

# Medicated Surgical Braces

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## Abstract

In current scenario, several surgical braces are available for different body parts like knee, elbow, back etc. for several clinical conditions, especially pain in that part of the body. All these supportive treatments are aided by some medication through oral route, which produces several side effects on prolonged use. Present work endeavors to combine these different treatments: supportive and medicated treatments by incorporating sustained release medicated topical patch into the inner side of surgical braces through specially designed patch holder mechanism for easy incorporation and removal of patch. It not only eliminates need of oral medication but also gives localized administration of medication, thus resulting in more patient compliant treatment with improving overall safety profile. For developing model prototype of the same, combination of surgical knee brace and oral NSAID (diclofenac) was selected. In order to execute the working prototype, a pocket mechanism to incorporate a sustained release patch of 7 cm X 7 cm size was designed. Patch formulation was randomly selected based on trial batches for sustaining drug release up to 12 h, considering put on- put off phases of brace of 12 h each. The pocket was designed in such a way that in case of any discomfort or other unfavorable conditions, it can be easily removed from the brace. Flexibility in terms of size, shape and drug release profiles proves its versatility for other supportive braces and medications. Thus this innovation can be easily extended for other braces like elbow braces, shoulder braces, back braces etc. It not only enhances efficacy of the current treatments but also improves patient compliance significantly.

## Introduction

- ✓ Current scenario for joint pain treatment is broadly classified under three categories:
  - i) Medicines;
  - ii) Surgical supports and
  - iii) Other novel treatments like gene therapy, stem cell therapy etc. [1]
- ✓ Body joint pain is extremely common situation. In one national survey, about one-third of adults reported having joint pain within the past 30 days. [2]
- ✓ It is need of the hour to develop a fast and effective treatment for the same.
- ✓ Unfortunately none of the above treatments are fully fledged for relieving joint pain.
- ✓ Combination of first two treatments is widely acceptable by medical practitioners.
- ✓ Major limitation for the above combined treatment is the side effect of medicines, usually NSAIDs.

## Objectives

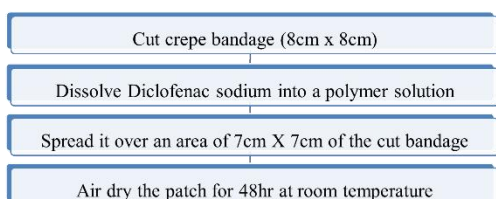
- ✓ To combine two different treatments for joint pain
- ✓ To design a medicated topical patch
- ✓ To design a pocket type patch holder mechanism
- ✓ To develop a working prototype of a medicated knee brace using a model NSAID drug.

## Materials

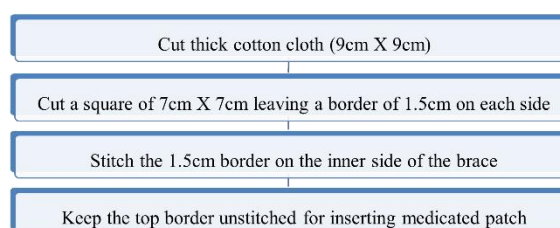
- ✓ Diclofenac sodium – commonly used NSAID [3]
- ✓ Surgical knee brace
- ✓ Crepe bandage
- ✓ Polyvinyl alcohol (PVA)
- ✓ Polyvinyl Pyrrolidone K-90 (PVP K90)
- ✓ Thick cloth for patch holder mechanism

## Methods

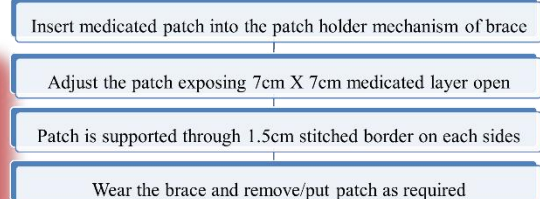
### A) Preparation of Medicated Patch



### B) Preparation of Patch Holder Mechanism



### C) Preparation of Prototype Medicated Knee Brace



## Results and Discussion

- ✓ Illustrative images for patch holder mechanism are shown in the figure below.
- ✓ Patch formulation can be modified to adjust drug release.
- ✓ In present prototype, 12h drug release profile was set considering 12h brace put-on time in a day.
- ✓ Size and shape of the patch can be varied as per the surgical brace size and shape.
- ✓ Improved patient compliance by elimination of side effects of oral medication.
- ✓ Effective and improved joint pain management by combination of two treatments.
- ✓ Presently, no such product is available in market. Hence it will open a new segment in market.

## References

- 1) <https://www.webmd.com/pain-management/guide/joint-pain#1> [WebMD Medical Reference Reviewed by David Zelman, MD on June 17, 2019]
- 2) CDC: "QuickStats: Percentage of Adults Reporting Joint Pain or Stiffness - National Health Interview Survey, United States, 2006."
- 3) Nair B., Taylor-Gjevre R. A Review of Topical Diclofenac Use in Musculoskeletal Disease. *Pharmaceuticals* 2010, 3, 1892-1908.



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