

# Beware! your mouse can bite your hand!

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When a typical form of work is extensively performed repeatedly over a large time span (years) it causes R.S.I. (Repetitive Stress Injury). Today, a person having a sedentary job works on the computer for an average of 8 hours. Having a static posture during computer work (especially with an improper posture) results in R.S.I. that mainly affects the arm, shoulders, neck, back, wrist, palm, fingers of the hand and feet. It starts by first affecting the soft tissues like the muscles and tendons before affecting the bones. The tissues get inflamed and cause pain, swelling, change of temperature of the affected area and that portion of body may also display change in skin color. If treated on time (with emergence of symptoms) the condition can be entirely cured, but if left untreated it gets severe and causes permanent damage like atrophy of muscles, damage of joints and bones, etc.

The following report deals with problems and the proposed design solutions regarding the fingers of the hand, palm, wrist and shoulders.

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**Listed below are some of the forms of R.S.I. that can affect people who spend most of their time working on the computer:**

## **Bursitis symptoms**

- Stiffness, that can result in mobility problems, and pain surrounding the affected region.
- Disruption of sleep.

## **Cubital tunnel syndrome symptoms**

- Pain, numbness and even a paralysis of the ring and little finger which can continue up the arm.

## **Carpal tunnel syndrome symptoms**

- Pain, numbness and even a paralysis of the thumb, index, and middle fingers.

## **Tendonitis symptoms**

- Localized pain, tenderness and a lack of mobility in the affected limbs.
- A gradually forming repetitive strain injury unless it is caused by muscle tearing.

## **Tenosynovitis symptoms**

- The surfaces of the tendon and sheath becomes rough and inflamed causing aching and tenderness in the area.

- Stiff joints, shooting pains along the arm and creaking tendons.

## **DeQuervain's syndrome symptoms**

- A painful, tender wrist with a swelling along the thumb side of the wrist.
- Difficulty in gripping objects.

## **Diffuse R.S.I. symptoms**

- Hand or wrist pain, which can spread to the upper arm region.
- Change in skin color and temperature in the affected area.

## **Epicondylitis symptoms**

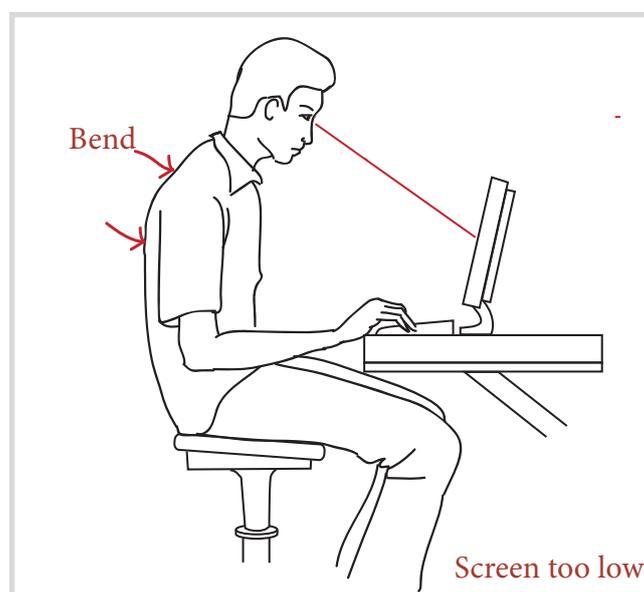
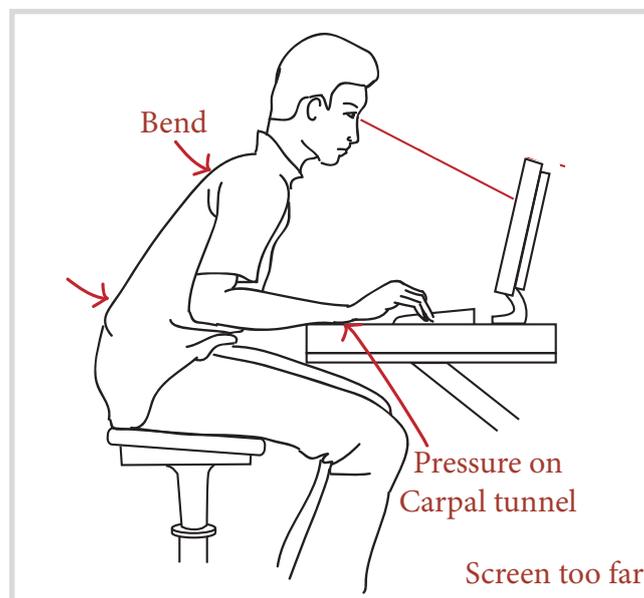
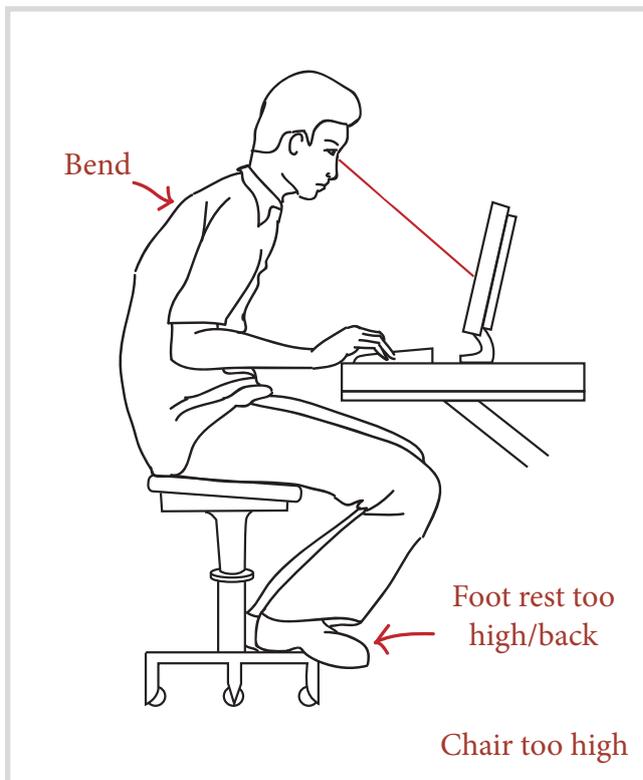
- A dull ache in the forearm with an exacerbation of pain when the arm is twisted, bended or an object is gripped.
- If left untreated, the pain can spread to the middle and/or ring fingers as well as the elbow itself.
- The elbow joint exhibits stiffness but not a swelling.

## **Dystonia (Writers Cramp) symptoms**

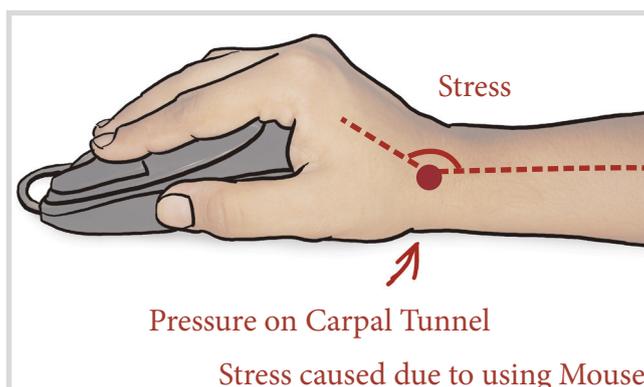
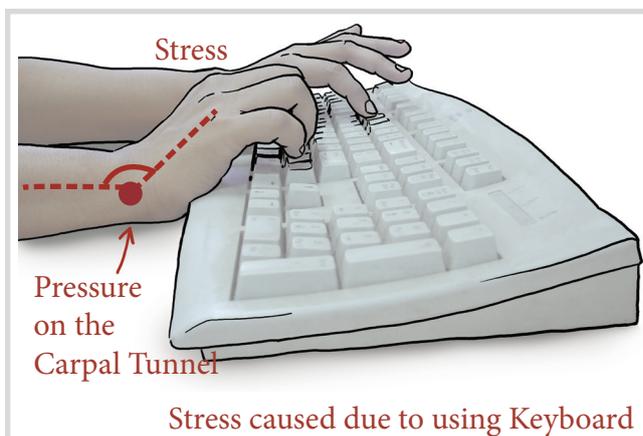
- An ongoing pain in the hand and forearm region.
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## Causes:

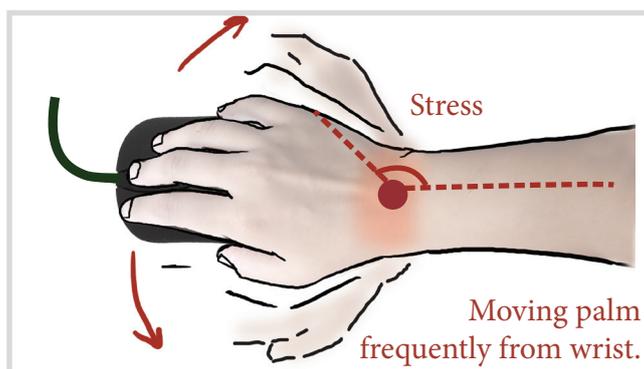
1. Bad posture while sitting (causes stress in some of the bones and most of the muscles in our body).
2. Many times, stress in shoulders, neck and back causes pain in the wrists.



3. Having unnatural wrist curve for long durations of time. This can put pressure on the carpal tunnel that is situated inside the wrist. (This is caused by using the mouse and keyboard for extended periods of time).
4. Not having proper support for the arms while using the mouse and typing.



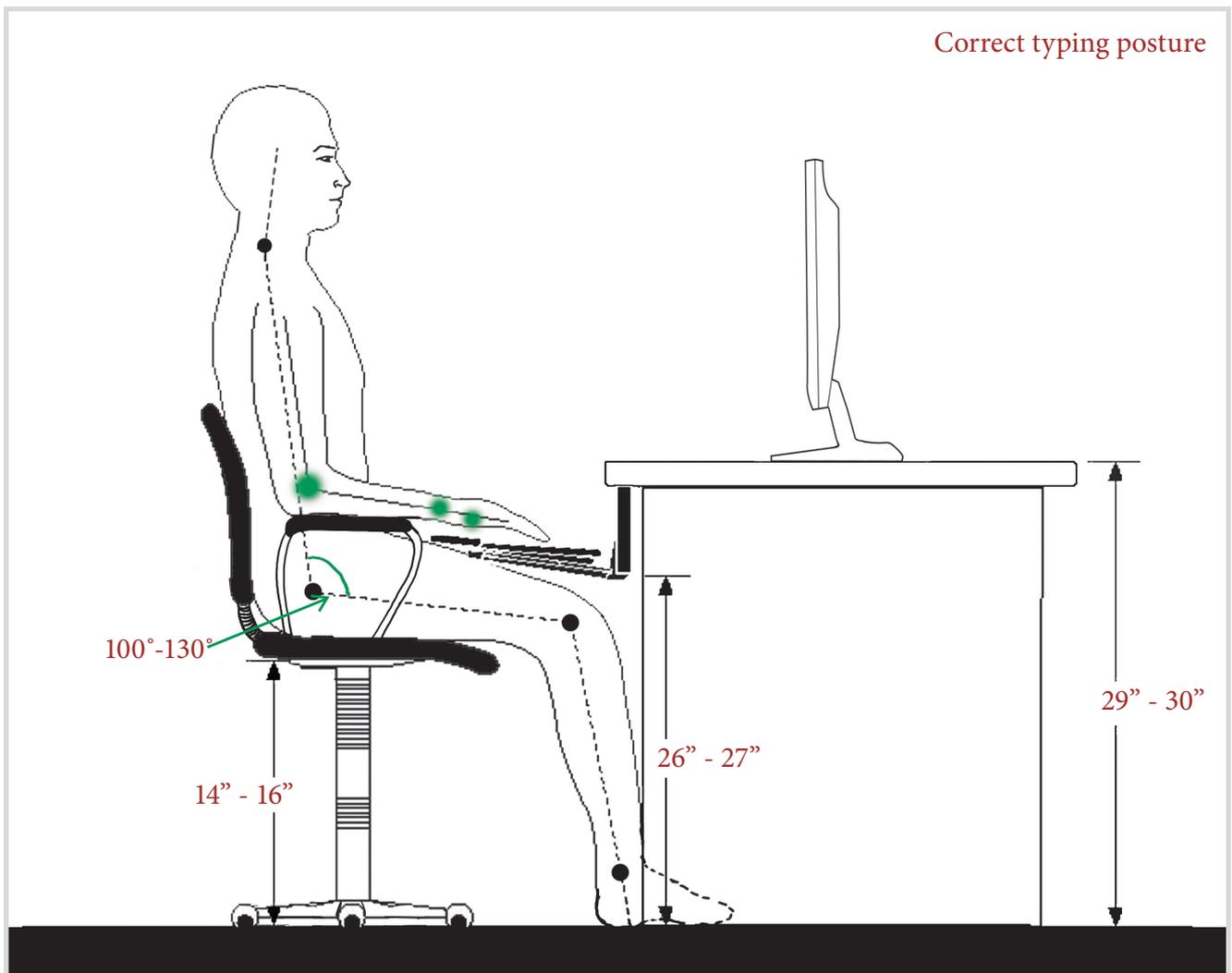
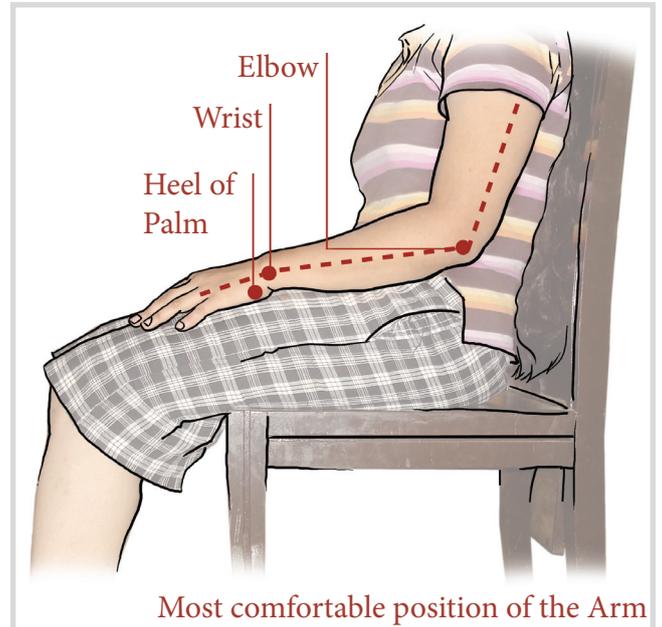
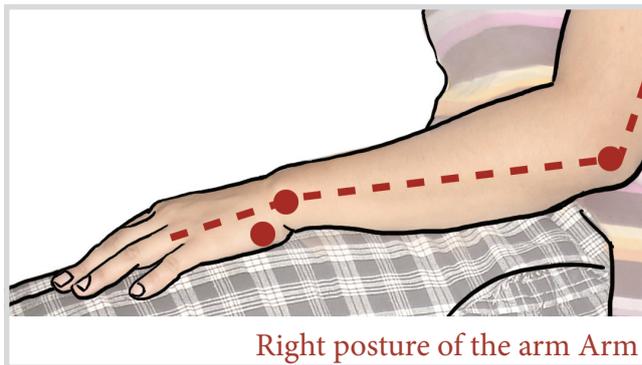
5. Moving palm frequently from the wrist (can lead to pain or injury in the wrist).



## Recommendations for mitigation:

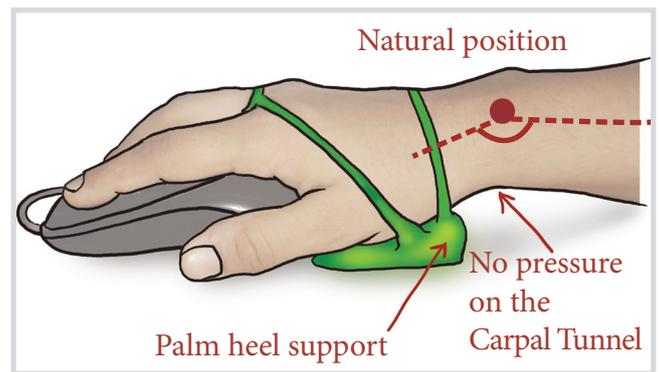
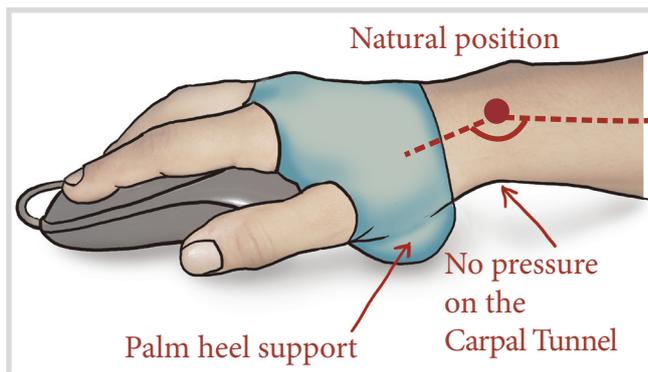
1. Moving the mouse from the elbow and not the wrist reduces strain.
2. The arms should be at your side and in the right posture, that is the wrist should be a little higher than the palm and a little lower than the elbow. This posture can be noticed when we sit on a surface with our arms rested on our thighs.
3. Also, the curvature of human thighs are the best form of support for our palm and wrist

hence, a mouse that is wide and possesses a similar curvature like that of the thigh is very comfortable for use.



4. 'Wrist supports' that provide support to the heel of the palm and not the lower region of the wrist (i.e. the portion that comes immediately

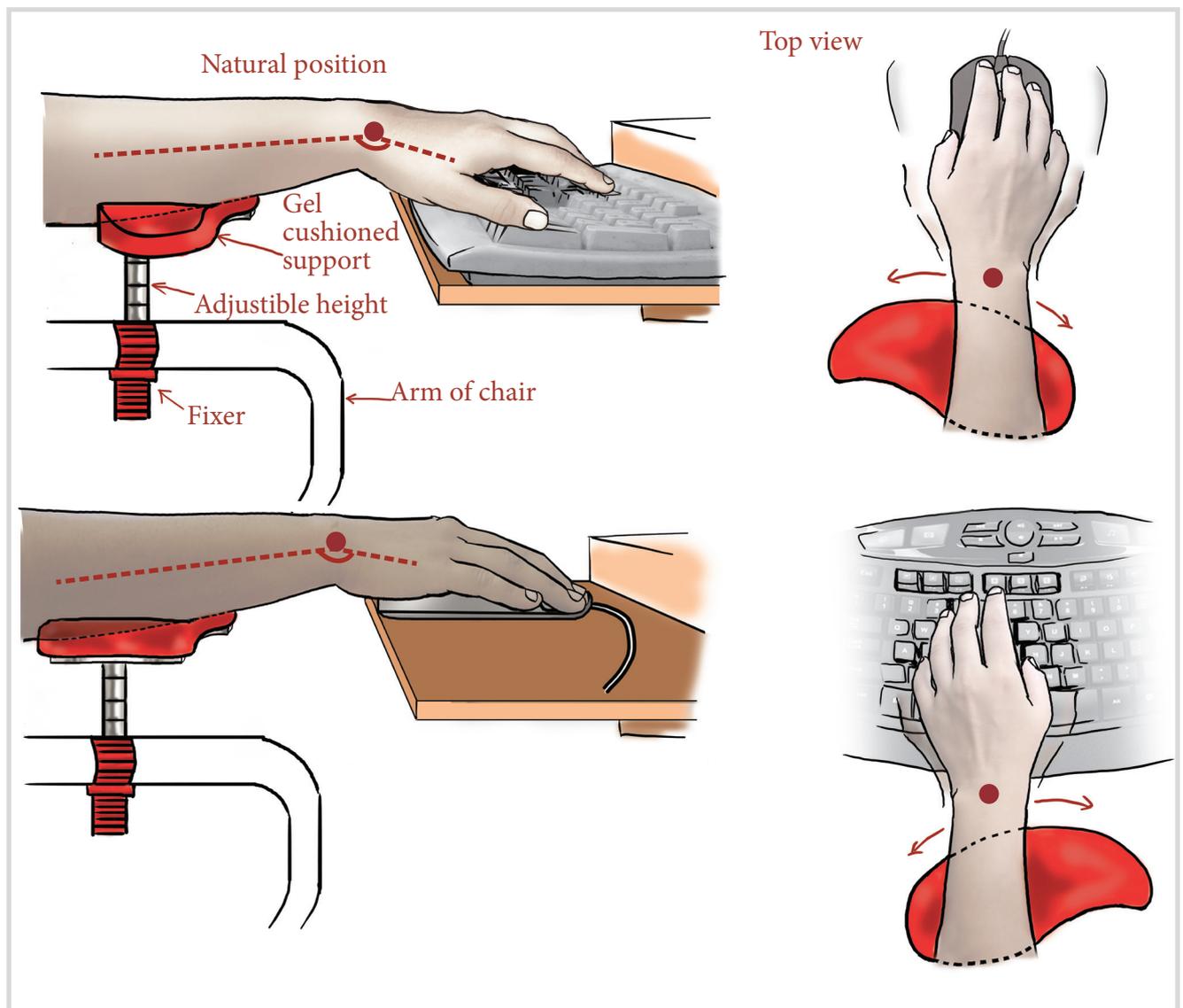
after the heel of palm where the carpal tunnel is exposed) to maintain its natural curve should be used. (Supports having gel are preferred.)



5. Equipment supporting the fore arm and allowing it to move freely would not just provide support to the shoulders but also to the wrist and the palm.

6. Equipment supporting the forearm should preferably be attachable to the arm of chair as many people don't rest their forearms on their working desk.

7. Although the standard upward slanting keyboard is preferable while a person is working up close, it causes stress in the wrist. To prevent this stress, a keyboard that slants downwards instead of upwards should be used as it encourages the natural curve of hand.



## Final Design Product:

It supports the Heel of palm thus helps maintain the neutral wrist. Because of its adjustable straps, it can fit hands of any shape and size.



Adjustable straps with velcro



Palm heel support with gel cushion



## References:

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