

# MANAGEMENT OF MOSSY FOOT IN ETHIOPIA

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Mossy foot in Ethiopia (otherwise known as podoconiosis) affects at least 5% of the population of South Central Ethiopia (Davey, 2010) and is recorded in many other countries. It is caused by exposure to irritant soil as a consequence of wearing no footwear and an absence of basic skin care. The pathogenesis includes a failure of the initial lymphatics of the skin and a consequent impairment of the barrier function of the epidermis.

## Key words

Mossy foot (podoconiosis)

Shoes

Washing

Self-care

A full description of the condition of lymphoedema has no more fascinating tale to tell than that uncovered by the Mossy Foot Association of Ethiopia. Known to the people of Southern Ethiopia for centuries, it was drawn to the attention of the tropical medicine community in publications by Price (1973) in the 1960s and 1970s. He recognised its high prevalence in the region around the city of Sodo. He visited the Institute of Dermatology, London with samples of tissue from the skin of feet and from the lymph nodes of the groin from patients he had treated in Ethiopia. The electron microscope laboratory

was next to the vascular laboratory. In the former, studies confirmed that there were silica particles in the tissues (Price and Henderson, 1978) and, in the latter, directed by Terence Ryan, a discussion acknowledged that here was an important unsolved problem. It was clear that podoconiosis was a result of walking without footwear in irritant soil—a conclusion derived from the electron microscope studies.

Forty years later, while remaining a disease which is difficult to explain, it is no longer hidden from view. It has become one of the neglected tropical diseases (NTDs) and several publications in leading journals, especially by Davey (2007; 2010), have brought it to the attention of the scientific community.

Terence Ryan, representing the World Alliance for Wound and Lymphoedema Care (WAWLC), Claire Fuller, representing Mossy Foot UK and Paul Matts of Procter and Gamble, visited the Mossy Foot headquarters in Sodo for two days in November 2010.

Perhaps the most surprising factor about mossy foot (podoconiosis) is its high prevalence. A figure of 5% of the population is given (Davey, 2010), hundreds of thousands are counted, a million are suspected in the active survey of the Sodo region and 2.5 million is a local guess-timate of the, as yet, unsurveyed regions.



**Figure 1. Bilateral podoconiosis and characteristic hyperkeratosis.**

Using a grading system developed for Ethiopia (Tekola et al, 2008), derived from many other previous staging systems for identifying the progression or severity of lymphoedema, much of the published work on mossy foot reveals classifications of grade 3 or upwards (Davey, 2010). Such cases present as enlarged feet with gross skin changes including hyperkeratosis (Figure 1) and nodules of fibrotic tissue over the toes (Figure 2).

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Figure 2. Nodules of fibrotic tissue covering the toes.



Figure 3. Characteristic 'mossy' skin changes around the toes.

Visiting five of the fourteen established centres for mossy foot in Ethiopia, the authors saw only a few cases with a higher grade condition. The majority of cases presented with bilateral foot swelling, which has the characteristic roughened 'mossy' texture and some papillomatosis, especially around the toes (Figure 3). It was seen that those patients who attended clinic and maintained a rigorous programme of self-care, improved their condition presenting with smooth, shiny intact skin over a moderately swollen foot. Patient

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feedback revealed that elevating the legs at night helped to reduce some of the softer swellings.

The authors were surprised by the number of affected persons who attended the clinics — up to 575 per month in one clinic. The 'cure rate' was also of note. In this context, 'cure' referred to:

- ▶ No more inflammatory and feverish episodes
- ▶ Reduced swelling
- ▶ Being able to wear shoes
- ▶ Daily washing
- ▶ Application of an ointment (Whitfield; 2% benzoic acid, 2% salicylic acid in petrolatum)
- ▶ Having a clear understanding of the need for regular care of the feet.

Examination and assessment are undertaken at the initial visit to the clinic and monthly thereafter. The maximum circumference of the swelling, assessed by tape measurement, is also recorded at each visit to the clinic. When a substantial reduction is recorded, the patient is seen to have 'graduated' and is supported by his fellow patients. With the word 'cure', patients realise that there is a requirement for life-long self-care in order to maintain this positive outcome. Once patients are seen to have smooth, shiny intact skin, indicative of care and regular wearing of shoes, they are invited into a rehabilitation scheme, enabling them to participate in society and earn a living once more.

The mossy foot headquarters in Sodo has a footwear workshop (Figure 4), where 20 persons make boots and shoes. These are manufactured and transported by road at the rate of >400 per month (for the present number of recorded patients, 800 are needed). Besides the use of footwear for long-term management of the condition, shoes are essential for children to prevent the onset of the disease by



Figure 3. The shoe-making 'factory' at the Mossy Foot Project, Sodo.



reducing exposure to soil. To date, the UNWives Group in Geneva has provided 1000 shoes for children and TOMS Shoes, USA, some 20,000. Due to wear and tear it is necessary to replace these every nine months to one year. In the authors' opinion, with a potential 2.5 million in need, this is a daunting, but achievable, objective.

While wearing shoes is a priority intervention, washing and emollients are of equal importance. However, washing involves clean water which is not always available. The authors visited Ethiopia with the intention of demonstrating Procter and Gamble's humanitarian drive to make clean water available using PUR ([www.pghsi.com/pghsi/safewater/development.html](http://www.pghsi.com/pghsi/safewater/development.html); <http://www.csdw.org/csdw/home.shtml>). This is provided in sachets of a flocculent which precipitates all contaminant material such as unidentified dirt, microbes, pesticides and heavy metals. One small 4g sachet cleans 10 litres of dirty water in 20 minutes. Paul Matts demonstrated, in a large, clear container of turbid, brackish water picked up from the river some miles away, that complete discolouration was achieved and all undesirable material precipitated to the bottom of the flask.

The authors noticed that the majority of the several 100 participants that they saw had intact skin. Terence Ryan pointed out that from those who had not achieved a positive outcome, this was not always due to neglect, but gross venous disease, a common reason for not bringing lymphoedema under control (Ryan, 2009). Whereas mossy foot is a bilateral disease, venous disease is often unilateral and is the commonest reason for a lymphoedematous leg developing ulcers (Figure 5). Oedema of podoconiosis tends to stop at the middle of the lower leg, whereas venous oedema is often up to the knee (Browse et al, 2003).

Congenital causes of lymphoedema will be seen in any large population. This could explain the case of an 11-year-old patient who presented at the clinic, who had experienced oedema up to his knees for the past three years.



**Figure 5. Podoconiosis not responding to wearing shoes and skin care. The site of the ulcer and surrounding pigmentation (and further examination showing venous incompetence), suggests that it is the accompanying venous disease that explains this poor response.**

Other causes contributing to, or compounding oedema should always be considered, such as heart failure or malnutrition (Browse et al, 2003). The latter is not uncommon in developing countries because those affected are often abandoned and have no income (Browse et al, 2003).

As discussed by lymphology societies, avoidance of trauma to the skin is an important theme in patient guidelines (Lymphoedema Framework, 2006). In Africa, easy and sustainable access to traditional healers exposes patients to some undesirable practises. Scarification (incision of the skin to let 'badness' out) causes chronic damage to the superficial lymphatic system and may be another explanation for incomplete healing. Scarification marks were frequently observed by the authors at the mossy foot clinics around Sodo (Figure 6).

Micro-finance/micro-credit schemes funded by a number of national and international organisations have proven successful. These focus on women who have often been abandoned and are extremely poor. Once it has been established that these women are looking after their feet and achieving good results, they are invited to join the scheme. Money is loaned and, to date, returns have been above 95%. The authors observed many smiling, well-dressed women exchanging funds with the organisers of the micro-credit scheme. When asked what they did for



**Figure 6. Scarification marks visible on the lower leg.**

a living, the staccato answers were 'flour', 'butter', 'cattle', and 'goats'.

Provided that there are no complications or additional causes of lymphoedema, mossy foot is easily managed and responds well to simple treatment. Previously, in Ethiopia, many people affected with podoconiosis had no support. However, this is no longer the case. Not only is the disability controlled and the handicap reduced, but those with mossy foot are participating members of their community, thus fulfilling the objective of complete 'cure'.

There are still unanswered questions and more research is needed about how to better combat the condition. The investigation of lung silicosis in the early days of the last century emphasised the importance of alkalinity in the determination of the colloidal form of silica (Heffernan, 1929). The authors carried out their own assessment of the soap distributed in Sodo and noted that it has a pH value of around 10. The following quote from an editorial in the *British Medical Journal* should be noted, 'The evidence in the case of alkalis and soaps, so far as it is known to me, is as follows. The most rapidly developing cases of silicosis in the literature have been reported in packers of siliceous scouring powders. These powders consist mainly of strongly alkaline dried soap made up with finely ground silica' (Heffernan, 1929). When these powders are wetted with water, the freshly made hydrosol is strongly absorbent and useful for washing, as it absorbs grease and oils. In Sodo, the alkaline soap appears to be effective, but perhaps it should be asked whether a more acidic soap, or other materials or washing protocols, would be more appropriate in view of the supposed role of silica in the causation of podoconiosis.

It is clear that societies aiming to eliminate the condition from resource-poor regions need to invest long-term

in the life of the patient. By providing footwear and educating sufferers about self-care, podoconiosis can be effectively treated and managed. Already in place is a successful model of care, but this should be maintained and expanded upon in order to ensure a secure future for sufferers in Ethiopia. JL

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### Key points

- ▶▶ Irritant soil, lack of footwear and poor self-care has meant that mossy foot is prevalent in areas of Ethiopia.
- ▶▶ Regular attendance at established clinics and the maintenance of a vigorous programme of self-care, can effectively manage and treat the condition, providing there are no complications or additional causes like venous disease.
- ▶▶ Despite the success of rehabilitation schemes, further action is needed to help provide adequate footwear, clean water and to experiment with washing materials in order to better combat the condition.

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