

## Goniometry in limited joint mobility

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### ABSTRACT

**Aim:** To study about the utility of goniometry in screening for limited joint mobility (LJM) in patients attending a secondary level Diabetic Clinic. **Materials and Methods:** Randomly selected data of 100 patients attending a secondary level diabetic clinic without any complications were used. Baseline neuropathy assessments, namely monofilament and biothesiometry were done. Range of movement around the ankle joint and 1<sup>st</sup> metatarsal joint was done using goniometry. Both the results were compared. **Inclusion Criteria:** Selected 100 patients attending a secondary level diabetic clinic and on regular follow-up were included in the study. **Exclusion Criteria:** Sick patients requiring parenteral feeds, IV antibiotics, co-morbid conditions such as microvascular complication, autonomic gastroparesis, and diabetic foot infections were excluded from the study. **Conclusion:** Goniometric screening for LJM is a cheap and effective screening tool for detecting early structural deformity producing a higher plantar pressure and ulcer, and thereby preventing them at early stage.

**Key words:** Goniometry, limited joint mobility, deformity

*“Superior doctors prevent the disease. Mediocre doctors treat the disease before evident. Inferior doctors treat the full-blown disease.”*

[Huang Dee, China, 2600 BC]

### INTRODUCTION

Plantar ulcer in patients with diabetes mellitus (DM) is a significant problem. Levin reports that 20% of all diabetic patients entering the hospital are admitted because of foot problems. The most important etiological factors that have been associated with diabetic polyneuropathy (DPN) are poor glycemic control, visceral obesity, diabetes duration, height, hypertension, age, smoking, hypoinsulinemia, and dyslipidemia.

Some common facts:

1. Foot ulceration is common, affecting up to 25% of patients with diabetes during their lifetime.
2. Over 85% of lower limb amputations are preceded by foot ulcers and diabetes remains the most common cause of non-traumatic amputation in western countries.
3. Prevention is the first step toward solving diabetic foot problems. Although it was estimated that a leg is lost to diabetes somewhere in the world every 30 s, a more important fact is that upto 85% of all amputations in diabetes is preventable.
4. Reductions in amputations will only be achieved if healthcare professionals from all specialties realize that, as Brand once stated, “pain is God’s greatest gift to mankind”: it is the loss of pain that permits patients with neuropathy to develop ulcers and continue walking on them despite the presence of often overwhelming infection.
5. Strategies aimed at preventing foot ulcers are cost-effective and can even be cost-saving if increased education and effort are focused on those patients with recognized risk factors for the development of foot problems.<sup>[1]</sup>
6. Diabetes is now the most common cause of Charcot neuroarthropathy.

#### Access this article online

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Website:  
www.ijem.in

DOI:  
10.4103/2230-8210.104125

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The consensus development conference on standardized measures in diabetic neuropathy recommended the following five measures to be employed in the diagnosis of diabetic neuropathy:

1. Clinical measures
2. Morphological and biochemical analyses
3. Electrodiagnostic assessment
4. Quantitative sensory testing, and
5. Autonomic nervous system testing.

More recently, Watkins and Edmonds have suggested a classification based on the natural history of the various syndromes, which clearly separates them into three distinct groups:

1. Progressive neuropathies
2. Reversible neuropathies
3. Pressure palsies.

There is no association with duration of diabetes or other microvascular complications of diabetes.

These troublesome foot ulcers can become infected and lead to amputation. The National Commission on Diabetes reported that an estimated 5-15% of diabetic patients will require a lower extremity amputation at some point in their lives.<sup>[2]</sup> Most and Sinnock also report that 45% of all lower extremity amputations are in patients with DM and that diabetic patients have a risk rate 15 times higher than the non-diabetic patients.<sup>[3]</sup>

Many factors can contribute to plantar ulcers in diabetic patients, but the two major factors are believed to be antipathy and neuropathy.<sup>[4]</sup> Neuropathy is currently recognized as the primary factor leading to plantar ulceration. Levin describes the sequence of ulceration secondary to neuropathy from sensory, motor, and

autonomic nerve fibers. Sensory loss can allow painless trauma, and motor neuropathy can lead to muscle atrophy and foot deformity, which causes increased pressure on parts of the insensitive foot. Autonomic neuropathy leads to decreased perspiration, which causes dry, cracking skin. Brand has strongly emphasized the role of decreased sensation and concurrent increased, repetitive mechanical pressures as principal causative factors in ulceration. He described that the gradual decrease in sensation seen in diabetic patients and noted a certain “threshold” of insensitivity they reach that puts them at risk for ulceration.

Numerous factors may increase local pressures on the insensitive foot and lead to ulceration. In addition to obvious deformity, limited joint mobility (LJM) of the foot and ankle may decrease flexibility and increase susceptibility to ulceration. Limited joint mobility has been well documented in the upper extremity of patients with insulin-dependent diabetes mellitus (IDDM) and recently in the shoulders of patients with non-insulin-dependent diabetes mellitus (NIDDM).

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**Cite this article as:** Gopinath S, Manoj K, R. Goniometry in limited joint mobility. *Indian J Endocr Metab* 2012;16:S443-4.

**Source of Support:** Nil, **Conflict of Interest:** None declared.