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參展科別 醫學與健康科學

作品名稱 **Overcoming Motion Disorders**

得獎獎項

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Abstract

Helping in overcoming the motion disorders is an important thing which deserve striving for. Every year number of people who have MS or paresis (paraparesis) is increasing. The device has effective results for the patients and it backs to finding the conditions of natural treatments in the device. Obviously, this device helps them to keep standing and achieve the required exercises the movement like normal people by using their hands. The degree of improvement differs from person to another as depends on the hardness of the disease and injury kind.

Introduction





Motion disorders is a challenge which is faced by lots of people and every year the rate of injured increases. Multiple scleroses and paresis in the lower part of the body are the common diseases which cause motion disorders.

Paresis refers to a condition in which muscle movement has become weakened or impaired. It may also sometimes see it referred to as “mild paralysis” or “partial paralysis.” Multiple scleroses (MS) causes inflammation and temporary lesions. It can also lead to lasting lesions caused by scar tissue, which can make it hard for the brain to send signals to the rest of your

body. So, it causes disorders in the patients' legs and forces him to use natural treatment. This device will help in Physical rehabilitation for the previous cases and the similar cases of them.

The device keeps the patient standing with straight knee to help people who have lack of tendons

Materials

<u>Material</u>	<u>picture</u>	<u>Amount</u>	<u>price</u>
<u>wire</u>		<u>6 meters</u>	<u>25 L.E</u>
<u>wheels</u>		<u>8wheels</u>	<u>25 L.E</u>
<u>Nails and nuts</u>		<u>10 pairs of nails</u>	<u>20 L.E</u>
<u>smooth pullies</u>		<u>8 pieces</u>	<u>400L.E</u>
<u>Painting</u>	<u>-----</u>	<u>-----</u>	<u>300L.E</u>
<u>Handle</u>	<u>-----</u>	<u>2 pieces</u>	<u>100L.E</u>

Methods

The parts of iron were soldered to others and it was made the form of rectangle walker. Nails and nuts were attached to the iron parts to be installed. The iron base was made with the design of entering a piece into another to make the design which makes the walker's levels. The 8 smooth pulleys were illustrated with nails and nuts in four directions in both sides of the walker (right, left, up and down) to load the wire on them. 2 meters of wire were attached to the right side and 2 meters to the left side. Then, the wire in each side was attached with the handle and pass over 4 smooth pulleys and attached to the knee joint to make the source of movement effects on the leg directly. After that It was soldered a supporter for the walker to prevent the patient from falling and a pole which make as the gate of the device in front of the patient to increase his safety inside the walker. After completing the whole components, it was realized that the movement still hard relatively. So, it was decided to add a motor which can move the iron leg forward and backward by taking the imperative from the patient.

Analysis

At the beginning of achieving the design, it was intended to make a primarily design to illustrate the idea and make it understandable. It consisted of a normal walker and an embodied to represent the patient. It was used threads to attach the leg of the patient and connect it to the hand to make



the source of the motion are hands as shown in the figure (2).

Figure(2).

The previous form helped in imagination the actual prototype by determination the design requirements.

It was improved to the actual form to be applicable and suitable for the patients. Two iron legs were installed in the outer side of the patients' legs to make an integration between legs and hands as shown in figure

(3).

figure(3)



Additionally, it was made the rectangle iron base and poles over the rectangle to install the pulleys. As shown in the figure (4)



Figure(4)

Although the patient already moved after the experiment, the motion still hard and need for a large effort. Consequently, it was decided to put a motor in the motile area of the wire to be able to take the imperative from the patient and burn the motor when pull or push the 2 handles which makes the motion easily and achieve the benefit form the device as possible.

It was got the final form as shown in figure (5)



Figure(5)

Results

After spending more time searching about the challenges which face paraplegics and try to solve them by manufactured the walker it was resulted that: not only people who have paraplegia can benefit from the device, but also people who have disorders on their movements, installed new limbs in their legs, injured by accidents and had surgery operation in knees.

As a result, it was achieved that

- The patients can depend on themselves from waking to sleeping depending on a supporter with a large person.
- Additionally, walker saves the patient from falling by the put supporter in front of the patient.
- Furthermore, it became suitable for more than a person with the different size of the body according to the multiple levels.
- Putting motor make the motion easy and reduced the require effort form the patient.
- The patient can move freely in all directions according to 4 directions' wheels.

Conclusion

Putting a knee joint on the iron legs, facilitates the patient's ability to take the right step.

Manufacturing 2 handles on the wire, helps the patient to control the movement more.

Being the rough lower part of the leg, increases the friction to the earth thus, increasing the performance of the step.

Soldering a small chair under the standing level of the patient, protects the patient from falling.

Decreasing the area of the walker, increases the patient's ability to move at home and street easily.

Resources:-

Multiple Sclerosis - Stat Pearls - NCBI Bookshelf,
<https://www.ncbi.nlm.nih.gov/books/NBK499849/> , date accessed:
April 15,2022.

Mayo Clinic Date published: January 07.2022
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Multiple Sclerosis - StatPearls - NCBI Bookshelf
<https://www.ncbi.nlm.nih.gov/books/NBK499849/>

Weakness, paraparesis (Chapter 85) - Neurologic Differential Diagnosis,
Cambridge Core, May 10, 2022

<https://www.cambridge.org/core/books/neurologic-differentialdiagnosis/weakness-paraparesis/EFEB8369D5431491D2C3A5946D14D0>

Paraparesis (paraplegia), tetra paresis (tetraplegia), urinary/fecal incontinence. Spinal cord diseases, Problems in veterinary medicine, May 2, 2022, <https://pubmed.ncbi.nlm.nih.gov/1802259/>

Non-surgical approach helps people with paralysis move their legs, University of California, July 30, 2015, <https://www.universityofcalifornia.edu/news/non-surgical-approachhelps-people-paralysis-move-their-legs>

<https://www.mayoclinic.org/diseases-conditions/multiple-sclerosis/diagnosis-treatment/drc-20350274>

【評語】 090019

This an exciting project with a delicate design to facilitate the rehabilitation of movement disorders. The judges are pretty impressed by the demonstration of the prototypes of the assembly of the designs. Several things could be enhanced :1. The demonstration by a real person using it to demonstrate the feasibility of safety. 2. Some discussions of the comparisons of this design to other available tools and see why this design might be better.