

The development of foot disorders is related to age and knowing this provides an opportunity for conscious prevention.

The foot is a marvellous arched structure. It fulfils a load-bearing role, carrying the weight of the body, and ensures extraordinarily varied movement. Just think of the different branches of sport, where the movements of sportsmen, pushing off from the ground and landing are carefully analysed. Perfect execution to reach the top of the winner's stand is measured in fractions of a second or a few centimetres.

To work properly the 26 bones of the foot, the ligaments connecting the bones and the special muscles need to be in harmony to carry weight and to function. The emphasis is on balance. If the load placed on the structure is excessive, damage and deformities occur. There are certain ages and situations in life which in themselves mean added burden and increased use. Expectant women are particularly at risk from the development of foot problems; increased body weight, altered distribution of body weight and changed hormones can lead to stretching of the ligaments in the foot and changes in the arch of bones.

The foot's arches

The healthy human foot rests on the ground on three points when standing: the heads of the 1st and 5th metatarsals and the heel bone. (Diagram 1)

Between these points there are spans reminiscent of arches familiar in architecture. (Diagram 2)

The arches in two directions, the longitudinal arch from the heel bone to the toes and the transversal arch at a right angle to it, ensure the load-bearing ability. The two feet placed next to each other form an arched dome-like structure. The arches are not rigid, and during walking the ligaments and joints between the bones absorb the jolts and make walking smooth.

The expectant mother's feet are subject to additional load as during pregnancy her body weight steadily increases due to the weight of the growing baby, the amniotic fluid and the placenta. This extra load, however, is not evenly distributed but is concentrated in the belly, in front of the centre of the body. To compensate for this, the posture characteristic of a pregnant woman develops. The increased weight itself is a burden on the structure of the foot to which hormonal changes and the negative effects of changed circulation also contribute.

A woman's body during pregnancy changes to bear her child, to bring it into the world and to feed it. The proportions of hormones alter to implant the fertilised ovum, to continue the pregnancy and to ensure the conditions necessary for the development of the embryo. As giving birth approaches, the levels of certain hormones change again, which results in the ability to stretch during birth and the loosening of connective tissue and ligaments. The hormones have an effect everywhere in the body. The ligaments connecting the bones of the foot likewise react to them and so the increased weight and slackened ligaments cause or may cause arches to drop. This explains the frequent development of flat feet or dropped arches and their consequences, bunions and hammertoe, during pregnancy. For women, foot problems, pins and needles, and the legs feeling heavy are part and parcel of the miracle of pregnancy, but after birth they do not disappear like other complaints of early pregnancy such as morning sickness, the frequent need to urinate, and pre-natal high blood pressure or diabetes. If arches drop, then even shoe size can change. Not infrequently, a woman's beautiful shoes carefully purchased before her first pregnancy simply don't fit after her baby is born. Wearing the right shoes and paying attention can prevent or reduce the development of foot problems.

A generation ago pregnant women on the street could be recognised by their shoes but the same cannot be said today. In practice pregnancy shoes are no longer worn, even though they were effective.

Pregnant women should pay attention to their footwear not only for their baby's safety (to avoid falls and twisted ankles) but also because the right choice of shoe can reduce the load on the arches. It is very important to wear safe, broad-heeled shoes when expecting a baby. While it is rare to see an expectant mother in high heels, completely flat shoes are often worn. Although as large an area of the heel as possible touches the ground with entirely flat shoes and this seems the safest, physiology contradicts the seemingly obvious solution. Such shoes do not favour the arches, while shoes with a 2-3 cm heel help support them, reducing the stress on the ligaments. Good-shaped shoes support the feet. Naturally, tight shoes should be avoided. Tight shoes often cause oedema of the foot and sooner or later the pregnant woman will stop wearing them. But it is good to remember that the shoe should hold the foot. This is easier to do in the winter when footwear which supports the ankle and lower leg is worn but harder for women expecting during a heatwave. In high summer, expectant mothers in flip-flops are a common sight. These are dangerous and are not good for the feet.

Orthotic insoles are the ideal support to relieve the weight placed on feet. An examination can determine for which pregnant women it is highly advisable to wear orthotic insoles, even if pain in the usual places, pins and needles, or cramp in the calf does not draw their attention to the changes of the foot.

Examining the sole of the foot from above is very difficult. If the foot is raised, its condition under pressure cannot be seen. To reveal the true situation, an impression can be taken with water or by stepping into plaster. A more modern means of examination is the computerised Pedikom procedure using a video camera, which is a Hungarian patent. With this the load on the foot is examined from below. A video recording is made of the sole while standing on a specially lit glass sheet, which, after it has been recorded on a computer (on a pressure map), can be analysed and deformities become clearly visible.

Normal feet

Fallen arches

Flat feet

No two fallen arches or flat feet are the same, and not simply because of differences in size. Like fingerprints, everyone has their own sole impression.

It is natural to have glasses made for your eyes, and so it should be natural to wear orthotic insoles made for your feet. The Pedikom system provides the opportunity to make individual orthotic insoles based on recordings of the sole.

During pregnancy circulation in the lower limbs changes. The increasing weight of the baby in the mother's womb impedes the return flow of blood in the veins of the legs to the heart. Frequently, venous diseases, distension of the veins and oedema of the leg develops. Unfortunately, there is nothing that can be done about it, but the extent of the change can be influenced by paying proper attention. The impeded return flow may be heightened by various factors. As a result of the hormonal changes during pregnancy, the connective tissue of the wall of the vein also stretches and becomes weaker. Veins do not have their own muscles. Blood from the sole returning to the heart is sent by contractions of the muscles in the calf and thigh squeezing the blood out of the vein. Valves in the veins ensure the flow is one-way and that the blood only flows towards the heart from valve to valve. In a vertical position when the muscle relaxes, the blood falls back to the valve, and then at the next muscle contraction it reaches the higher valve. When the system becomes ill, varicose veins develop, which can become inflamed and painful, and complications may occur. What is more, it is not a pleasant sight. An expectant mother can help her body by avoiding standing in the same place for a long time. When standing still, the movement of the muscles pumping the blood back to the

heart is reduced and so is the flow back to the heart. Every time the heart pumps, however, a new quantity of blood is pushed forward through the arteries to the legs. The blood collects in the legs and as a consequence the legs become swollen. If an expectant mother has to stand, it is best to pace and move the feet (rocking from toes to heels, flexing the calves) to help circulation in the veins. Blood flow is also impeded when sitting on a chair, especially a hard one, because the larger veins in the thigh are pressed together. It helps if pregnant women do not sit on the edge of a chair but lean back as much as possible and, if they can, put their feet on a stool to avoid pressing the veins together. It is not just what they sit on that can press the veins together, but also crossing their legs. It is best for pregnant women to refrain from crossing their legs even while their bellies allow them to do so, and when lying they should put their feet on a pillow to help circulation. Sport and swimming have a decidedly beneficial effect. It is important, however, that they consult their doctor to avoid any sport that may pose a risk to themselves or their unborn child.

People tend to press and massage painful, swollen legs. Massaging the calf can be good for the circulation in the veins during pregnancy, too, but it is important to know that if you have phlebitis or any infection of the leg you shouldn't massage the calves. Massaging the foot is a different thing and expectant mothers who have not tried this before should only begin after they have given birth. Massaging the reflex zones has different effects on the body. Particular attention must be paid to the lesser pelvis during pregnancy for those who have already taken part in foot massage and are going for such treatment during pregnancy as well. Only an expert with a thorough knowledge should massage the feet during pregnancy. The principle of *nil nocere* (no harm) is even more valid here: it is better not to massage than harm the baby. When a pregnancy is at risk, foot massage is forbidden.

Due to the increased weight and impeded venal circulation, perspiration of the feet can increase during pregnancy, which can lead to fungal infections. Thorough foot hygiene is especially important at this time.

Shoes with a comfortable width that hold the foot, perhaps pregnancy shoes, an orthotic insole if necessary, wearing cotton socks, and foot exercises are all small things that nevertheless require attention. After the miracle has happened and the child is born, it becomes clear how worth while it was.