

# Prevalence of High Risk Diabetic Foot in the Rural Population of Jharkhand and Impact of Awareness

Dr. Kumar Pankaj Prabhat<sup>1\*</sup>, Dr. Ruby Kumari<sup>1</sup>, Dr. Saurav Kumar<sup>2</sup>

<sup>1</sup>Prabhat Medical Centre, Near Kali Mandir, Main road Garhwa, Jharkhand, India - 822114

<sup>2</sup>Fred Hutchinson Cancer Research Institute, Seattle, Washington, USA 98109

\*Corresponding Author

Email: kumarpankajprabhat[at]gmail.com

**Abstract:** *Diabetes is increasing at the rapid rate worldwide and India has approximately 42 million cases. Diabetic foot ulcer (DFU) is one of common complication associated with diabetes. This is more likely to be of neuropathic in origin. This is associated with high morbidity and huge health care cost. India is country with majority of rural population and are also economically insufficient to take care of cost associated with the diabetic foot ulcer. Because of socioeconomical condition, these patients are not capable of bearing the high cost treatment and end up with limb amputation and death in serious condition. Therefore aim of the study is to educate and aware patient with DFU regarding foot care in the rural area of Jharkhand. This is prevalent from the study that changing life style with proper care of the foot might lead to reduce or manageable diabetic foot ulcer.*

**Key words:** Diabetic foot ulcer, social awareness, rural area

## 1. Introduction

India is called as “the diabetic capital of the world” because of very high number of diabetic case. The increase in the number of diabetic case in India could be due to adaptation of western culture. Among several complication associated with diabetes, foot ulceration is most common (15% approximately). Diabetic foot ulcer is a severe diabetic complication with lesion in deep tissues associated with neurological disorder which can be caused by repetitive stress over an area on the feet (Apelqvist, 2012). Patient with peripheral artery disease also present diabetic foot ulcer (Apelqvist, 2012). The death rate for the diabetic patient with foot ulcer is 2.5 times higher than the patient with diabetes but no foot ulcer (Walsh et al., 2016). Approximately 20% case of diabetic foot disease have to go through some form of amputation, which further add complication in the life style and around 70% of the death reported for patient after amputation (Armstrong et al., 2017). The seriousness of the case can be considered by taking data from England in 2010-2011 period where around 10% of the patient with diabetes were either of ulcer care or for amputation (Kerr et al., 2014). The cases of limb amputation in India is very high which goes up to 28.4%, according to study done in north India (Zubair et al., 2012).

The higher cases of foot ulcer in diabetic patient in India is prevalent due to sociocultural factors such as common practice of walking bare foot, lack of awareness about diabetic foot ulcer complication, as well as socioeconomical factor. The direct cost of treating diabetic foot complication exceeds more than \$176 billion dollar in United State, which is lot more than cost for many common cancer. It has been reported that awareness in the patient can reduce the financial burden and would be accessible for the family of poor financial background. Therefore, in this study we have presented the way to reduce the severity of the DFU by awareness program in the rural part of Jharkhand, which also belongs to group with low financial status.

## 2. Method

The study was conducted in 62 patients which includes both male and female. The inclusion criteria were established diabetes cases, age>40 years, and both gender, while, we have excluded patients with habit of heavy cigarette smoking (>20 cigarettes per day), and foot deformity by birth or acquired after bone fracture due to any cause.

Performa was designed to record the following:

Case history (chief complain, past history, family history, personal history, obstetric and menstrual history (in case of female patient), Inspection for bunion, hallux valgus, mallet toe/hammer toe amputation, pressure point/due to abnormal pressure point hot spot, ulcer, infection, ingrown toe nail. We also check the skin type (rough, reddened, dry, flaky scales, cracks, smooth, shining), and peripheral pulses (dorsalis pedis artery, posterior tibial artery, ankle brachia index); Nerve function assessment was done by checking touch/pressure on SM monofilament, vibration perception (tuning fork/bisthesiometer), motor control by looking at the paper grip test and spreading of toe, and autonomic by checking the dryness of skin. X-ray of foot was taken to look at the changes in the foot.

## 3. Results and Discussion

Garhwa, which is a backward area of Jharkhand state, India (**Figure 1**), was selected for the study. Most of the diabetic patients here are from rural areas with no awareness at all about the importance of the foot care, and complication associated with this. They walk bare foot and work in the agriculture field, which is prime source of their living. Total 62 patients (male-46 and female-16) from different age groups ranging from 40->80 years were selected with the case of diabetes (**Figure 2**). These patients were belonging to lower socio-economical class and most of the males were labour or farmer by profession, while female patients were house wife.

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Figure 1: Political map of Jharkhand

Sex	Age group			Total
	40-59	60-79	>80	
Male	30	13	3	46
Female	12	3	1	16
Total patient				62

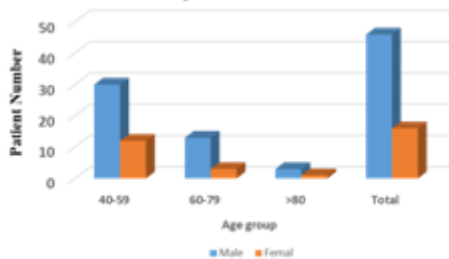


Figure 2: Sample size and gender distribution

They were examined for high risk abnormal foot based on the following criteria: 1. Cases of previous healed ulcer (anatomical), 2. Presence of deformity, 3. Unable to feel 10 gm monofilament test <6/10 score, 4. VPT> 25 MV, 5. Evident PAD. Based on these criteria, 36.95% of male (17 out of 46) and 43.75% of female (7 out of 16) were found to have high risk diabetic foot (Figure 3).

These patients were given control food plans in order to control good glycemic control, as suggested in the literature (Barik et al., 2019). They were also examined routinely for the blood glucose level. These patients were given instruction for following certain physical exercise other than their routine work up to 6 months. We have also aware them to wear well fit foot ware with soft therapeutic insole. Diabetic foot patients are prone for the multiple infections, which is primary contributor for the high amputation rates (Boulton et al., 2020). Therefore, we have recommended the patients to take care of their foot by cleaning the foot properly, using oil or moisturiser for their foot and to trim the nail with curved nail clipper. Also, these patients were given antibiotic and dressing were done regularly according to the IWGDF guidelines (Lipsky et al., 2016).

Sex	Total Number	No. of high risk	%
Male	46	17	36.95
Female	16	7	43.75

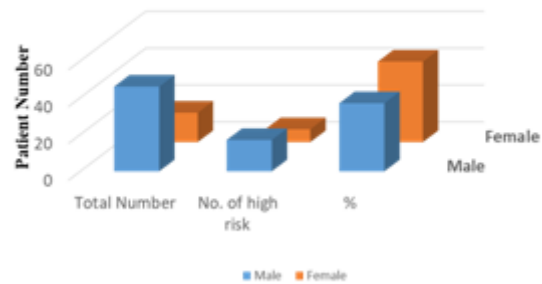


Figure 3: Risk of diabetic foot ulcer male and female

Cigarette smoking are reported to be associated with diabetes and it has been linked to causative agent for diabetic foot because of the smoking-induced oxidative stress inside the cells (Xia et al., 2019). Therefore, these patients were recommended to avoid smoking.

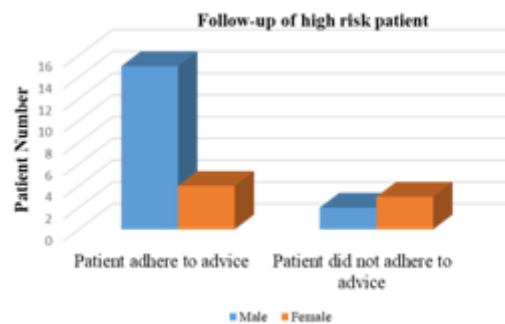


Figure 4: Follow-up of high risk patient

These patients were followed up to 6 months and re analysed their foot ulcer. 86.66% male and 75% female were followed the instruction given (Figure 4). Further analysis suggests that 87% of male patients did not show foot ulcer, when followed the advice, while, 100% male patient still had foot ulcer when they did not stick to the advice. Likewise, we observed 33.3% of female had foot ulcer when they did not follow the instruction. These differences in the outcome in male vs. female could be because of difference in the lifestyle, where males were mostly labour or farmer, while females were house wife or remained indoor. Therefore, our data suggested that there is big difference in the improvement of foot ulcer upon awareness in the patient independent of their gender.

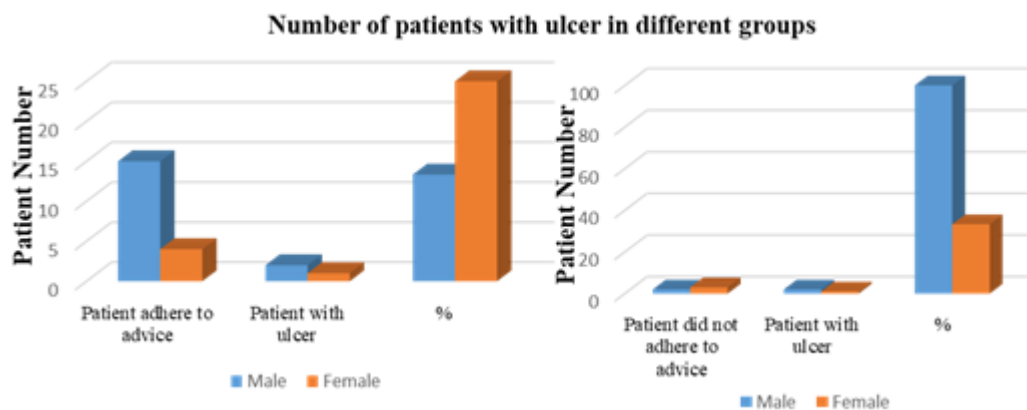


Figure 5: Number of patients with ulcer in different groups

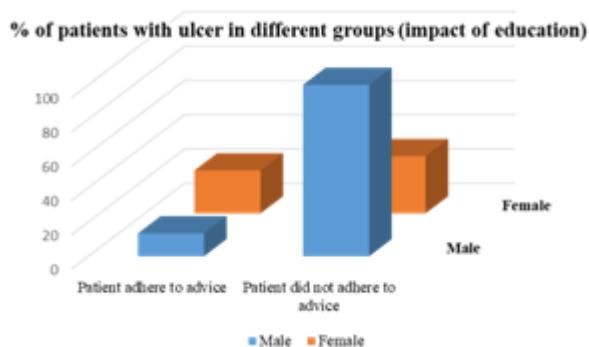


Figure 6: Effect of awareness on the diabetic foot ulcer

#### 4. Conclusion

Diabetic foot ulcer is very prevalent in the rural India. It has been observed that diabetes patients who wore suitable footwear and maintain healthy lifestyle developed lesser foot problem than the other group (Jayasinghe et al., 2007). Our observation are in line with the several previous study who advocate the requirement for the education in the primary foot care training to potentially avoid the complication of diabetes associated foot ulceration. This is the first study conducted in the rural part of Jharkhand and setting up a follow up study in the other part of the Jharkhand with larger population might give us better idea about the requirement for the prevention of severity of diabetic foot ulceration. Foot ulceration is generally preventable and can reduce amputation by 80% after selecting to live according to recommended foot care plans (Edmonds et al., 1986). This would lead to reduction in the major financial burdens on family and government.

Therefore, we suggest a need to form a special focused group devised to count not only the number of patient with the diabetes but also are equipped to give friendly online or telephonic suggestion for foot care. This can be also done by setting up mobile clinic with the trained medical staffs, who can ultimately guide the patient with the primary care and also aware them of the consequence. In future, we need more of such initiative to take care of diabetic patients and associated complication for the rural India.

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