

# ATTIPAS SCIENTIFIC RESEARCH

Wearing the right footwear is important for infants and toddler's to form a normal walking pattern. Therefore, kinetic analysis of walking pattern presents important data for the development of baby footwear.

Based on kinetic and plantar pressure physio-dynamic test of toddler's walking, Attipas enables steady and stable walking pattern, in terms of angle of the leg joint, Attipas helps to brain development by feeling the sole and toe movements, Attipas correct toddler's walking behavior.

Attipas relates to shoes for infants, and more particularly, to shoes according to the walking characteristics of infants and toddlers, not adults

## Background :

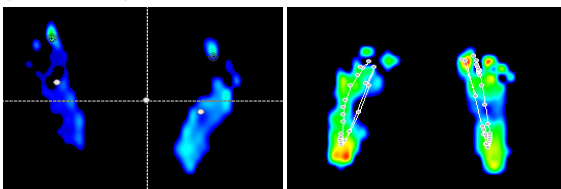
What is plantar pressure assessment?

Measurements of plantar pressure provide an indication of foot and ankle function during gait and other functional activities, because the foot and ankle provide both the necessary support and flexibility for weight bearing and weight shifting while performing these activities.

The use of force platforms is the method most commonly used to assess the interaction of the foot and the supporting surface. The force platform provides valuable information regarding both the vertical and shear components of the ground reaction force.

Plantar pressure assessment change depends on age and position

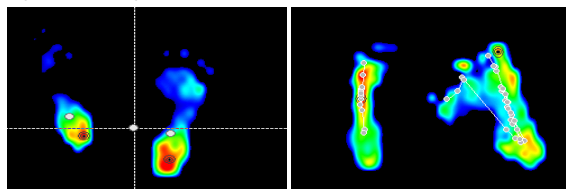
(11 months )



Standing position

Walking

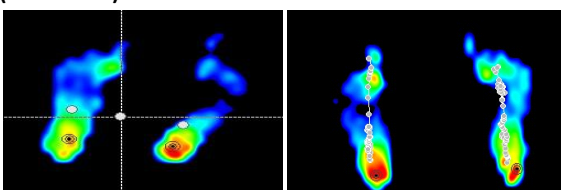
(24 months)



Standing position

Walking

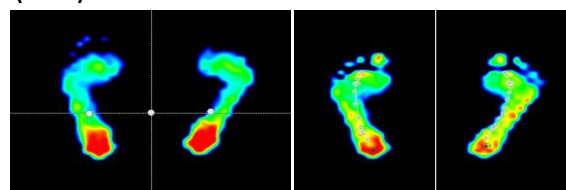
(36 months)



Standing position

Walking

(Adult)



Standing position

Walking

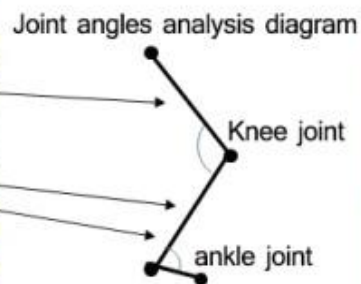
### Methods :

- Three participants, aged 1 to 3 years were recruited : PSY, SSS and KHJ
- Data from three tests walking trials were collected :

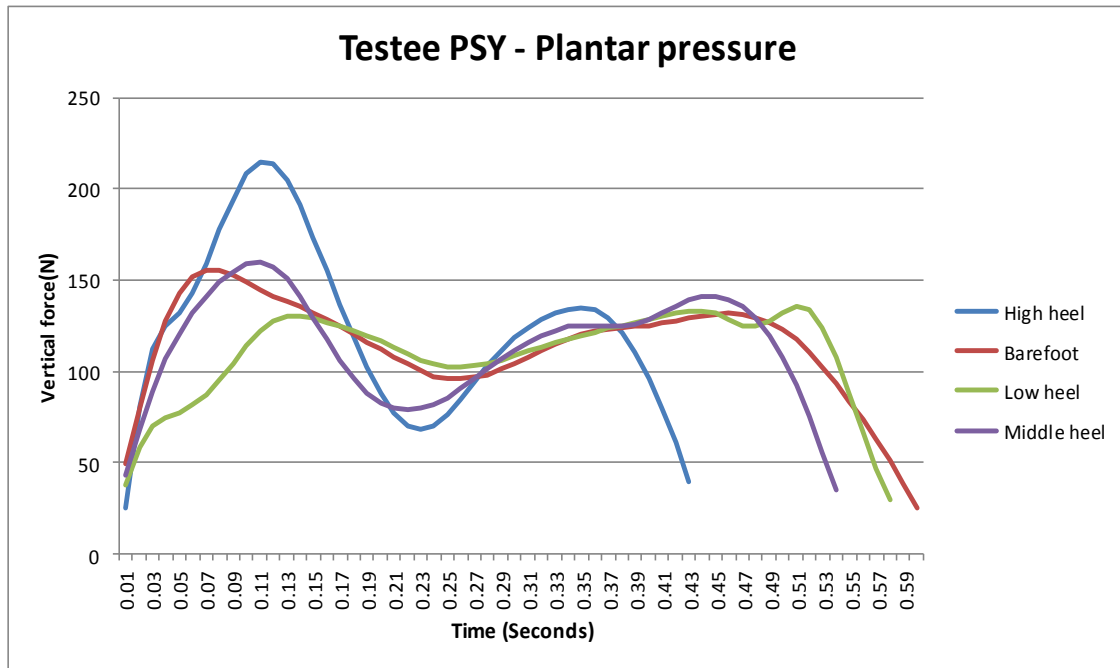
**1st test :** Plantar pressure - using barefoot, soft shoes, hard shoes  
- using barefoot, low heel, middle heel, high heel

**2nd test :** Ankle angle changes - using barefoot, soft shoes, hard shoes  
- using barefoot, low heel, middle heel, high heel

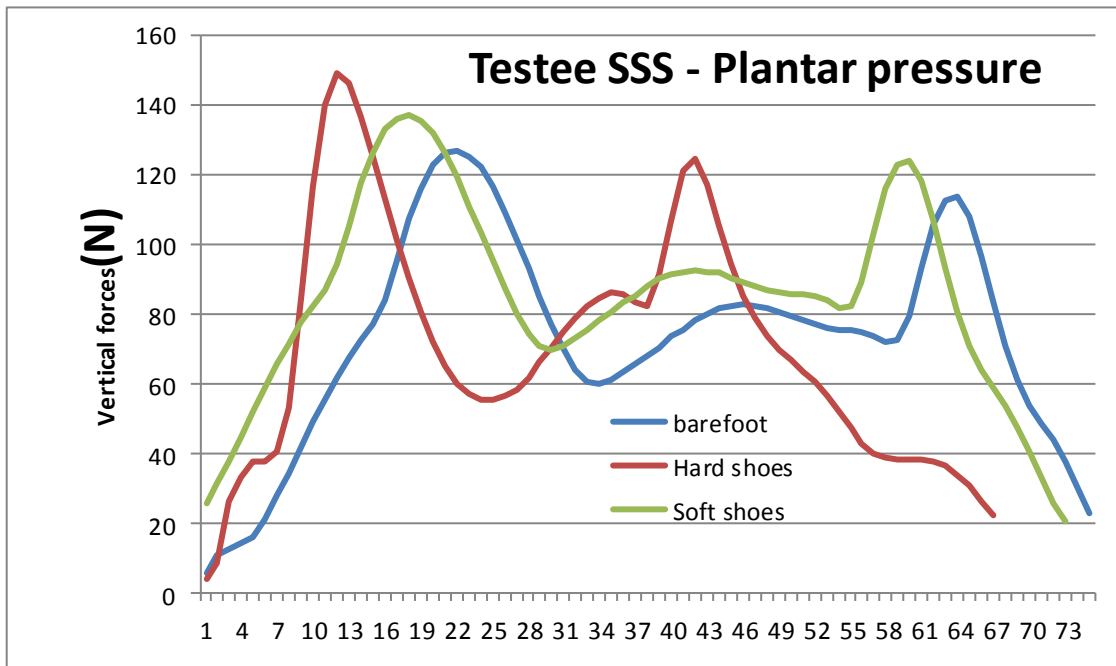
**3rd test:** Knee angle changes : - using barefoot, soft shoes, hard shoes  
- using barefoot, low heel, middle heel, high heel



**1st Test Plantar pressure**



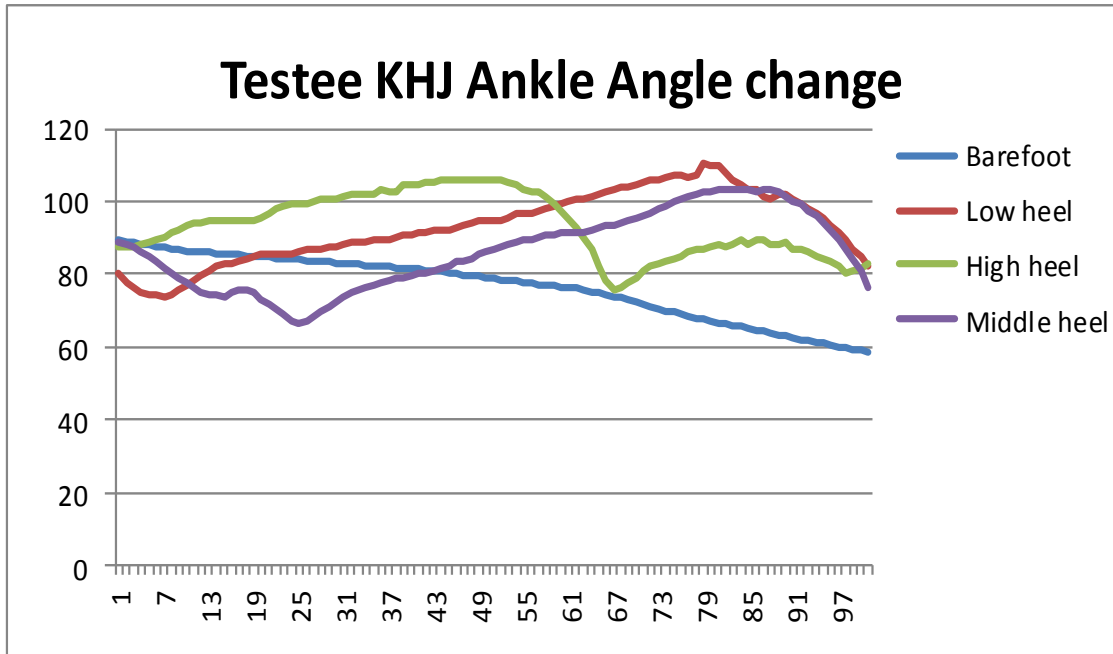
The test proves that the plantar pressure change rapidly while wearing high heel shoes, changes which can affect the good walking pattern



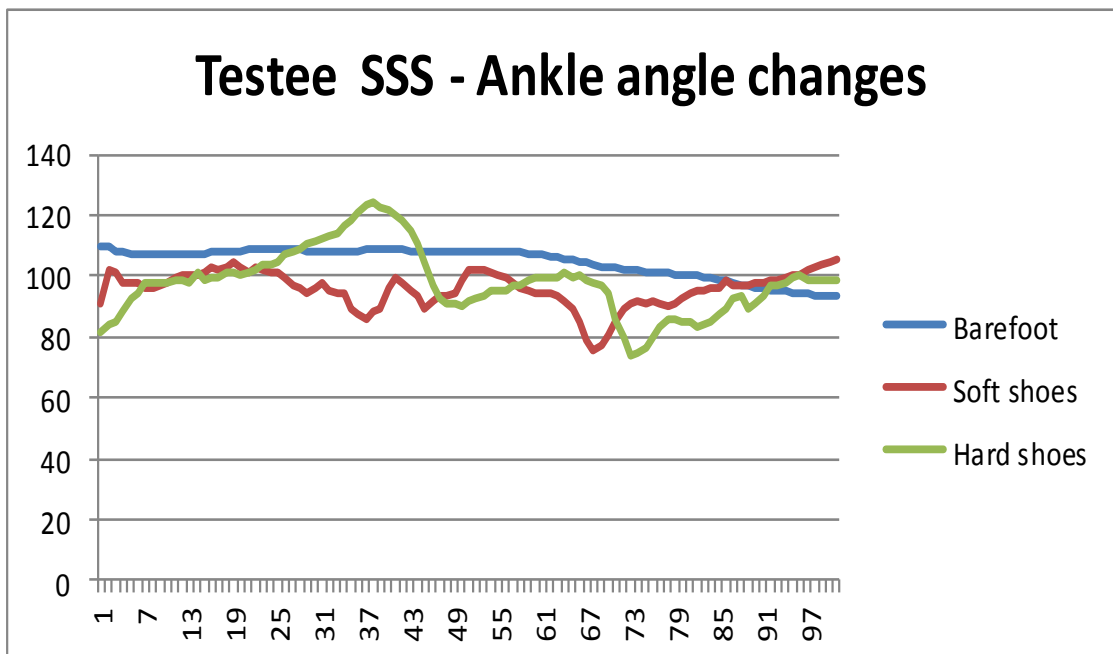
The graphic shows unstable pattern of plantar pressure when baby wear hard shoes, especially when they start to walk, the pressure is higher than normal, more than when they wear soft shoes or barefoot.

Result : The 1st Test (Plantar pressure) shows that low and soft shoes are the most adequate for the babies. Graphics proves that low and soft shoes are almost similar as barefoot.

2nd test Ankle angle changes



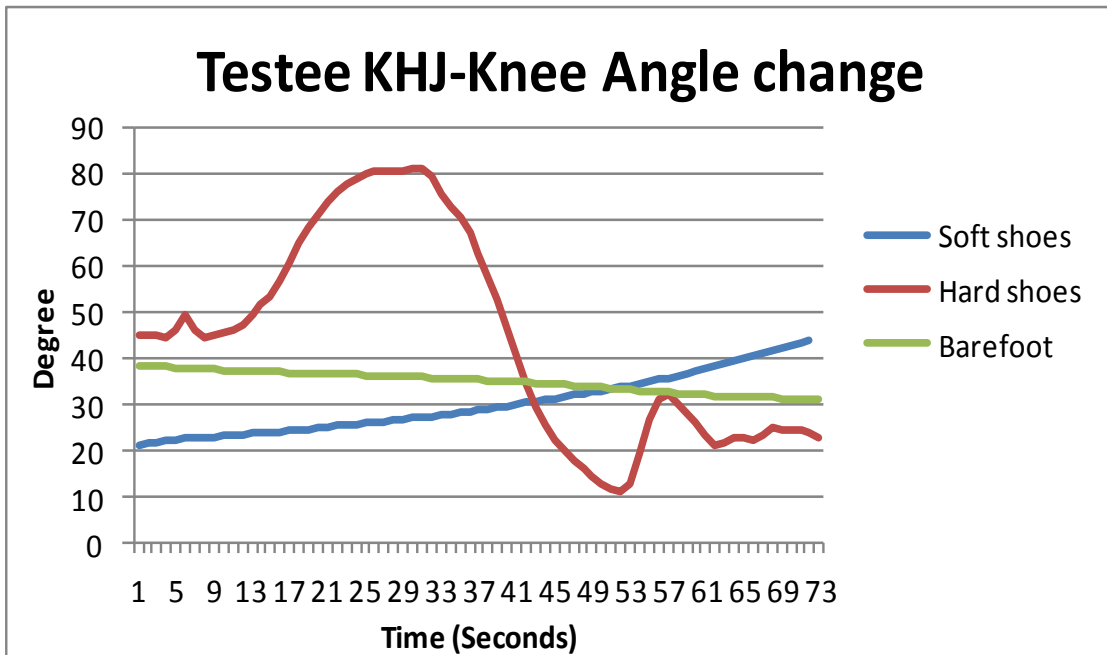
While babies are wearing high heels the ankle angle suddenly changes. The ankle angle is forced to change after few seconds when the babies are starting to walk using high heels.



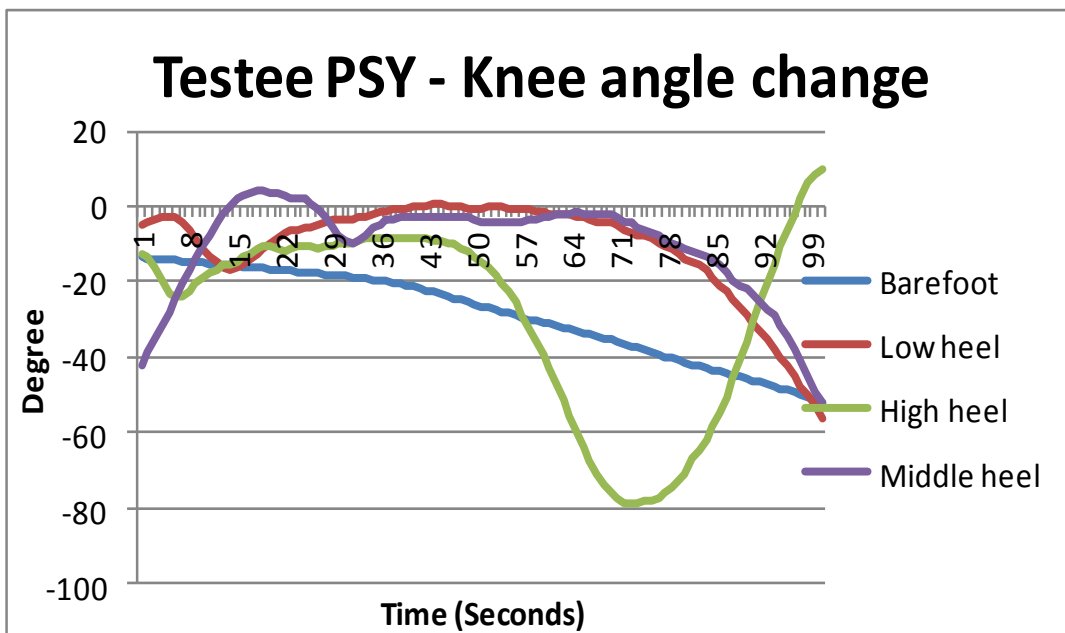
The graphic shows that the barefoot and soft shoes barely change the angle of ankle while hard shoes suddenly change the ankle angle drastically.

**Result :** The 2nd Test (Ankle angle changing test) shows that low heel and soft shoes are slightly changing the ankle angle. The test suggest that the soft shoes with low heel are recommended for good walking of babies.

3rd test Knee angle changes



Hard shoes induces excessive use of knee joints and bother the normal walking pattern, therefore the knee is forced to change the angle in order to keep the balance.



The graphic shows that compared with barefoot, low and middle heel shoes, high heel shoes makes baby to use their knee abnormally, therefore the knee is forced to change the angle drastically.

**Result :** The 3rd Test (Knee angle changing test) proves that high heels and hard shoes can affect the good walking of babies by changing the knee angle and force the knee to be used abnormally.

## CONCLUSION

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From the results of the tests, we could figure it out the best choice of a fast and good development of our babies feet is barefoot. But due to the natural and social circumstances, our babies cannot have their feet naked all the time. So the shoes for infants and toddler's were created.

Basically the shoes for infants and toddler's have the role to protect their feet and offer them the support when they start to walk. However the existing shoes for infants and toddler's are produced without consideration of physical form characteristics (fan shaped sole of the feet) and gait characteristics. In other words, they are keeping the same shape and structures like for adults, existing the risk of bad development of walking patterns, or worse, decline in cognitive behavioral development and intellectual development.

If the babies are restricted to wear inadequate shoes, their feet will have abnormal growth, malformation or physical development imbalance. When babies are wearing the existing shoes, the center of gravity rises as high as the thickness of outsole. As the result, they have a difficult to balance their body.

Learning from others mistakes and making the adequated researches, Attipas was created to overcome all the above problems. The front part has enough space for toes, has the fan-shaped form in accordance with shape differences of infants and toddlers which can provide stable walking and cognitive behavior development.

It has internal space which becomes wider as from the back to front, without existing any interference between shoes and feet. The sole is made from soft and flexible material, so the smooth movements of feet are possible. In addition, Attipas has minimized thickness of its sole, and the entire center of gravity of the infants also becomes minimized, which makes our babies feel more confident and keep the body balance while walking.

Attipas shoes are the new type of shoes created in accordance with foot shape and walking characteristics of infants and toddlers. Attipas shoes are divided into three parts; the fore-end space where toes are placed, the middle space where top of the foot is placed and the rear space where heel is placed. The length of internal space is between 110mm and 140mm. And at the position 80~85% from the rear-end, the high of internal space is between 20mm and 30mm (the height of outsole).

