

PALINDROMIC RHEUMATISM

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Abstract:

This scientific report discusses palindromic rheumatism - a rare type of inflammatory arthritis which causes stiffness, swelling, and pain in joints. Palindromic rheumatism can attack at any time, diminishing the quality of life by leading to disabilities and physical constraints. As of now, there are no treatments which completely resolve arthritis. Conventional treatments are possible, but are costly and inaccessible in areas such as China and India, places with highest reports of arthritis. In response to this preceding, we have developed a cost-effective and eco-friendly product, named **WristEase**, which is designed to alleviate the pain and discomfort, using sustainable materials. This report outlines a clean development process with the type of materials being used, and the scientific reasoning behind the innovation.



(Image 1.1)

Introduction:

2.1. Context:

Palindromic rheumatism (PR) is a rare autoimmune inflammatory condition characterized by recurrent, episodic attacks of joint pain, swelling, and stiffness. Although first described in the early 20th century, palindromic rheumatism remains relatively understudied compared to other rheumatic diseases, such as rheumatoid arthritis (RA) and psoriatic arthritis (PsA). Despite its rarity, Palindromic rheumatism poses significant challenges in diagnosis and management due to its unpredictable nature and possibility of progression to more severe forms of arthritis. This study focuses to develop and evaluate the effectiveness of a sustainable device for managing palindromic rheumatism symptoms. Specifically, we hypothesize that the use of **WristEase** - our product - will provide non-invasive, drug-free relief from joint pain, swelling, and stiffness during Palindromic rheumatism flare-ups, therefore improving the patient's quality of life and reducing the need for pharmacological interventions.

2.2. Overview of Previous Research:

Previous research on palindromic rheumatism has mainly focused on describing its clinical characteristics, disease progression, and a possibility of overlap with other autoimmune conditions. Early studies by Hench et al. in 1944 and Holman et al. in 1952 provided some of the earliest descriptions of PR, highlighting its notable episodic pattern of joint involvement and the absence of radiographic evidence of damaging changes during remission periods. Following investigations by Gonzalez-Lopez et al. and Gonzalez-Gay et al. in 2010, further classified the demographic and clinical features of Palindromic rheumatism patients, emphasizing the diversity of symptoms present and the variable progression to chronic arthritis. While these studies have contributed insights into the clinical spectrum of Palindromic rheumatism, there remains a lack of research on sustainable management strategies for this condition. Current treatment guidelines usually recommend conventional pharmacological therapies, such as NSAIDs and DMARDs, which may not fully address the fluctuating nature of Palindromic rheumatism symptoms and may carry long-term risks for patients. Furthermore, the environmental and economic sustainability of pharmacotherapy has received limited attention in research. Therefore, this study aims to build upon existing knowledge by developing a sustainable device for managing Palindromic rheumatism symptoms. The goal is to integrate principles of sustainable healthcare innovation to address the unmet needs of Palindromic rheumatism patients while minimizing the environmental footprint of treatment modalities.



(Image 2.1)

Materials:

- Bamboo fabric was used in this innovation as the inner layers which covers and protects the materials inside WristEase. The fabric was used in this design as it contained many benefits such as being hypoallergenic, eco-friendly, and sweat absorbent. The fabric would feel smooth and soft, making it easier on the patient to wear on their wrist while working.
- An organic cotton cloth with water-resistance coating was also used as the outer layer of WristEase in order to make the design water-resistant, which would be useful for daily use.
- WristEase uses cotton as the padding within the layer of the wrist band as cotton would provide a cushioning effect, flexibility, hypo-allergenic, and has breathability, making it the best filling to use.
- A recycled, thin metal sheet is used as one of the inner layers. The metal sheet adds strength to the critical areas without adding heavy weight to the wrist, which would support the build of the design.
- Biodegradable gel packs are used in this design as they can provide heat and cold therapy for the wrist in order to cool down the inflammation of the arthritis. Biodegradable gel packs are also eco-friendly as they are usually made from materials which can decompose naturally.
- Eco-friendly drawstrings and wooden buttons are used in this design to secure the wrist band in place and to adjust the tightness of the band itself, as it varies from person to person. The button acts as a timer to let the wearer know when to heat/cool up the biodegradable pack.
- Jute thread used for stitching the products together and to open and close the item to get access to the gel pack.

Method:

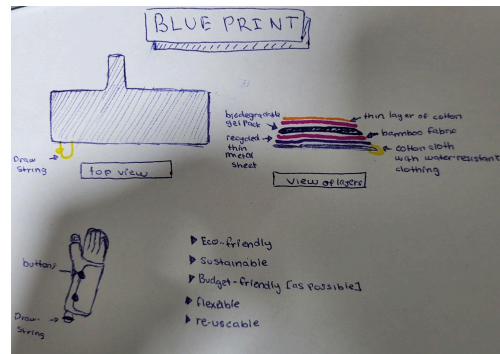
4.1 Techniques:

In order to create **WristEase**, we choose suitable materials which can ease and comfort the pain of the inflammation. Before making the product, make sure to cut and shape the selected materials according to precise measurements to create the components of the wrist band. This involves cutting the bamboo fabric, organic cotton cloth, and other materials to the appropriate size and shape needed for assembly. Layer the materials together in a specific order to form the structure of the wrist band (stated below):

1. Creating **WristEase**:
 - a.) Start off by laying down the cotton cloth with water-resistant coating, according to the needed hand measurement.
 - b.) Apply a layer of the bamboo fabric.
 - c.) On top of the bamboo fabric, apply the biodegradable gel pack. Make sure the gel pack is smooth and even.

- d.) On top of the biodegradable gel pack, apply a thin layer of metal sheet.
- e.) Attach the drawstring at the bottom of the creation and sew it all together to close the layers.
- f.) Turn the product around and sew two buttons with the natural rubber on top together, which contain the battery for the remainder of when to heat/cool the gel pack.

(4.1)



Through the manufacturing process, conduct thorough quality checks to ensure the comfort and functionality of the final product. This involves inspecting each component step to identify any defects and addressing them promptly to maintain product quality. The main aim with WristEase is to help people dealing with palindromic rheumatism by providing a wristband that eases their pain and reduces inflammation. It is to be comfortable to wear and using heat and cold therapy and cushioning, in hopes that it will offer targeted relief where it is needed most. Since it is a sustainable product and eco-friendly, it is made of recycled materials and biodegradable components. The goal is for WristEase to be adjustable and customizable, fitting each person's needs just right. Ultimately, it is targeted to give people with palindromic rheumatism a sense of control over their symptoms and helps them live fuller lives.

Discussion:

5.1. Results:

This innovation has shown promising results by providing relief to the individuals who are facing palindromic rheumatism (PR). By utilizing cost-effective materials such as bamboo textile, thin metal sheets, cotton, wooden buttons, etcetera; we have created this innovation. The use of biodegradable gel packs help in serving temperatures by staying cool or warm. The reinforcement with the help of sustainable duct tape and jute strings help in stability and durability. The remote has a button that has to be clicked when a person has WristEase on, it has an automatic beeping sound that will ring once it is time to change the biodegradable gel to either warm or cold depending on what temperature it was set to previously. This was made to make sure our innovation has a complete look. Our group decided to use sustainable batteries to make the remote. The remote is layered with natural rubber.

5.2 Scientific thinking:

Our design integrates principles from ergonomics and material science. Ergonomics is a trend and it is highly expensive, but using less expensive materials have helped us reach our goal in making ergonomics available to citizens facing palindromic rheumatism (PR). The materials we have chosen to make our design are highly comfortable and do not require any additional support. Keeping all the types of climatic conditions in consideration, the innovation's final layer is a thin metal sheet which is waterproof. Having the final layer as waterproof helps the individual have comfortable time outdoors. The remote added with the innovation is really helpful for older people because they tend to have handy materials that are easy to operate rather than using apps which need access to devices and the internet. We have made sure to use sustainable batteries in order to use energy in an efficient manner and using biodegradable materials helps earth be a better place. Natural rubber has been used to add a layer to the battery. On top of that, attached to the battery, a button has been added. Conductivity of electricity was also taken into consideration and we came to a conclusion on how natural rubber is an insulator and it was safe to use when exposed to water as hydroelectricity might lead to current shock.



(Image 5.1)

Conclusion:

To conclude with, our innovation "WristEase", offers comfort, cost-effective ergonomic feel. Our team came up with efficient and sustainable items to create this innovation. Using sustainable items and creating this is also environment-friendly, and helps earth be a better place. We believe that this innovation will be taken into consideration by patients suffering from arthritis and hope they get general relief. Arthritis is not easy to manage since it interrupts one's daily life a lot. Finding something affordable to get relief is something a person facing it would expect; our goal is to make sure that no matter which economic status one belongs to, they feel the same when it comes to health. Technology has taken over nature, and should be considered as a false statement, since students are able to come up with something that uses minimal technology, user-friendly, sustainable and most importantly affordable.

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