisting conditions of the study population were shocking to learn because 505 females had hypertension, which increases the risk of developing other conditions, and 98 women had both diabetes and hypertension with poor lifestyles, which will increase the risk of coronary artery diseases and other atherosclerotic diseases. As we questioned their medication usage, they answered a few times that they would forget to take the medicine due to time constraints. 120 women had hypothyroidism, which decreases basal metabolic rate and tends to

develop diabetes and weight gain; these people had no regular thyroid monitoring. 248 females had diabetes with zero knowledge of glycemic control, and 150 men had hypertension with an average blood pressure of 170 mm/hg in 6 months with 5 follow-ups. 128 men had diabetes with average capillary blood glucose of 150mg/dl. These results show the importance of regular monitoring of chronic lifestyle diseases and knowledge on diet and energy expenditure in rural areas **(Figure 5)**.

Out of 740 male populations 280 of them are alcoholics and 35 among them had diabetes, 85 women out of 1260 are alcoholics and 5 amo14ng them had diabetes, 4 women had hypertension, this depicts that men who are alcoholics are at more risk to develop liver disorders which further more increase the risk of diabetes **(Figure 6)**.

Newly Detected Cases of Hypertension and Diabetes: After screening the study population, we found alarming results. We detected 78 new hypertension cases in both male and female participants with an average blood pressure of 175 mm/hg, and we detected a total of 87 de novo diabetes cases with an average capillary blood glucose value of 190 mg/dl. These results show that many people were undiagnosed and unaware of their illness. We advised these patients to consult the doctor for better outcome with pharmacological treatment **(Table 5)**.
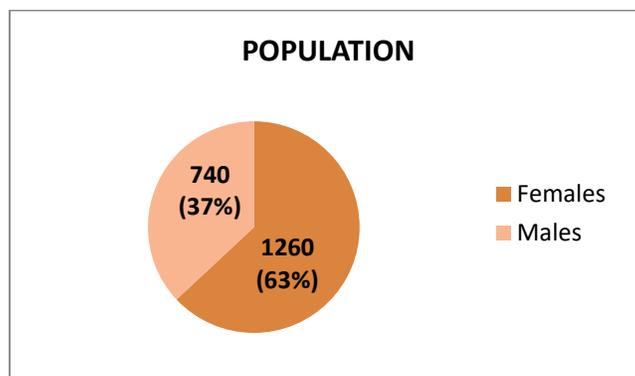

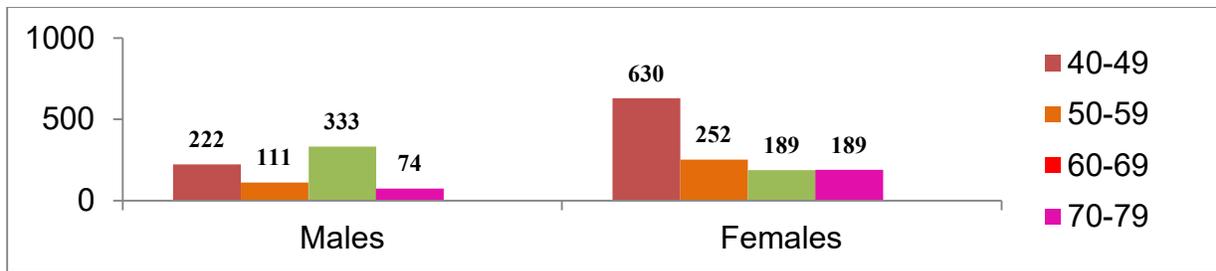**Figure 1: Total Population of the Study**

Figure 2: Age wise distribution of the subjects

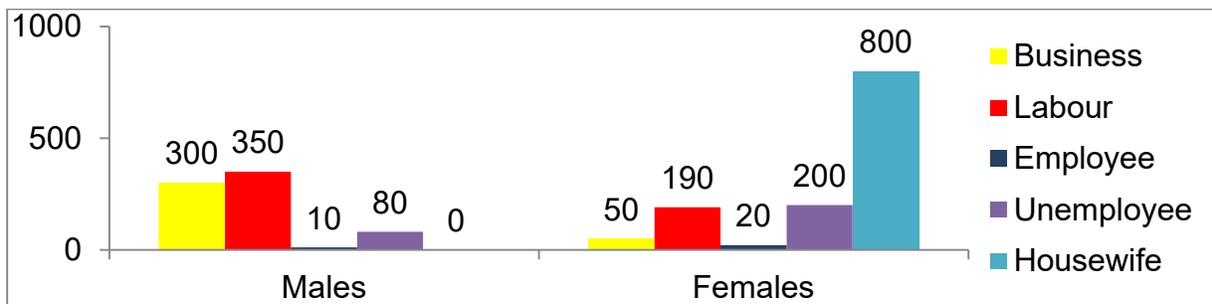**Figure: 3 Education details of study participants**
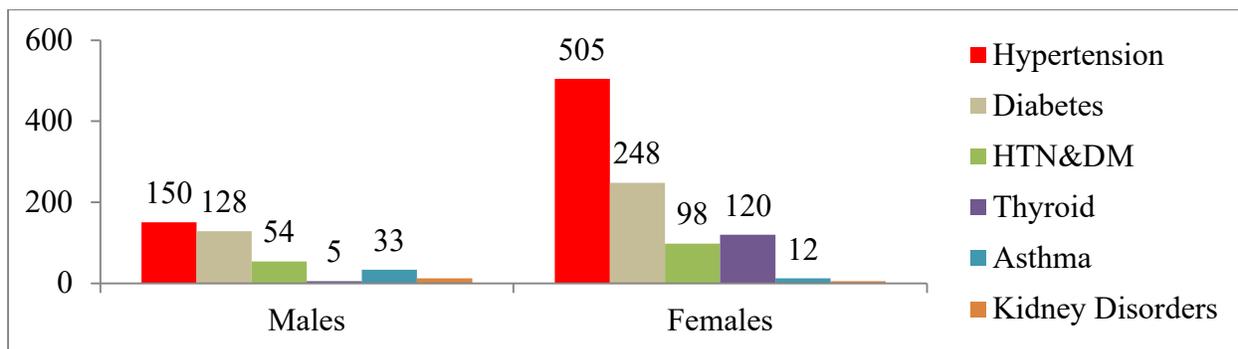

Figure 4: Occupation Details of Study Participants

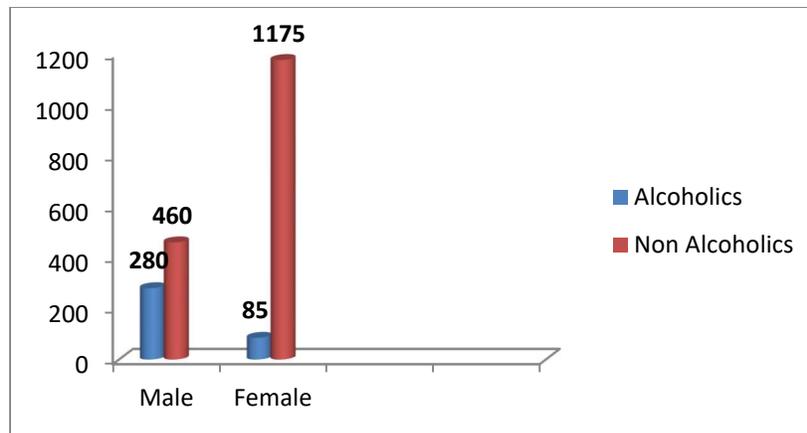**Figure 5: Details of Pre-existing Clinical Conditions**

Figure 6: Data of Alcoholics in study

Table 5: Newly Detected cases:

Newly Detected	Males	Females	Average monitoring parameter values before treatment	Average monitoring parameter values after treatment
Hypertension	51	27	175 mm/hg	155mm/hg
Diabetes	45	42	200 mg/dl	180mg/dl
Hypertension with Diabetes	06	04	NA	NA

Incidence: Incidence is used to calculate the number of new cases of a particular event, such as a disease or illness, during a specific period of time by using below formula.

$$\frac{\text{Number of new cases}}{\text{Total Population}} \times 100$$

The incidence of hypertension is 3.9 and diabetes is 4.35, which is intriguing to know because these results show the benefits of mass screening and epidemiological surveys to diagnose chronic lifestyle disorders in India.

CONCLUSION:

➢ Our study results show the importance of epidemiological screening and early detection of non-communicable diseases, which can be managed with lifestyle modifications and proper treatment.

➢ Early detection will prevent complications, decrease the morbidity rate, and improve the quality of life.

➢ Many rural people were unaware of the healthy diet chart, which will improve the disease conditions of both hypertension and diabetes.

➢ Patient counseling plays a pivotal role in maintaining and managing chronic non-communicable diseases.

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