



University of Al Mustaqbal
Biomedical Engineering Department



Biomechanics Design Lab

Dr. Ameen M. Al-Juboori

Experiment # 4

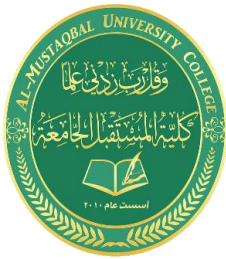
Foot Plantar Pressure (Dynamics Test)

Introduction: -

Since birth, our first involuntarily movement is walking, which is any human's daily activity and gait plays an important role in the human movement. The synchronization of both neural and musculoskeletal systems is essential to achieve stability and balance of the body during movement. Analysis of gait parameters plays an important role in the evaluation of different factors. The feet are the major source of support during gait and are corresponding to the rapid changes of the surrounding and thus, are exposed to large force. The deduction of the human foot pressure distribution can provide the essential information and thus, greatly assist the medical diagnosis. This foot plantar uses the FSR, force sensitive resistor sensors to collect the necessary data which is then processed to give digital output. These values are fed in a software to give a pedobarography image that depicts visually the different pressure distribution of the foot. The study of pressure fields acting between the plantar surface of the foot and a supporting surface is called pedobarography.

Feet are in contact with the surrounding environment during motion and thus, interact with the ground. Many activities are solely possible due to the movement of feet such as walking, running. Thus, the importance of feet in daily activities is immense and so proper care should be taken to avoid injury. To analyze the condition and suitable standard of feet is with the help of foot plantar characteristics. Thus, an accurate and secure measurement system for foot plantar pressure is imperative.

Footwear has been one of the first factors for determining the foot plantar pressure. 1997



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witnessed the influence of mean peak plantar pressure on shoes with and without viscoelastic insoles, thus, giving the optimized effective result. In time, many various studies were available for foot pressure measurement and designs of footwear for non-disabled people. It was deduced rocker bottom shoes would reduce pressure under the first and fifth ray (metatarsal head) and thus, they were also used to decrease the foot pressure beneath the forefoot. These metatarsal heads are frequently the position of ulceration in patients with imbalance muscle deformity. It was concluded that the future shoe pattern will be different according to gender to avoid the metatarsal head formation as the plantar pressure varies between the two genders, men and women.

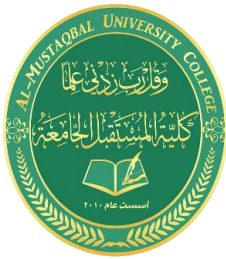
Considering the applications that are connected to disease diagnosis, many scientists have determined that foot problems are mainly because of diabetes that causes extreme foot plantar pressures in specific sites under the foot. Diabetes is now considered as a widespread condition and, according to reports; the number of patients suffering from diabetes is ever increasing. Balance is considered as a top priority for various sports and other biomedical applications such as soccer balance training and forefoot loading during running. Pressure distribution is promptly seen in aged and other impaired personal due to the gait instability. Thus, it is essential to develop and create capable techniques to measure the foot plantar pressure precisely and with efficiency.

Objective:-

1. Investigate the variation in foot plantar pressure during walking.
2. Investigate the variation in the surface area during walking.
3. Tracking the bodycenter during walking for the right and left foot.

Apparatus: -

1. Laptop.
2. Tactilus Foot plantar pressure.
3. Biomech Studio software



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Procedure: -

1. Connect the foot plantar pressure device to the laptop.
2. Start the Biomech Studio software.
3. Set up database for the test.
4. Select dynamic test.
5. Choose five test subject.
6. Ask the test subject to stand in front of the device. Ask the test subject to walk on the platform using his right foot. Ask him to turn and walk on the platform using his left foot.
7. Save the date.
8. Repeat steps 5-7 for the remaining test subjects.

Data Analysis: -

Record the required information in the table below:

Test subject	Median pressure		Average pressure		Integral Pressure	
	Left	right	Left	right	Left	right
1						
2						
3						
4						
5						

Discussion: -

1. Discuss the pressure variation during walking?

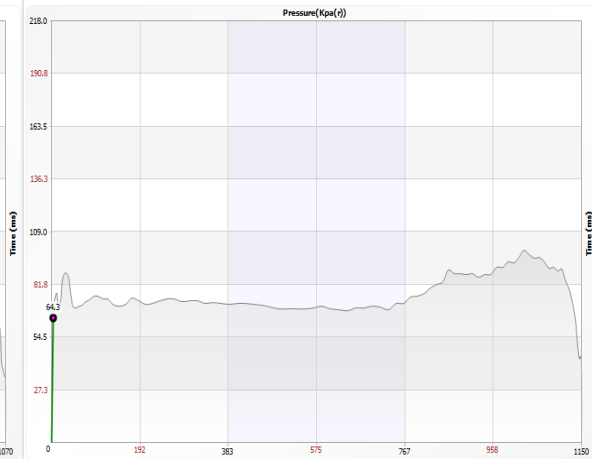
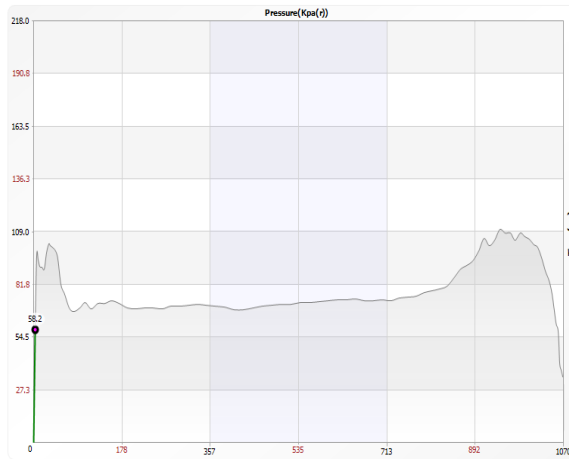


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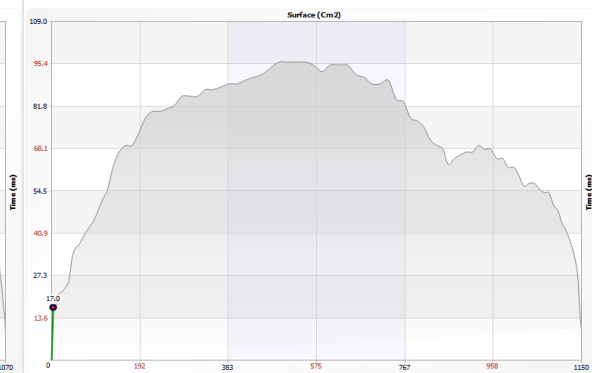
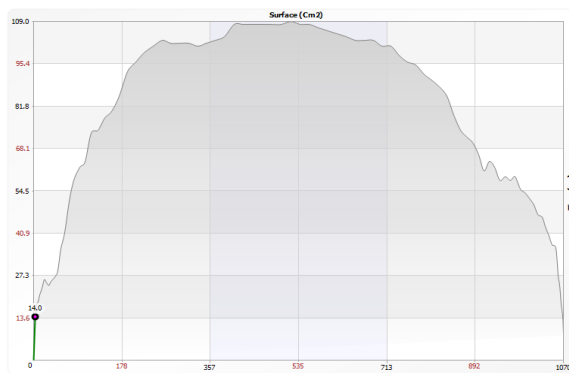


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2. What is the relation between the three rockers during gait and surface area?



3. Mark the subphases of gait cycle on surface area graph?
4. Discuss the reason of variation in the results between the three test subject?
5. What are the sources of error in our experiment?