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Quantitative Screening and Assessment Of Diabetes Mellitus Patients To Identify Long-Term Complications and Glycemic Control At A Tertiary Care Out-Patient Centre

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ABSTRACT

Diabetes mellitus is becoming extremely prevalent in India and other developing countries. Diabetes consequences, such as long-term cardiovascular, renal, neurovascular, and retinal problems are primary contributors of disability and mortality, necessitating screening. To describe the screening strategies of long-term complications amongst patients with diabetes attending a tertiary care out-patient facility. A cross- sectional quantitative analysis was performed using patient's clinical records. A random sample of 120 individuals with diabetes who consulted the hospital was chosen randomly. The results of the dilated eye, foot and dental examination, urine analysis, cholesterol profile, other associated comorbidities along with demographic data were all extracted. Data was collected and descriptive analysis was performed using Microsoft Excel. The following screening tests were consistently prescribed to be performed: HTN, eye care, foot care, dental care, vaccines, smoking cessation and alcohol cessation. Out of the patients recommended with screening tests, 100% of patients underwent screening for HTN followed by 20% of patients underwent screening for eye care, 38.80 % patients underwent screening for foot care, 14.28% patients for dental care and none of the patients for vaccines, smoking and alcohol cessation. All the patients had their HbA1c tested and highest proportion of patients with abnormal results were found which could eventually lead to long- term side effects. In most individuals, screening for long-term consequences of diabetes mellitus was inadequate, and incorrect documentation of results were common. Screening techniques need to be improved.

Keywords: Diabetes, Screening, Complications, Hyper-glycemia

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INTRODUCTION

Diabetes mellitus is a collection of metabolic illnesses marked by chronic hyperglycaemia caused by insulin production, insulin action, or perhaps both. The relevance of insulin as an anabolic hormone causes metabolic irregularities in carbohydrates, lipids, and proteins. Diabetes across the globe affects 537 million individuals (20-79 years old), or one out of every ten people. By 2030, this number is expected to climb to 643 million, and by 2045, to 783 million. In 2022, diabetes will be responsible for 6.7 million fatalities, or one every five seconds. Some diabetic patients, particularly those with type 2 diabetes in the early stages of the disease, are asymptomatic; however, individuals with severe hyperglycaemia, particularly among children with absolute insulin shortage, may experience polyuria, poly-dipsiapoly-phagia, loss of weight, and impaired vision [1-4]. Due to keto-acidosis or, less commonly, non-ketotic hyperosmolar syndrome, uncontrolled diabetes can cause stupor, coma, and death if not addressed [5].

Although diabetes categorization is crucial and has consequences for treatment options, it is not a simple process. Many patients, particularly younger individuals, [1,6-8] may not simply fit into a particular category, and 10% among those first categorized may require modification[9]. In his accelerator theory, Wilkin hypothesized that type 1 and type 2 diabetes are the same condition of insulin resistance with different hereditary backgrounds [10-11]. The speed differs between the two types, with the quicker tempo representing the more sensitive genotype and earlier manifestation in which fat, and thus insulin resistance, is at the centre of the theory. Elevated stature growth velocity and reduced glucose sensitivity of cells are also markers of type 1 diabetes [12-14].

Screening is characterized as the diagnosis of an unidentified ailment in otherwise healthy people by the use of tests or examinations to identify those who are at a higher risk of developing the disease [15]. Diabetes has a significant preclinical stage in which high blood glucose levels lead to the onset of problems. Diabetic screening in asymptomatic patients may help to detect the condition early [16,17].

Aim and objectives of the study:

The objective of this study is to describe how patients at a tertiary care hospital in Telangana are treated and are screened for long-term consequences of diabetes mellitus, such as retinopathy, nephropathy, foot issues, and glycaemic management.

Significance of the study:

This study is expected to give baseline data on diabetes mellitus complication screening procedures, which will serve as a useful reference for interventions aimed at improving patient care and preventing complications.

MATERIALS AND METHOD

Design:

Descriptive cross-sectional research was done to analyses clinical information included in patient records. All patients with diabetes mellitus who consulted the hospital's outpatient clinic were included in the study.

Procedure:

A cross-sectional study was conducted at out-patient center of Medicover Hospitals, Madhapur, Hyderabad.

Ethical Committee clearance was obtained from Institutional Ethical Committee of Medicover Hospitals, Madhapur, Hyderabad.

The following information was gathered from patient files:

- Age, gender, location of residence (urban or rural) and BMI are the demographic characteristics.
- Glycemic control, glycated haemoglobin (HbA1c), lipid (total cholesterol, LDL cholesterol, and HDL cholesterol), and blood pressure targets were all reported as levels of control.
- The following tests and examinations were documented for the diagnosis of long-term complications: dilated eye exam, complete foot exam, dental exam, smoking and alcohol cessation detection of nephropathy and urine examination assessment results.

Analysis:

Data was collected and descriptive analysis was performed using Microsoft Excel.

RESULTS AND DISCUSSION:

The diabetes medical assessment forms of 120 patients with diabetes mellitus were examined and analyzed of whom 74 (61.67%) were male and 46 (38.33%) were female [Table 1, Figure 1].

Table 1: Distribution of responses according to gender

S.No	Gender	No. Of patients	Percentage of patients
01	Male	74	61.67%
02	Female	46	38.33%

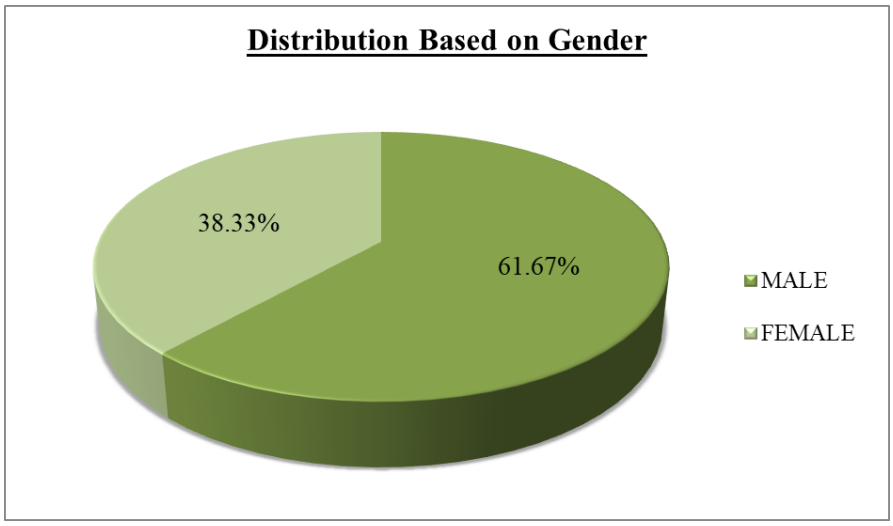

Figure 1: Distribution of responses according to gender

Majority of the patients with diabetes participated in this study belongs to age group between 31-40 years (25%) followed by 51-60 years (23.33%), 41- 40 years (22.50%), 61-70 years (21.67 %), 71- 80 years (3.33%), 81-90 years (2.5%) and 21- 30 years (1.67%) of patients respectively [Table 2, Figure 2].

Table 2: Distribution of responses according to age

S.No	Age	No. Of patients	Percentage of Patients
01	21-30	02	1.67%
02	31-40	30	25.00%
03	41-50	27	22.50%
04	51-60	28	23.33%
05	61-70	26	21.67%
06	71-80	04	3.33%
07	81-90	03	2.5%

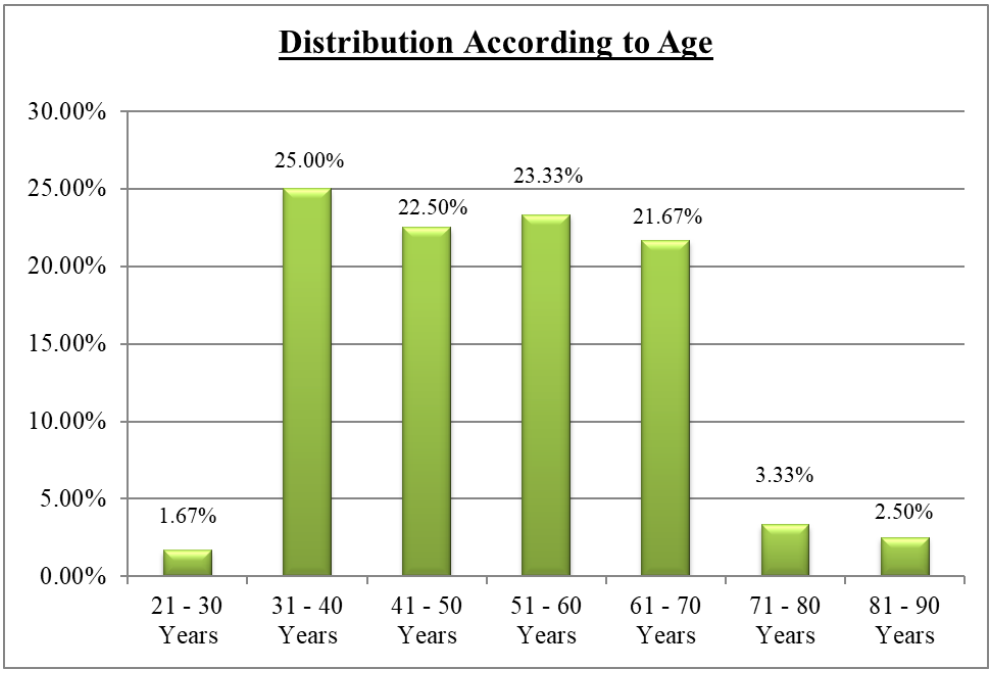

Figure 2: Distribution of responses according to age

Most of the patients have been attacked with diabetes for less than 10 years [Table 3, Figure 3]. In this context our study is in accordance with a study Screening for diabetic retinopathy James Bay, Ontario: a cost-effectiveness analysis by Maberley D, Walker H, Koushik A, Cruess A (18) which found that most of the patients were suffering with diabetes since 10 years.

Table 3: Distribution of responses according to past diabetic medical history

S.No	Duration (years)	No. Of patients	Percentage of patients
01	0-5	66	55%
02	6-10	36	30%
03	11-15	12	10%
04	16-20	02	1.7%
05	21-25	03	2.5%
06	26-30	01	0.8%

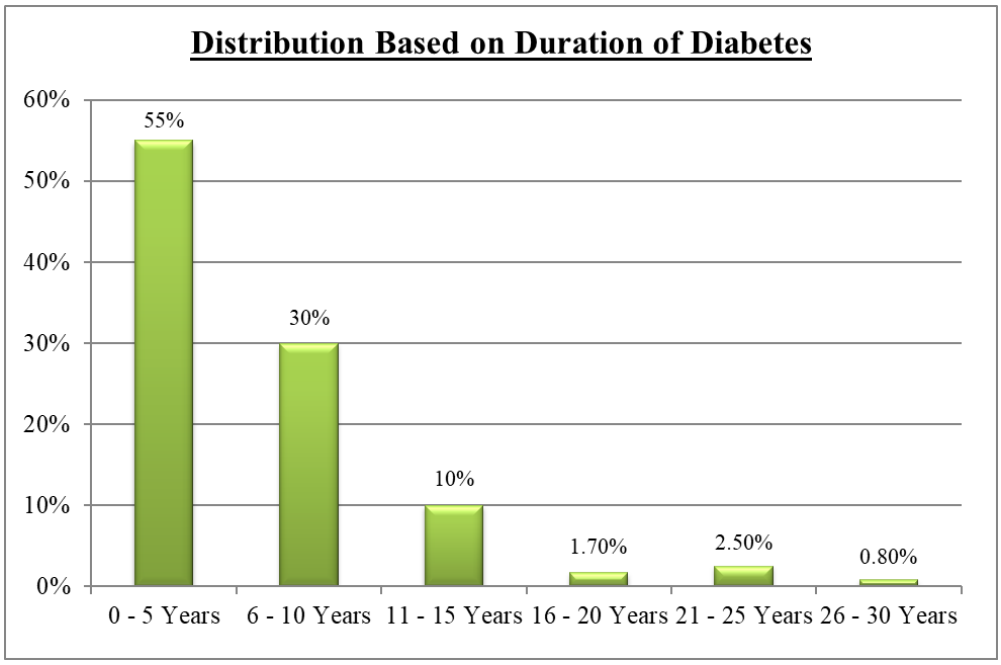

Figure 3: Distribution of responses according to past diabetic medical history

All the patients had their HbA1c tested and their results are as follows: normal < 5.7% seen in 5 (4.2%) patients, pre-diabetic 5.7% - 6.5% seen in 33 (27.5%) patients and majority of the patients i.e., 82 (68.3%) results reported in between the diabetic range > 6.5%. [Table 4, Figure 4]. Abnormal levels of glycated haemoglobin could eventually lead to long-term effects.

Table 4: Distribution of responses according to patients HBA1c levels

S.No	HBA1c (%)	No. Of patients
01	Normal - < 5.7 %	05 (4.2%)
02	Pre- diabetic – 5.7% - 6.5%	33 (27.5%)
03	Diabetic - > 6.5%	82 (68.3%)

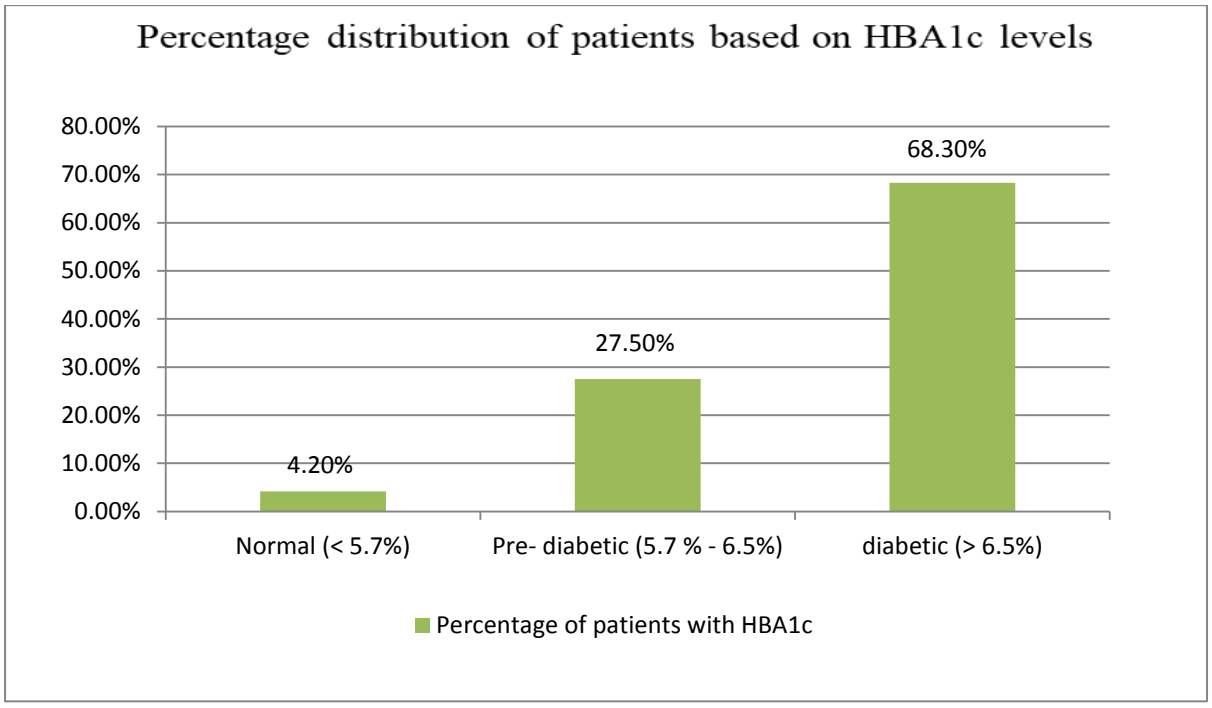

Figure 4: Distribution of responses according to patient's HBA1c levels

Patients were recommended to take a screening test as part of their treatment plan and the results were as follows: 75 patients (62.5%) for HTN followed by eye care for 60 patients (50%), foot care for 67 patients (55.83%), dental care for 49 patients (40.83%), vaccines for 22 patients (18.33%), smoking cessation for 77 patients (64.16%) and alcohol cessation for 70 patients (58.33%). While few patients were not recommended to undergo screening tests and those results are as follows: 45 patients (37.5%) for HTN followed by eye care for 60 patients (50%), foot care for 53 patients (44.17%), dental care for 71 patients (59.17%), vaccines for 98 patients (81.67%), smoking cessation for 43 patients (35.84%) and alcohol cessation for 50 patients (41.67%) [Table 5, Figure 5].

Table 5: Distribution of responses according to no. of patients prescribed to undergo screening

S.NO	Screening tests	No. Of patients prescribed to undergo screening	No. Of patients prescribed not to undergo screening
01	HTN	75 (62.5%)	45 (37.5%)
02	Eye care	60 (50%)	60 (50%)
03	Foot care	67 (55.83%)	53 (44.17%)
04	Dental care	49 (40.83%)	71 (59.17%)
05	Vaccines	22 (18.33%)	98 (81.67%)
06	Smoking Cessation	77 (64.16%)	43 (35.84%)
07	Alcohol Cessation	70 (58.33%)	50 (41.67%)

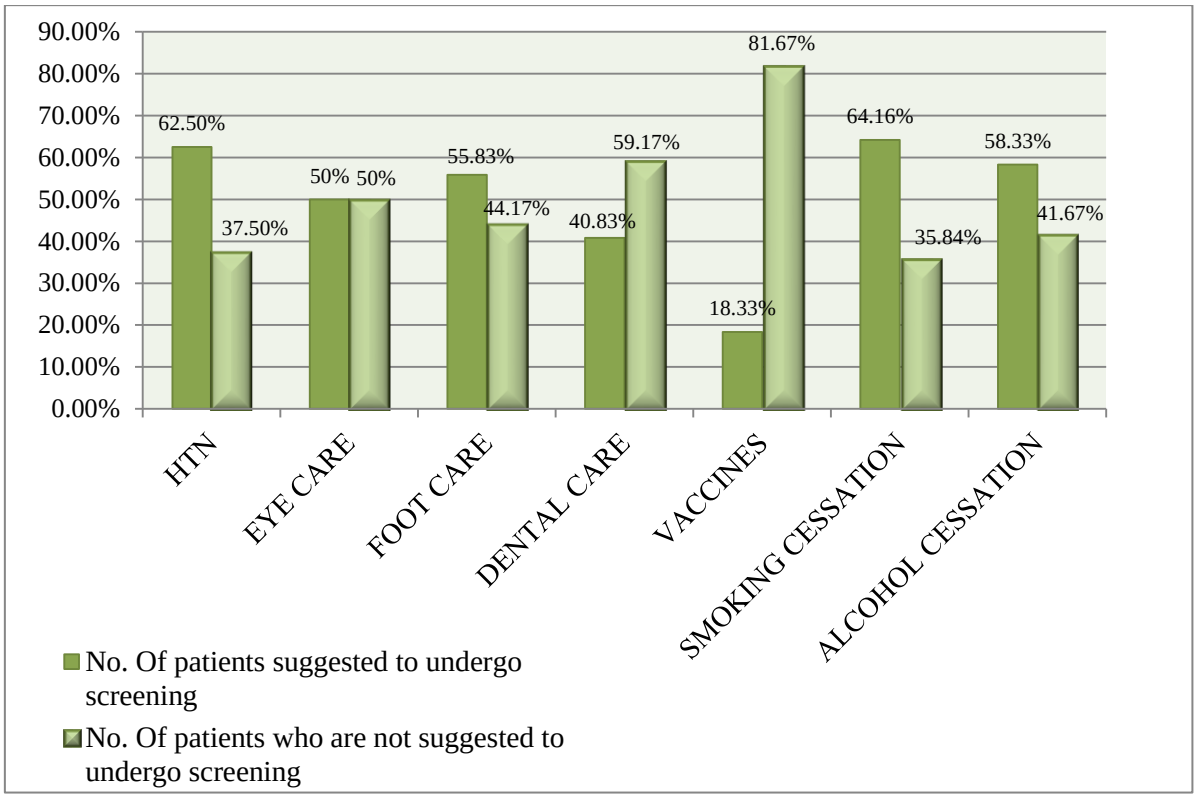

Figure 5: Distribution of responses according to no. of patients prescribed to undergo screening

Out of the patients recommended with screening tests, 75 patients (100%) underwent screening for HTN followed by 12 patients (20%) underwent screening for eye care, 26 patients (38.80%) underwent screening for foot care, 07 patients (14.28%) for dental care and none of the patients for vaccines, smoking and alcohol cessation, while the count of the patients who did not undergo any screening tests are as follows 48 patients (80%) for eye care, 41 patients (61.19%) for foot care, 42 patients (85.71%) for dental care , 22 patients (100%) for vaccines, 77 patients (100%) for smoking cessation and 70 patients (100%) for alcohol cessation [Table 6, Figure 6].

Table 6: Distribution of responses according to no of patients who followed the prescription to undergo screening

S.NO	Screening tests	No. Of patients who underwent screening	No. Of patients who did not underwent screening
01	HTN	75 (100%)	00 (0%)
02	Eye care	12 (20%)	48 (80%)
03	Foot care	26 (38.80%)	41 (61.19%)
04	Dental care	07 (14.28%)	42 (85.71%)
05	Vaccines	00 (0%)	22 (100%)
06	Smoking Cessation	00 (0%)	77 (100%)
07	Alcohol Cessation	00 (0%)	70 (100%)

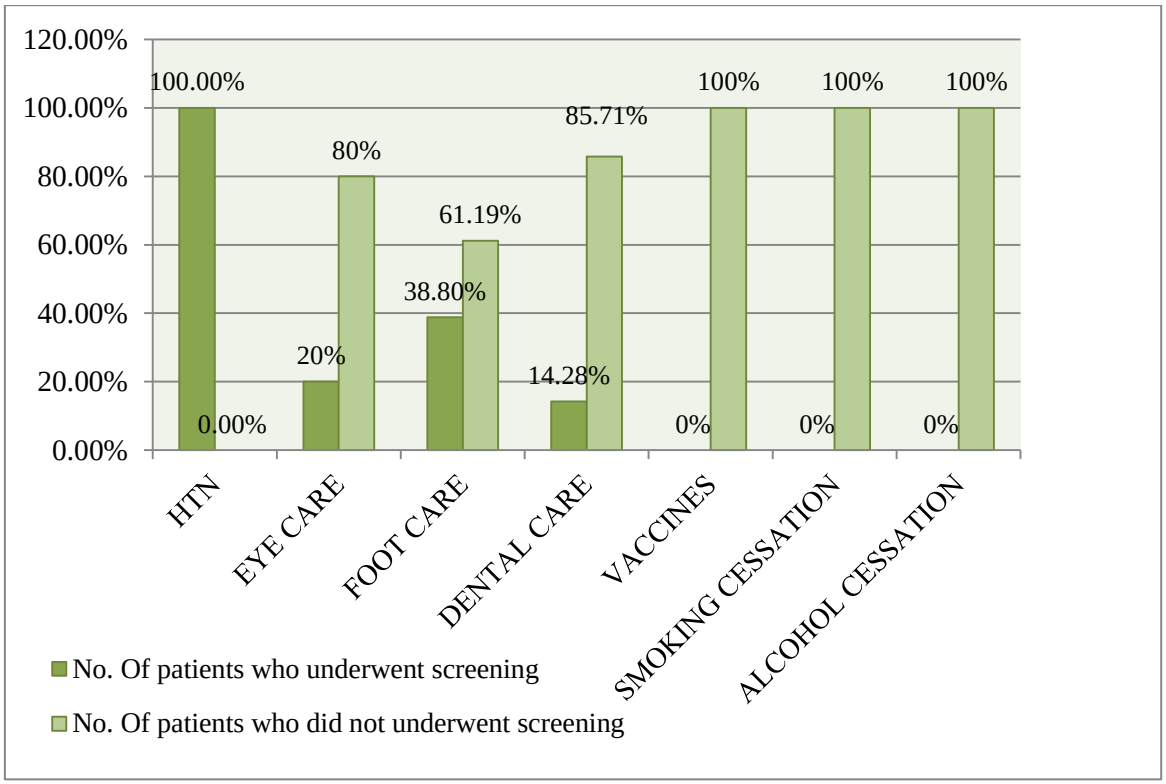

Figure 6: Distribution of responses according to no of patients who followed the prescription to undergo screening

Our study results had a low frequency of screening which are in accordance with a study conducted in South Africa by Tumbo JM, Kadima FN where their results were eye examination (19.5%), foot assessment (20.6%). The study's key conclusion was that the majority of patients had a poor frequency of screening for long-term DM consequences, including retinopathy (10%), dental care (5.83%) and diabetic foot issues (21.66%). These are examinations that necessitate clinical or technological expertise to complete (19). A brief pictorial representation of diabetes screening parameters of our study is depicted in Figure 7.

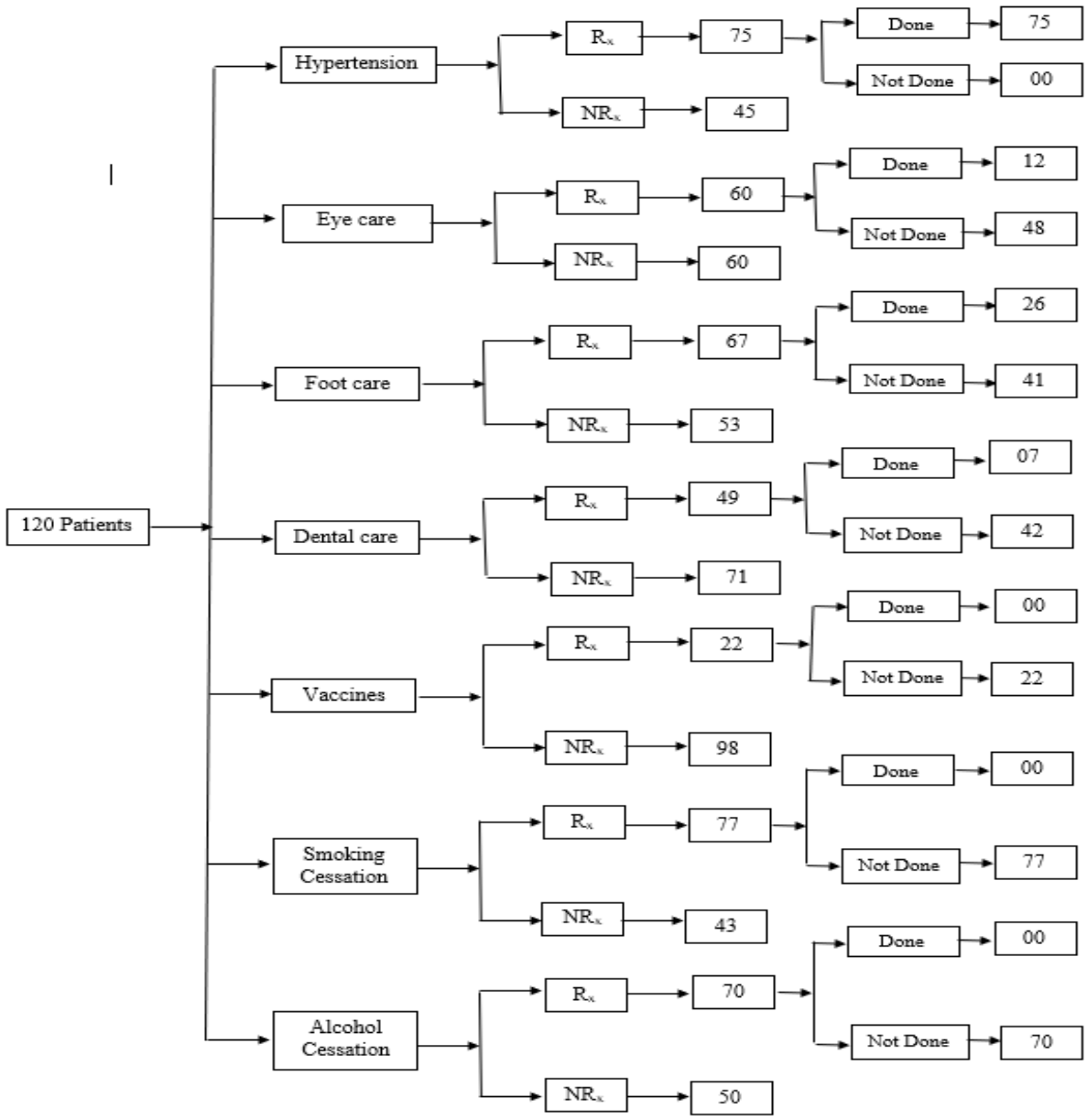

Figure 7: A pictorial representation of Diabetes screening parameters

R_x - Prescribed for screening

NR_x - Not Prescribed for screening

Done - Screening done for prescribed patients

Not done - Screening not done for prescribed patients

In our study, 20% diabetic patients underwent eye screening which is in contrast with the study Diabetic retinopathy in Victoria, Australia: The Visual Impairment Project conducted by McKay R, McCarty CA, Taylor HR (20) where their study results were found to be 70% diabetic patients and also in contrast with a study Management of insulin-treated diabetes in Tasmania by McCarty DJ, Greenaway TM, Kamp MC et al. ([21]) where their study results were found to be 90%.

Diabetic patients frequently experience foot complications, which are deemed one of the most dangerous diabetic consequences. Only 21.66 % of patients in our current study were

examined for foot problems. This was significantly higher than the findings of a medical center in Germany, where the prevalence of foot abnormalities was estimated to be 2.9% in diabetic patients, with nearly half of those with diabetic foot problems requiring major or minor amputations [22]. This prevalence was found to be 16.8% for diabetes mellitus in Moscow [23].

Long term effects from diabetes can often be delayed or prevented with appropriate screening and good primary care for long – term consequences and adherence with the suggestion from healthcare professionals [24]. In our current study all the patients had their HbA1c tested and a high percentage (100%) of patients had abnormal results and this could predispose patients to long-term consequences.

Limitations of the study:

The researchers were only able to get a snapshot of the issue surrounding long-term repercussions of Diabetes Mellitus (DM) screening patterns at Registered Pharmacist (RPH) because of the cross-sectional study design. Because of the inadequate documentation and inability to determine the stages of problems such as retinopathy, using patients' records as a data source could be a constraint. The results were evaluated based solely on reported acceptable and bad outcomes, with no mention of anatomical lesion or severity. The screening techniques at a tertiary hospital were the focus of this investigation. It was unable to offer information on screening processes at primary health care facilities, which care for the vast majority of people with diabetes and other chronic comorbidities.

CONCLUSION

The majority of patients had inadequate screening for long-term consequences of type 2 diabetes, such as retinopathy, nephropathy, and foot complications. A large percentage of the screening tests yielded abnormal results. Poor screening techniques may be to blame for the rise in late detection of long-term problems. To address this issue in the specific setting, screening protocols should be introduced at all treatment sites, clinicians should be taught on the methodologies and capabilities for screening, and finally, a programme should be launched immediately employing this evidence as the baseline.

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All authors have contributed equally in studying the case and writing the manuscript.

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