Footwear problems in developing countries: a practical approach

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Article points

1. Footwear in people with diabetes plays an essential role in protecting the foot from trauma and preventing complications.
2. Although guidelines are often issued on footwear's usage, there are several factors that play an important role regarding its usage and adherence in clinical practice.
3. The Amit Jain's footwear ladder approach is a new, practical, easy-to-use method that guides the clinician on the use of diabetic footwear in a graded manner.

Key words

- Developing countries
- Diabetic foot
- Footwear

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The diabetic foot is an unfortunate complication of diabetes, but it is one that is preventable. One such strategy to prevent this complication is by using appropriate footwear. Footwear should, however, be considered a 'double-edged sword' as it can prevent foot complications, as well as cause them. Although there are various guidelines on footwear laid down by different international bodies, it can be difficult to execute them in practice, as there are various factors that govern usage of diabetic footwear in developing countries. The authors suggest a simple and practical approach for using diabetic footwear in these developing countries.

Diabetic foot complications are common and a serious consequence of diabetes, and they can lead to amputation, adding to increases in morbidity and mortality. In addition, wellbeing and financial issues are something the individual must contend with (Al-Rubeaan et al, 2015). Complications include gangrene, cellulitis, ulcers, abscess, etc (Jain and Sabasse, 2015; Jain, 2016). Most of these complications are preventable. Various strategies for preventing diabetic foot complications include education, foot screening and use of footwear (Nather et al, 2018; Jain et al, 2019). Once a problem arises with the foot in diabetes, footwear becomes a medical device (Levine, 2009).

The primary author firmly believes that footwear should be considered a 'double-edged sword' as when appropriate, footwear serves to protect the feet, whereas when footwear is inappropriate, then it can cause foot problems.

In diabetes, there are foot problems and footwear problems (Uccioli and Giacomozzi, 2009; Bus et al, 2016). Although experts provide different guidelines on footwear usage in people with diabetes, in practice, it is not easy to execute them, especially in developing and under-developed countries.

The main problem in developed countries on therapeutic footwear usage is mainly related to adherence (Jarl and Lundqvist, 2016), although other factors also play an important role. However, when it comes to developing countries like India, myriad factors combine to render a fixed protocol/guidance on footwear unsustainable. Socioeconomic conditions, cultural factors, beliefs, religious factors and attitudes, for example, all play a vital role in influencing footwear practices in India and other developing countries. Some of these factors are discussed in *Figure 1*.

Habitual factors

The barefoot walking

There has been a tradition of barefoot walking among most people in this country. Manual workers, agriculturists working in fields, building workers and tree climbers are known not to wear footwear during work (Babu et al, 2016). This is more of a habit than anything as, anecdotally, they can find this uncomfortable. Agricultural fields are heavily contaminated with microorganisms, especially manure, and a small injury to an unprotected foot can lead to deadly infective complications, such as abscess, wet gangrene and necrotising fasciitis. There is a study from south India (George et al, 2013a), which shows abnormal foot biomechanics in coconut tree climbers. This would be hazardous if they develop diabetes.

Another study from the same authors found that hallus valgus, callosities and deviated toes are common deformities among coconut tree climbers (George et al, 2013b). Anecdotally, the myth that walking barefoot in a green garden improves eyesight is also highly prevalent in people living in south India.

Religious factors

A country with many religions, it is customary for Hindus and Jains to remove footwear before entering their place of worship in India. This is often considered a mark of respect, and wearing footwear and entering a place of worship may enrage other devotees. Hence, almost everybody in India leaves their footwear outside when they visit these places. Further, some footwear is made of animal hide, which is not acceptable in temples.

Social factors

It is unadvisable and considered rude to enter a house, be it one's own or someone else's, wearing footwear (*Figure 2*). Many Hindus and Jains have small in-house temples, which strictly forbid one to don footwear indoors. A study by Jain and Rajagopalan (2018) found that only 5.3% of patients who had diabetic foot problems used footwear inside a house. Another factor is that many types of footwear are also made from animal skin and, like religious sites, many Hindus and Jains object to them being worn in their house.

Economic factors

Whereas importance is assigned to clothes, ornaments, furniture and other personal items, footwear can be neglected by some individuals. One reason may be that these items are expensive and require immediate attention, compared to an item that is perceived to be less important. Another prevailing attitude is that many consider footwear to be a simple and cheap item. Even if few individuals purchase expensive diabetic footwear, the maintenance of these items is often poor compared to others (*Figure 3*). A study by Jain and Rajagopalan (2018) from India found that only 10.5% of diabetic foot patients changed their footwear yearly. Patients who are poor simply do not buy them.

Cultural factors

Another important factor determining the usage of footwear is the culture in India. Different parts of the country have different levels of footwear usage. India is the second largest producer of footwear in the world, producing around 2,065 million pairs of

Figure 1. Factors influencing footwear usage in diabetic foot patients.

Figure 2. Footwear has to be left outside when one enters the house or temples.

Figure 3. Even if one uses diabetic footwear, often they are not changed regularly, even if worn out.

Figure 4. The flip flops can lead to toe deformities as it requires first and second toe to grip.

Figure 5. Common to see inappropriate diabetic footwear being sold by the roadside for less than $2.

footwear per year (Surbhi, 2017). Popular footwear in India, includes Kholapuri slippers, Mojaris and Juttis. Most of these are not advisable for people with diabetes, yet they are worn due to cultural habits. Another issue is the common usage of T strap/Y strap/ flip flop types of footwear in India, whereby one has to grip the footwear between the first and second toes. These are not advised in people with diabetes who also have neuropathy, as it can lead to toe deformities (*Figure 4*).

Healthcare factors

Appropriate foot care is, anecdotally, well known to be omitted even by healthcare professionals in India, and so is the footwear (Jain and Rajagopalan, 2018). Jain and Rajagopalan (2018) found that only 15.8% of patients with established diabetic foot complications received advice on footwear, which is extremely low by global standards. Such a low rate is more than likely replicated in other developing and underdeveloped countries.

Business factors

One can see advertisements by the roadside and outside footwear shops of wrongly labelled diabetic footwear sold by vendors (*Figure 5*). A large number of people regularly fall into the trap of buying inappropriate or poor diabetic footwear, which can cost less than $2.

If a healthcare professional, who is trained in diabetic footwear, advises not to use cheaper footwear and prescribes specialist diabetic footwear that is more expensive than locally available footwear, then it can be viewed with suspicion by patients. This is further precipitated by the fact that many healthcare professionals inexperienced in diabetic footwear have blindly prescribed expensive footwear that has led patients to suffer the consequences. These bad experiences can remain fresh in the minds of patients and later, when they are advised by other healthcare professionals not to use these items of inappropriate diabetic footwear, they can become reluctant to wear more appropriate diabetic footwear for many years, or sometimes for the rest of their lives.

Practical solutions

Patients with diabetes require footwear to protect their feet and it is recommended that they wear them both indoors and outdoors, but often this is not followed. Armstrong et al (2001) observed that only 15% of patients used their footwear at home (Williams, 2015). Jain and Rajagopalan (2018) noted that only 5.3% of patients used footwear at home, with 94.7% walking barefoot; this was associated with higher incidence of type 1 diabetic foot complications.

The primary author has suggested a new simple practical approach for healthcare professionals that may be helpful for use in clinical practice in developing and underdeveloped countries. This footwear ladder approach (Jain, 2020a) is designed to encourage patients who are not using footwear to begin accepting diabetic footwear gradually in their life, and such an approach should be tailored towards

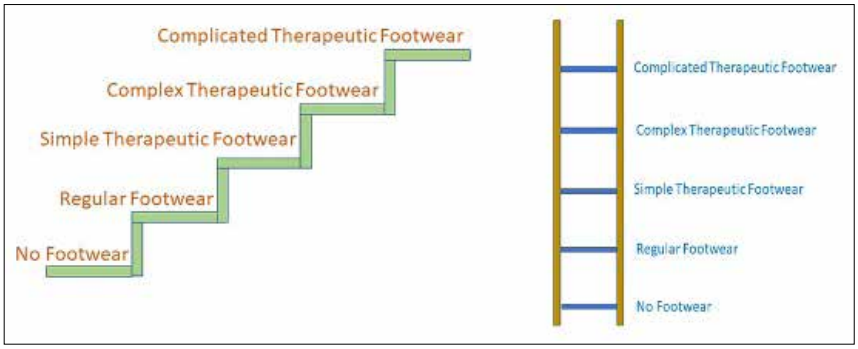
the individual. For example, people with diabetes not using footwear and walking barefoot should be made to climb the ladder/staircase (*Figure 6*), and people encouraged to wear regular footwear as a starting point, even indoors, where they are at low risk of experiencing diabetic foot complications.

Another example would be that those wearing regular footwear should be encouraged to climb the ladder or staircase using simple therapeutic footwear like microcellular rubber sandals or microcellular polymer footwear, when they develop risk to their feet. It is possible to improve patient compliance in using therapeutic footwear over a period of time, one rung or one step at a time. In terms of complications, the clinician can select the appropriate rung of the ladder or the step on the staircase to prescribe footwear relevant to the case, ranging from complex footwear like half shoes and anterior wedged footwear, to modified molded footwear, especially in conditions like Charcot foot. In a scenario whereby a person with diabetes has a habit of walking barefoot or is using his regular footwear infrequently and suddenly develops Charcot foot, then one might have to jump the rungs or steps to use appropriate footwear, such as a modified molded type (Jain, 2020b).

Through this footwear ladder or staircase approach, it is possible for patient compliance to improve as individuals begin to accept the important role of therapeutic footwear in their life. This approach is a flexible one and the clinician can adapt it easily, based on case scenario. One can also use the elevator approach in cases where the clinician does not want to climb the footwear staircase (Jain, 2020a). These footwear ladder and elevator approaches are derived from concepts akin to reconstructive ladder and elevator used for wound closure (Jain, 2020a). In this footwear elevator approach (*Figure 7*), the clinician can go directly to the choice of footwear needed. For example, a patient who has habit of walking barefoot frequently and, on evaluation, it is noted that they have Charcot foot, then one can directly use the elevator approach wherein complicated footwear can be prescribed (modified molded).

Conclusion

In spite of understanding the importance of footwear for people with diabetes, there are many practical problems related to selecting and using the right one, and their usage is governed by many factors, including socioeconomic, religious and cultural. Clinicians should consider all of these factors before recommending therapeutic footwear to their patients. Amit Jain's footwear ladder approach is a simple, easy-to-remember and practical approach, guiding clinicians on the usage of footwear in people with diabetes in a graded manner. ■



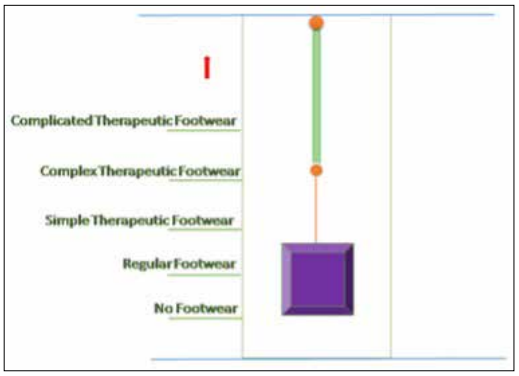


Figure 6 (Above). Amit Jain's Footwear Ladder or staircase approach. Figure 7 (Left). Amit Jain's footwear elevator approach.

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Expert commentary: Is the UK classed as a developing country when it comes to the provision of footwear for people with diabetes?

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After reading Amit Jain's paper 'Footwear problems in developing countries: a practical approach' it got me thinking — is the UK a 'developing country' when it comes to the provision of footwear for people with diabetes? In Amit's paper, he talks about the provision of footwear being difficult to introduce in India because "although experts provide different guidelines on footwear usage in people with diabetes, in practice, it is not easy to execute them, especially in developing and under-developed countries".

He does expand on some of the reasons for this in a country like India and some of these he states are: barefoot walking, religious factors, social factors, economic factors, cultural factors and healthcare factors. I feel that in the UK some of these factors are more pertinent than others, nevertheless, I believe the provision of footwear for people with diabetes is still very poor.

From my 39 years of patient-facing clinical practic, I have seen the development of multidisciplinary foot teams/clinics and the ever-increasing importance of orthotist input to provide footwear and insoles for patients who have previously ulcerated and are 'In Remission'. This works extremely well in centres that can provide such a service and I have no doubt that this strategy reduces ulcer recurrence and increases ulcer-free days.

Even with this group of very high-risk patients, in my experience we encounter problems regarding barefoot walking in the home setting. In some cases, this may be a religious factor but in most it is just the fact of the patient not wishing to wear outdoor shoes around the house. Social factors in my experience are usually governed by the appearance of some of the provided footwear, both 'off-the-shelf' prescription and bespoke, and this can be understandable.

This now brings me to the economic factors which, to my mind, to the biggest obstacle we face in the UK. Diabetes foot ulceration and amputation with associated costs costs the NHS in excess of £1bn per annum.

We have a diabetes foot screening system, to assess risk of ulceration that could lead to amputation in the UK (Stang et al, 2016), but when we identify those patients who are 'at risk' do we have a structured robust system in place to carry out an in-depth structured assessment to provide insoles and/or footwear to the identified cohort of patients that would benefit to prevent primary ulceration? I think not. At best, it is very much a 'postcode lottery' situation.

Many international guidelines (International Working Group on the Diabetic Foot, World Health Organization) and regional guidelines like NICE (2015) and Scottish Intercollegiate Guideline Network (SIGN, 2013) exist, alluding to the use of footwear and insoles in at-risk patients with diabetes so why do we not follow these guidelines? Is it due to the lack of clinical evidence or is it because we are a 'developing country' when it comes to preventative strategies for diabetes foot disease?

The IWGDF clearly states: "Instruct a person with diabetes who is at moderate risk for foot ulceration (IWGDF risk 2) or who has healed from a non-plantar foot ulcer (IWGDF risk 3) to wear therapeutic footwear that accommodates the shape of the feet and that fits properly, to reduce plantar pressure and help prevent

a foot ulcer. When a foot deformity or a pre-ulcerative sign is present, consider prescribing custom-made footwear, custom-made insoles, or toe orthoses. (Strong; Low). In a person with diabetes who has a healed plantar foot ulcer (IWGDF risk 3), prescribe therapeutic footwear that has a demonstrated plantar pressure relieving effect during walking, to help prevent a recurrent plantar foot ulcer; furthermore, encourage the patient to consistently wear this footwear. (Strong; Moderate)."

I feel a country like the UK should be leading in such matters as preventative care strategies for the diabetic foot as we currently do for other long-term conditions like cancer.

For this to work effectively, we need to:

- Introduce and record a structured, agreed assessment strategy to ensure the patients who would benefit from insoles and or footwear are identified
- Develop an 'invest to save' strategy and whether that investment would be achieved via health board-level funding or better still lobbying for central government funding to provide insoles and or footwear is something that would need explored.
- Provide aesthetically acceptable footwear to the level required
- Audit robustly to monitor effectiveness.

I am aware that this might sound a bit 'pie in the sky', but if we are serious regarding preventative care strategies and not wanting to be providing a service associated with an 'underdeveloped country' then something has to change. ■

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