

## Original Research Article

# Determining foot evaluation done in diabetic in-patients admitted in medical wards and analyzing it through Amit Jain's triple assessment for foot in diabetes

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## ABSTRACT

**Background:** The present study was done to assess the foot evaluation done by the physician in diabetic patients and analyzing it through Amit Jain's triple assessment for foot in diabetes.

**Methods:** A descriptive retrospective study was done at Rajarajeswari Medical College, Bangalore, Karnataka, India. The study period was from July 2017 to December 2017. All the patients admitted in medical ward with diabetes were studied.

**Results:** A total of 65 patients were included in this study. Majority of patients had diabetes of less than 10 year duration. Around 27.7% who were admitted had some history of foot complaints. However, foot examination was done by physicians only in 7.7% of the cases. It was seen that only 6.2% of the feet were inspected (look component), 1.5% of patients pulses were assessed (Feel component) and none of the patients had their sensation checked (Test component). Ophthalmologist was most commonly consulted specialist (35.4%) for eye evaluation in comparison to surgeon for foot evaluation.

**Conclusions:** Diabetic foot is a common complication of diabetes mellitus and screening of foot is essential to prevent complications and amputation. This study done through Amit Jain's triple assessment for foot in diabetes showed that foot evaluation was poorly done by physicians.

**Keywords:** Amit Jain, Assessment, Diabetes, Foot, Screening, Triple

## INTRODUCTION

Diabetes mellitus is a serious and complex disease that needs attention as it affects almost all the vital organs of the body.<sup>1,2</sup> In country like India, it is projected to affect more than 100 million by year 2030.<sup>3</sup> One of the most common and dreaded complication of diabetes is the foot disease.<sup>4</sup> It is believed that one in 4 patients with diabetes will develop a foot ulcer.<sup>5</sup> Around 56% of these ulcers can get infected and lead to some form of amputation.<sup>6,7</sup> It thus becomes quite essential to screen the diabetic

patients who are at risk of foot problems that can lead to amputation.<sup>8</sup> It is often said that physicians in internal medicine have an important role in the prevention, diagnosis and management of diabetic foot complications.<sup>9</sup> Although often said, it is believed to be least followed in practice. Authors conducted this study to determine the foot evaluation done by physicians in diabetic patients who were hospitalized in medical wards through the Amit Jain's triple assessment for foot in diabetics, which is now considered to be the fastest

screening tool that is a minimum and mandatory evaluation to be done for foot in diabetes.<sup>6,10-13</sup>

## METHODS

A descriptive retrospective analysis was carried at Rajarajeswari Medical College, Bangalore, India which is a tertiary care teaching hospital. The study period was 6 months from July 2017 to December 2017. All the patients admitted in medical ward with diabetes were included in this study. Patients admitted in other department wing were excluded.

Data was analyzed using statistical software SPSS 18.0 and R environment Ver.3.2.2.<sup>14-17</sup> Microsoft word and excel were used to general graphs and tables. The descriptive and inferential statistical analyses were carried out in this study. Results on continuous measurements are presented on Mean SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumption on data is made. Assumptions:

- Dependent variables should be normally distributed,
- Samples drawn from the population should be random, cases of the samples should be independent.

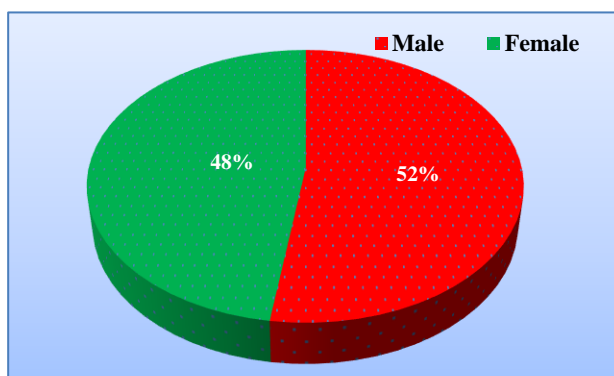
Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups, Non-parametric setting for Qualitative data analysis. Fisher exact test used when cell samples are very small.

### Significant figures

- + Suggestive significance (P value:  $0.05 < P < 0.10$ )
- Moderately significant (P value:  $0.01 < P < 0.05$ )
- \*\* Strongly significant (P value:  $< 0.01$ )

## RESULTS

A total of 65 patients were included in this study. 34 patients (52.3%) were males (Figure 1) and 31 were females (47.7%).



**Figure 1: Gender distribution.**

**Table 1: Age distribution of patients studied.**

Age in years	No. of patients	%
<30	1	1.5
31-40	3	4.6
41-50	13	20.0
51-60	24	36.9
61-70	20	30.8
71-80	4	6.2
Total	65	100.0

The age range was from 30-80 years with mean age of  $57.78 \pm 10.68$  (Table 1). Majority of the patients (36.9%) were between 51-60 years. Only 6.2% were above the age of 70 years.

**Table 2: Duration of diabetes mellitus distribution of patients studied.**

Duration of DM	Gender		Total
	Male	Female	
<5yrs	16 (47.1%)	10 (32.3%)	26 (40%)
6-10yrs	13 (38.2%)	13 (41.9%)	26 (40%)
11-15 yrs	4 (11.8%)	5 (16.1%)	9 (13.8%)
16-20 yrs	0 (0%)	2 (6.5%)	2 (3.1%)
21-25yrs	1 (2.9%)	1 (3.2%)	2 (3.1%)
Total	34 (100%)	31 (100%)	65 (100%)

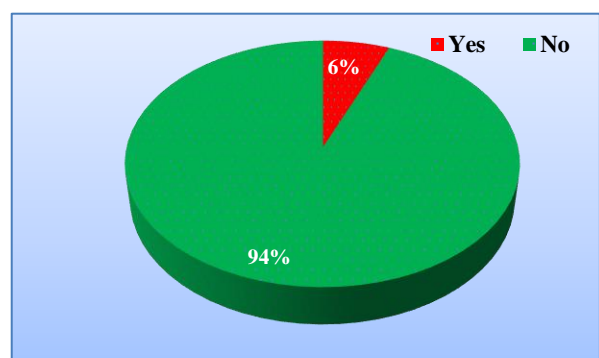
P=0.810, Not Significant

Majority of patients had diabetes of less than 10 years duration (80%). Around 16.9% of them had their diabetes between 11 to 20 years. Only 3.1% of them had diabetes of more than 20 years (Table 2).

**Table 3: History versus foot examination.**

Event	Yes	No
History taken	18 (27.7%)	47 (72.3%)
Examination done	5 (7.7%)	60 (92.3%)

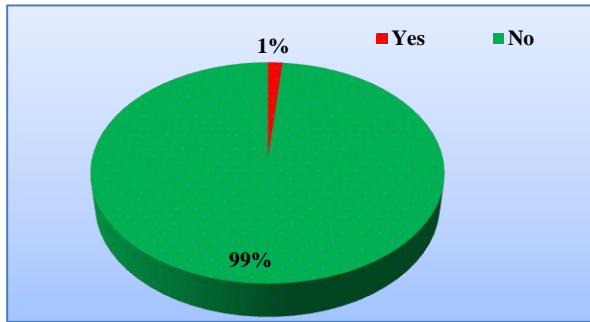
P=0.003\*\*, Significant, Chi-square test



**Figure 2: Distribution of cases where feet were inspected (look component).**

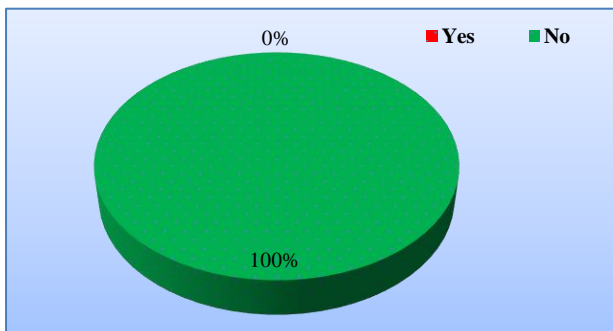
Around 18 patients (27.7%) who were admitted had some history of foot complaints (Table 3). However, foot examination was done only in 7.7%, with 92.3% of the

patients foot examination not being done ( $P=0.003$ , significant).



**Figure 3: Distribution of cases where pulses were felt (feel component).**

When we did component distribution through Amit Jain's triple assessment, it was seen that only 6.2% of the feet (Figure 2) were inspected with 93.8% feet not seen (look component), 1.5% of patients (Figure 3) pulses were assessed with 98.5% patients pulses not checked (Feel component) and none of the patients (Figure 4) had their sensation checked (test component).

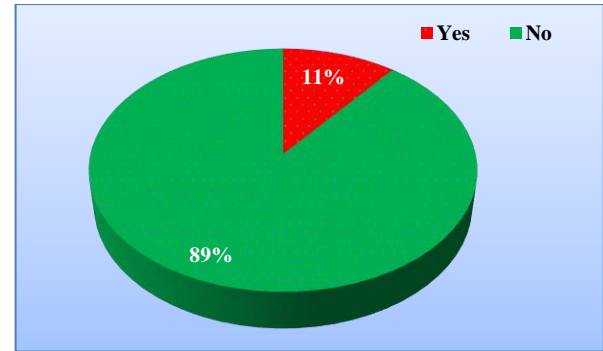


**Figure 4: Distribution of cases where sensation of feet was tested (test component).**

Overall, 44.6% of patients had cross specialty consultation (Table 4) of which ophthalmologist was most commonly consulted (35.4%). 3.1% of patients had cardiology consultation, 6.2% had nephrology consultation and 10.8% having dietician being consulted.

**Table 4: Specialties consulted.**

Specialty consulted	Gender		Total (n=65)	P value
	Male (n=34)	Female (n=31)		
Ophthalmology	14 (41.2%)	9 (29%)	23 (35.4%)	0.306
Cardiology	0 (0%)	2 (6.5%)	2 (3.1%)	0.224
Nephrology	3 (8.8%)	1 (3.2%)	4 (6.2%)	0.615
Surgery	5 (14.7%)	2 (6.5%)	7 (10.8%)	0.430
Dietician	6 (17.6%)	1 (3.2%)	7 (10.8%)	0.107
None	17 (50%)	19 (61.3%)	36 (55.4%)	0.360



**Figure 5: Distribution of cases where surgeon was consulted.**

Only 7 patients (10.8%) had surgical consultation (Figure 5).

**Table 5: Surgeon consulted for foot evaluation.**

	History of foot complaints	No history of foot complaints	P value
Surgeon consulted	6 (33.3%)	1 (2.1%)	P = 0.001**
Surgeon not consulted	12 (66.7%)	46 (97.9%)	

6 patients (33.3%) with history of foot complaints had surgical consultation (Table 5) whereas 12 patients (66.7%) with foot complaints didn't receive surgery consultation ( $P=0.001$ , significant).

Only 1 patient (1.5%) had investigation (duplex) of foot being done with 98.5% not having any investigation pertaining to foot.

**Table 6: The type of co-morbidities in patients.**

Type of co-morbidities	Gender		Total (n=65)	P value
	Male (n=34)	Female (n=31)		
Hypertension	16 (47.1%)	10 (32.3%)	26 (40%)	0.224
Chronic kidney disease	18 (52.9%)	22 (71%)	40 (61.5%)	0.051+
Ischemic heart disease	4 (11.8%)	3 (9.7%)	7 (10.8%)	1.000
None	0 (0%)	0 (0%)	0 (0%)	1.000

All 65 patients (100%) had some form of co morbidities with commonest being chronic kidney disease (61.5%) followed by hypertension (40%). 22 females had CKD (Table 6) whereas 18 males had CKD ( $P=0.051+$ , significant). 10.8% of the patients had underlying ischemic heart disease.

None of the patients had their opposite foot examined (contra lateral limb).

## DISCUSSION

Diabetic foot is well known to be characterized by the classical triad of neuropathy, infection and ischemia.<sup>2,10,18</sup> Hence it is believed that self care by patients along with education and screening can prevent the foot complication.<sup>2,3,8</sup>

Amit Jain's triple assessment for foot in diabetes is the newly proposed evaluation tool which is one of the simplest and fastest screening tools in the world.<sup>6,10</sup> This screening method addresses the triopathy effectively with its 3 components.<sup>6,10,11,13</sup> The look component aims at identifying the infection/ulcer. The feel component aims at addressing the adequacy of circulation to foot by palpating the dorsalis pedis/posterior tibial artery. The test component aims at detecting the neuropathy with which ever available modality of testing at respective centre ranging from monofilament and tuning fork to advance instruments like biothesiometer.<sup>6,10</sup> The advance triple assessment (LFT) can be done at specialty centers.<sup>10</sup>

However, there are studies that show diabetic foot care among patients to be inadequate.<sup>19,20</sup> Further, it is also seen that foot evaluation by the health care professionals has been poor. There are data which suggested that diabetic foot is adequately evaluated only in 12-20% of the time.<sup>21</sup>

There are some other studies which show that none of the patients had regular foot examination by the physician.<sup>22</sup> Around 60% of diabetics said that their feet were never inspected by doctor and 40% said that their feet were examined several years ago.<sup>22</sup> In another study by Kumar et al only 13.8% of diabetics had their foot examined by doctors.<sup>23</sup>

In present study, only 7.7% of diabetic patients were examined. In component distribution of Amit Jain's triple assessment, 6.2% of feet were inspected, 1.5% patient's foot pulses were felt and none had their sensation tested. Ismail E et al found that the examination of peripheral pulses and sensation were poorly performed and documented.<sup>24</sup> In this study involving in patients, none had their neuropathy evaluation and 6 out of 24 hospitalization had their peripheral pulses documented.<sup>24</sup> Even in Jain et al series involving surgical patients with diabetic foot that were evaluated through Amit Jain's triple assessment, it was seen that 58% of patients pulses were not checked (feel component) and 98% of patients neuropathy assessment was not done (Test Component).<sup>13</sup> The affected feet was examined in 94% of their cases (look component).<sup>13</sup>

It's well known that of all factors assessed in diabetic care, foot examination was found to be least satisfactory with only 22% having been examined.<sup>3</sup> In present study, it was observed that ophthalmologist was most frequently consulted (35.4%) by the treating physician's compared

to surgeon for foot (10.8%). In Jain et al series, the opposite foot was examined in only 2% of cases (look and feel component only).<sup>13</sup> In this series, none of the patients' opposite foot was examined.

## CONCLUSION

Diabetic foot is one of the most common complications of diabetes and also most feared due to the fact that it may lead to amputation if adequate care is not taken. Although patients' negligence is known for poor foot care, the health care professionals' negligence is also well documented in literature for not examining the foot. This study done through Amit Jain's triple assessment for foot in diabetes showed that only 7.7 % of the foot were evaluated in whole. The component distribution revealed that only 6.2% of the feet were inspected, 1.5% of patients pulses were assessed and none of the patients had their sensation checked. It was also seen that patients who were symptomatic of foot complaints also not evaluated. We recommend that Amit Jain's triple assessment should be a minimum mandatory evaluation tool to be done by every health care professional worldwide in view of its ease and simplicity that effectively addresses the triopathy in diabetic foot.

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