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AN EXPERIMENTAL STUDY TO EXPLORE THE ACTION OF HOMOEOPATHIC MEDICINES IN THE TREATMENT OF TENOSYNOVITIS OF WRIST IN AGE GROUP 19 TO 65 YEARS

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ABSTRACT:

Tenosynovitis of wrist is commonly seen in people involved in repetitive movement of hands like manual workers, athletes, students and women and it is also called washerwoman sprain. It is the inflammation of the synovial sheath leading to pain, swelling and stiffness. Another term is De Quervian's tenosynovitis. We do innumerable work with our hands and wrist and repetitive use leads to wear and tear causing pain. Studies shows that it affects subjects working long hours on computer and smartphone. Homoeopathy is safe and cost effective and treats the patient as a whole hence in this study we prove the effectiveness of homoeopathic medicines in tenosynovitis.

Keywords: Tenosynovitis of wrist, de Quervian's tenosynovitis, Finklestein's test, homoeopathic medicines.

Introduction

Tenosynovitis is inflammation of the synovial sheath of a tendon and is usually distended with fluid, it typically affects tendons that run through osseous- fibrous tunnels, each enclosed in its own sheath.^[1] Tendinopathy is one of the common causes for visit to clinics for wrist pain and commonly seen in women.^[2] Tenosynovitis of wrist involves the extrinsic tendons of first dorsal compartment and their corresponding retinacular sheaths. They begin as tendon irritation and causes pain and eventually progressed to into catching and locking when tendon gliding fails.^[2] Tenosynovitis in the wrists is a frequent cause of wrist pain and reduced hand function.^[3]

This often occurs in individuals who regularly use a forceful grasp with ulnar deviation of the wrist with excessive mechanical stress, often due to a work related task. It is also defined as the ***washerwomen's sprain***.^[4,5] It is more frequent in women because the angle between the tendon and the retinacular sheath's distal margin, with the wrist placed in flexion is more marked in women.

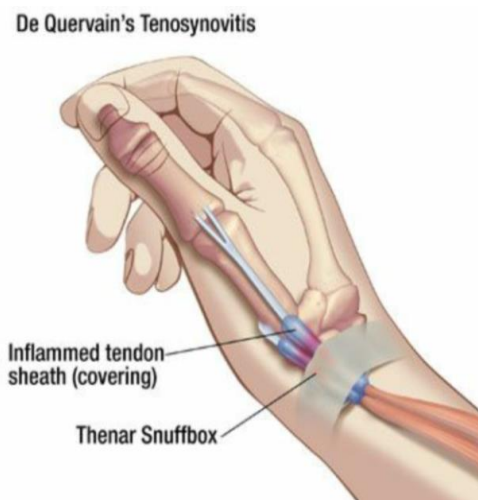


Figure 1: De Quervain's Tenosynovitis.^[6]

Epidemiology:

Upper extremity complaints are common among manual works with a prevalence of 30-45 %.^[7] Constantly repeating certain movements or certain types of strain can cause the

tendons become inflamed. This is commonly seen in wrist that are used for typing in computer and smartphone [8]

The incidence of tenosynovitis of wrist is 2.8 cases per 1000 in women and 0.6 cases per 1000 in men in general population. Women had a higher rate of De Quervian's tenosynovitis due to their work load including laundry, cooking and nursing babies.^[1,9] Most cases of are associated with overuse, and local trauma can also precipitate the condition^[10].

Etiology :

This condition is seen in repetitive motion activities such as:

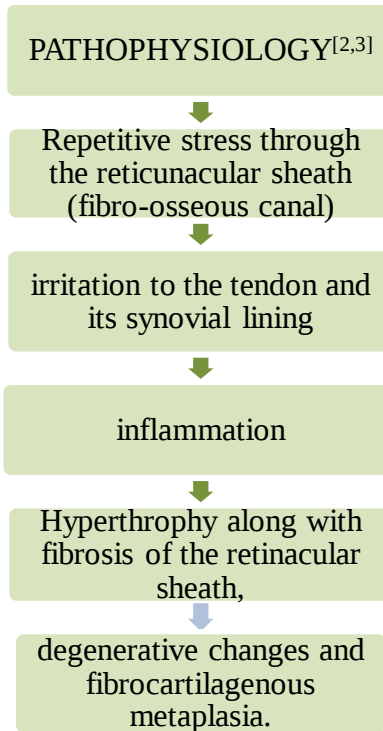
- fishing
- golfing,
- carpenters,^[7]
- dentists,
- musician,
- officer workers,
- writers,
- computer operators,
- Nursing a child for a prolonged period.^[11]

Other causes include:

- Rheumatic arthritis ^[1]
- Diabetes
- Hypothyroidism
- Gout ^[3]
- Infectious disease ^[1] (chikungunya, tuberculosis)
- Estrogen deficits have also been considered as possible risk factors.^[1]

Common signs and symptoms:

- Pain with aching and pulling sensation which is aggravated lifting and twisting motions of the hands ^[5]
- Localized swelling around the wrist joint ^[12]
- Tenderness
- Crepitus with the movement of the tendons
- Severe pain resulting in weakness with pinching or grasping ^[5]
- Stiffness limiting the range of motions ^[5]
- Pain may radiate to the forearm with extension of the thumb ^[9]



Diagnosis :

It can be diagnosed through clinical examination and tests.
(Finkelstein's test) ^[1-3,5].

TABLE 1: Simple exercises that can be advised to patients: ^[12]

positional stretch:	Rest the hand on the table, palm up. Touch the tip of the thumb to the tip of the little finger. Hold this position for 6 seconds. Repeat 10 times. Figure 2: opposition stretch^[12]
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Wrist flexion:	With one hand help to bend the opposite wrist down by pressing the back of the hand and holding it down for 15 to 30 seconds. Next, stretch the hand back by pressing the fingers in a backward direction and holding it for 15 to 30 seconds. Keep the elbow straight during this exercise. Do 3 sets on each hand. Figure 3: Wrist stretch^[12]
Wrist extension	Hold a can or any light weight object. Flex the wrist upward. Slowly lower the weight and return to the starting position. Do 3 sets and gradually increase the weight. Figure 4: wrist flexion^[12]
	Hold a can or a light weight object. Slowly extend the wrist upward. Slowly lower the weight down to the starting position. Do 3 sets and gradually increase the weight of the object.

	 Wrist extension Figure 5: wrist extension^[12]
Grip strengthening:	Squeeze a rubber ball and hold for 5 seconds. Repeat 3 to 5 times.  Grip strengthening Figure 6: grip strengthening^[12]
Finger spring:	Place a large rubber around the thumb and fingers. Open the fingers to stretch the rubber band. Repeat this for 3 sets.  Finger spring Figure7: finger spring^[12]

TABLE 2: HOMOEOPATHIC REMEDIES INDICATED FOR TENOSYNOVITIS OF WRIST

[13,14,15,16,17]

MEDICINE	PHYSICAL SYMPTOMS	CAUSATION/MODALITIES
Arnica Montana	It acts on the blood vessels, muscles and nerves. Fibrous tissue Pain as if bruised or beaten. Sprained and dislocated feeling. Coldness of forearm ^[15-17]	A/F trauma < least touch, < motion ^[15] < exertion+ > lying down+
Apis Mellifica	It produces serous inflammation with effusion. Synovitis, numbness of hands and tips of fingers. Tired bruised feeling. Constricted sensation Edematous ^[16]	< touch, < pressure < heat < right side > open air > uncovering > cold bath ^[15,16]
Rhus toxicodendron	Affects the fibrous tissue- tendons, joints, Sheaths aponeurosis. Tearing type of pain in tendons, ligaments and fasciae Paralytic stiffness of wrist. Pain as if sprained. hot, painful swelling of joints. ^[14-16]	A/F over lifting, physical exertion, stretching < beginning of motion. < cold < during rest > warmth > motion > change of position > stretching out limb ^[16]
Ruta Graveolens	Acts on fibrous tissues, tendons and ligaments Straining of flexor tendons, wrists, ankles	A/F fracture, carrying heavy weights < cold, wet weather < pressure

	Pain and stiffness of wrist and hands. Numbness and tingling in hands. Spasmodic contracture of the finger.	<exertion >lying on the back >warmth >motion [15]
Ledum Palustre	It acts on fibrous tissues, tendons, and capillary system Affection of the small joints Affected part swollen and hot Cracking in joints Throbbing type of pain Trembling of hands when moving them Or grasping anything.[15-17]	A/F injuries < warmth <injury <motions <night >cold bathing
Hypericum Perforatum	Injury to the nerve, crushed finger Crawling sensation in the hands, lancinating pain Tingling, burning pain and numbness Joints feel bruised. Makes mistakes while writing.[15-17]	A/F injuries < in cold <in a fog <in close room <least exposure < touch [16]
Belladonna	It causes congestion and inflammation Swollen, red joints Throbbing, sharp, cutting pain Shifting rheumatic pains Weakness of extremities [13-17]	<touch <pressure <motion <lying down >rest in bed >bending or turning the affected part
Colocynthis	Contraction of muscles Stiffness of joints and shortening of tendons Numbness with pain. Pulling in the tendons of the thumb. Bruised like pain in the joints.[17]	>pressure >heat <gentle touch >rest [13-16]

Pulsatilla Nigricans	Drawing, tensive type of pain Pain shifting rapidly Accompanied with chilliness. Numbness Redness, inflammation, swelling ^[13-16]	<heat < towards evening < warm room < lying on painful side > open air > motion > cold application ^[15]
Calcareo Carbonicum	Rheumatic pains Sharp pain as if parts were sprained Weakness of extremities Old sprain Swelling of joints Tearing in the muscle ^[13-16]	A/F mental and physical exertion < cold < towards evening > dry climate > lying on painful side ^[15]
Silicea	Imperfect assimilation and defective nutrition Cramping pain in extremities. Synovitis Tense and contracted feelings Trembling of hands. Inflammation Swelling.	< uncovering < lying on left side < touch < pressure > warm > wet humid weather ^[15]
Magnesium Phosphoricum	Cramping of muscles with radiating pain. Involuntary shaking of the hands Writer's and players cramps. Tenderness of extremities Weakness in arm and hand. ^[13-16]	Ailments from prolonged exertion. < right side < cold < touch < night > warmth > pressure ^[15]

Eupatorium Perfoliatum	Aching pain in bones of extremities Soreness of flesh Aching type of pain in the wrist Dropsical swelling Inflammation of joints. [13-16]	<periodically <lying on parts <motion >sweating
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RESEARCH METHODOLOGY/ MATERIALS AND METHODS

- **Study design:** Experimental study.
- **Study Setting:** Study was conducted in Out Patient Department, In Patient Department of hospital and camps arranged by a homoeopathic medical college.
- **Sample Size:** Total 30 cases were included of adult age group 19 to 65 years, both sexes.
- **Sampling technique:** Simple Sampling.
- **Duration of Study:** 18 months
- **Method of selection of Study Subject:**
 - a. **Inclusion Criteria:**
 - i. 19 to 65 years
 - ii. Both sexes.
 - iii. H/o fall, strain, sprain, occupation hazards.
 - b. **Exclusion Criteria:**
 - i. surgical cases including tendon rupture, Colle's fracture and suppurative tenosynovitis,
 - ii. Immuno-compromised patients.
 - iii. Pregnancy
 - iv. Mentally retarded patient.
 - v. Lactating mother.

DATA COLLECTION FORMAT:

- A. A detailed case taking was according to:
 - 1 Case taking format.

- 2 Physical examination: Finkelstein test, Wrist hyper flexion and abduction of the thumb^[18,19]
 - 3 Assessment outcome for severity of disease-self designed ^[20,21]
 - 4 VAS Pain Scale ^[22]
- B. CLINICAL TEST FOR DIAGNOSING TENOSYNOVITIS OF WRIST:
- **Finkelstein Maneuver:** the patient is asked to make a fist over the flexed thumb; the wrist is actively deviated in an ulnar direction. If pain results the test is positive.^[18]



Figure 8: The Finkelstein's test^[18]

- **Wrist Hyper flexion and abduction of the thumb:** the patient is asked to fully flex their wrist and keep their thumb fully extended and abducted, while the examiner applies a gradually increasing abduction resistance to the thumb. Pain on resisting against the examiner signifies a positive result.^[19]



Figure 9: The wrist hyperflexion and abduction of the thumb test (WHAT)^[19]

TABLE 3: SCALE OF ASSESSMENT OUTCOME FOR SEVERITY OF DISEASE:^[20,21]

Symptoms	0	1	2	3
Pain when performing any specific activity	0	1	2	3
Swelling around the joint of wrist	0	1	2	3
Crepitus on moving the wrist	0	1	2	3
Stiffness of the joints	0	1	2	3
Weakness sensation	0	1	2	3
Pain radiating to forearm	0	1	2	3

Mild 1-6 , Moderate 7-12 , Severe 13-18

Patient Name :

Date :

Age :

Sex :



VAS PAIN SCALE



No pain

Worst pain ever

0

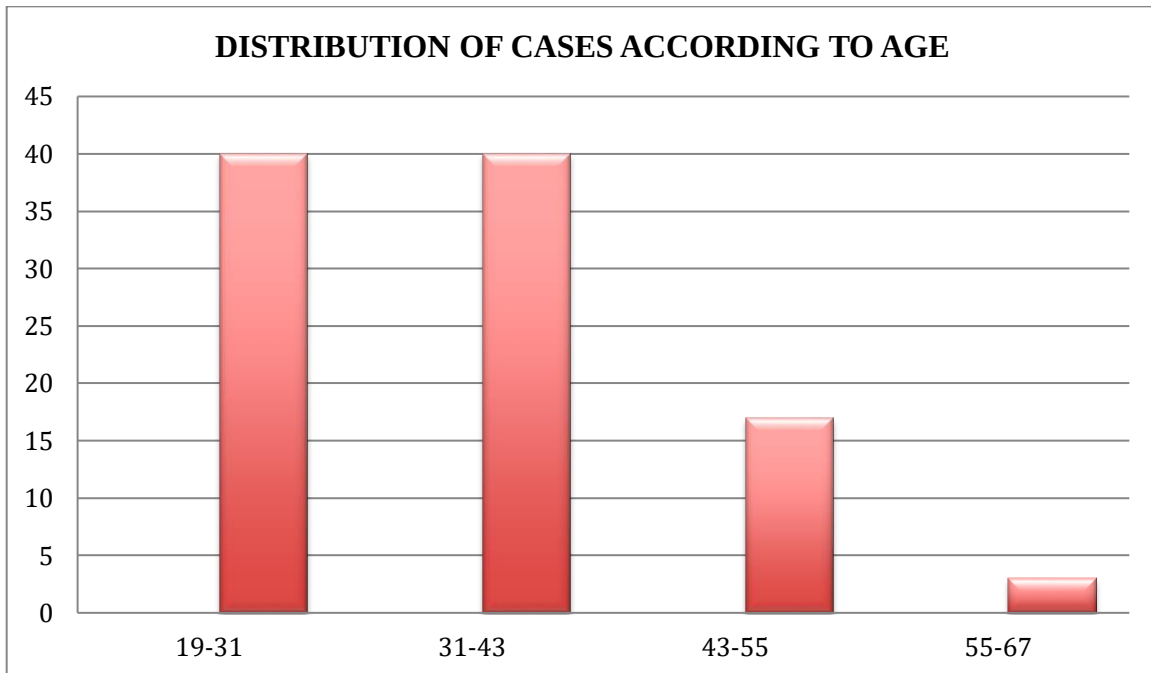
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Figure 10: Vas pain scale ^[22]

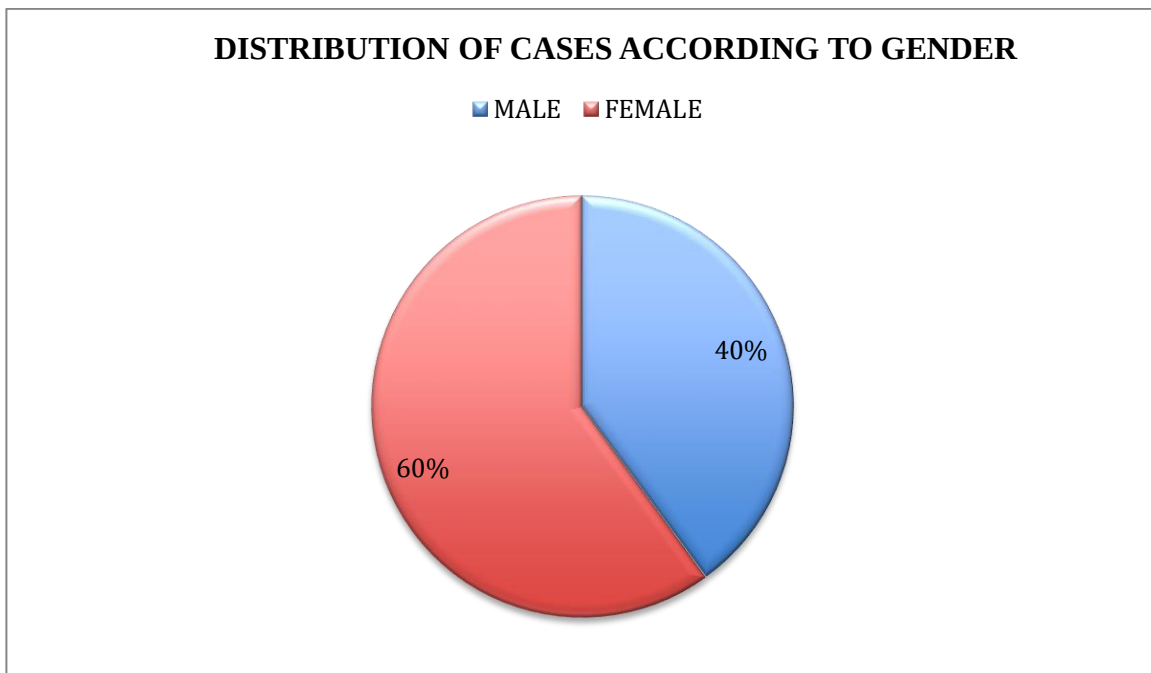
OBSERVATION AND RESULT

The observations in my study are given below in the form of tables, graphs, diagrams and charts for better understanding.

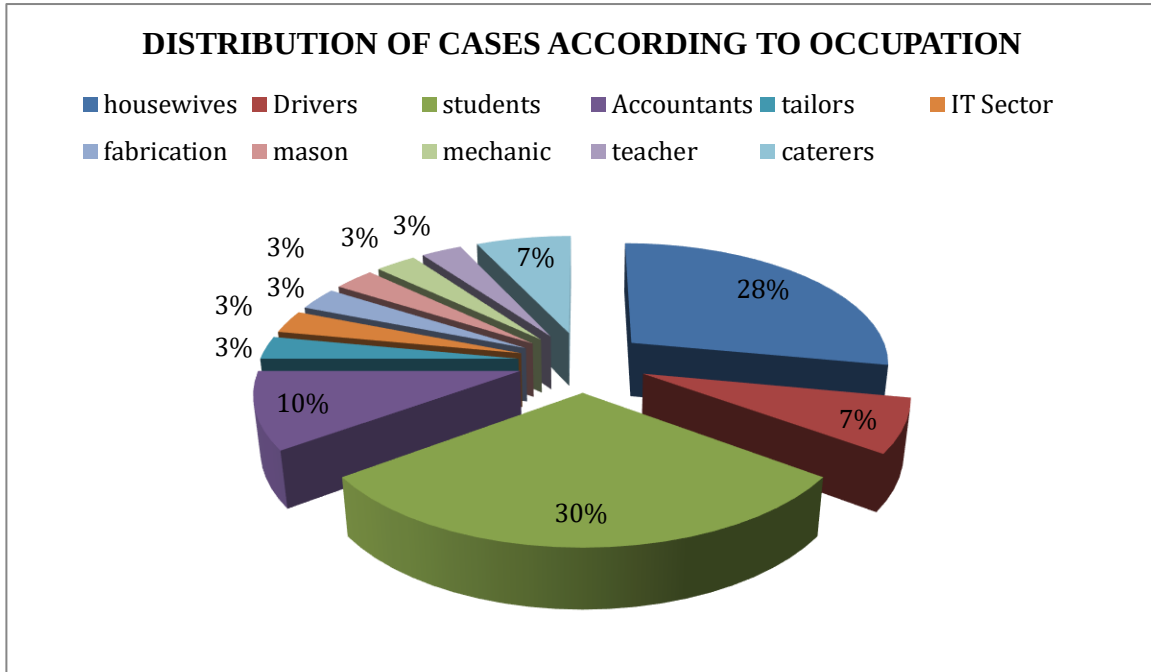
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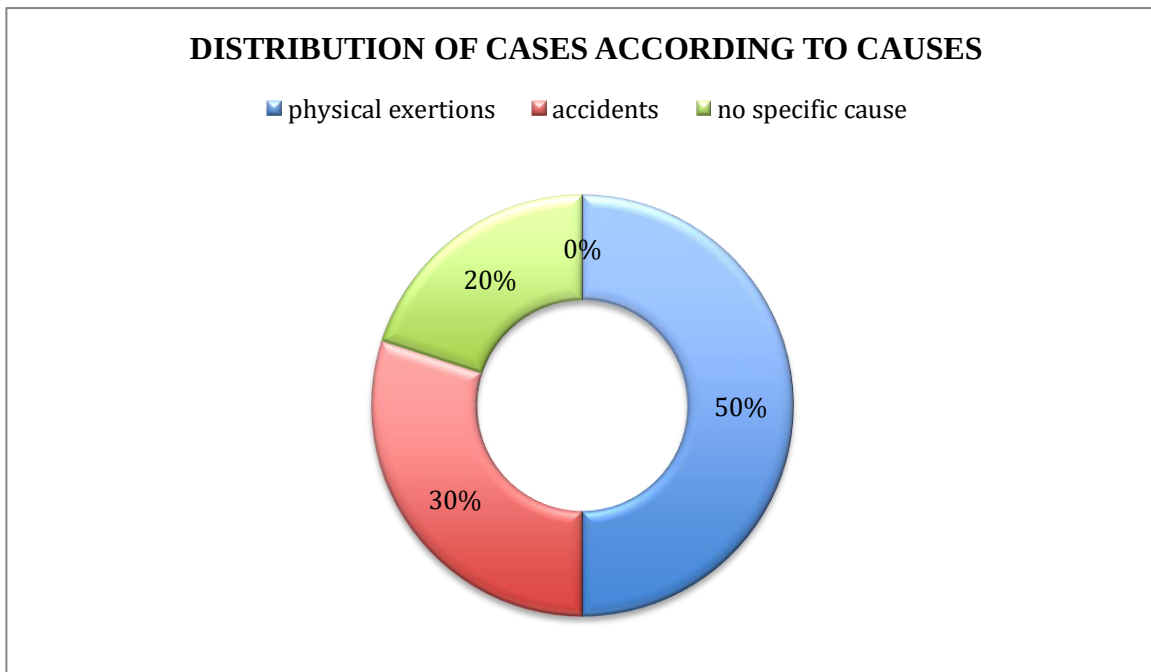
GRAPH 2:



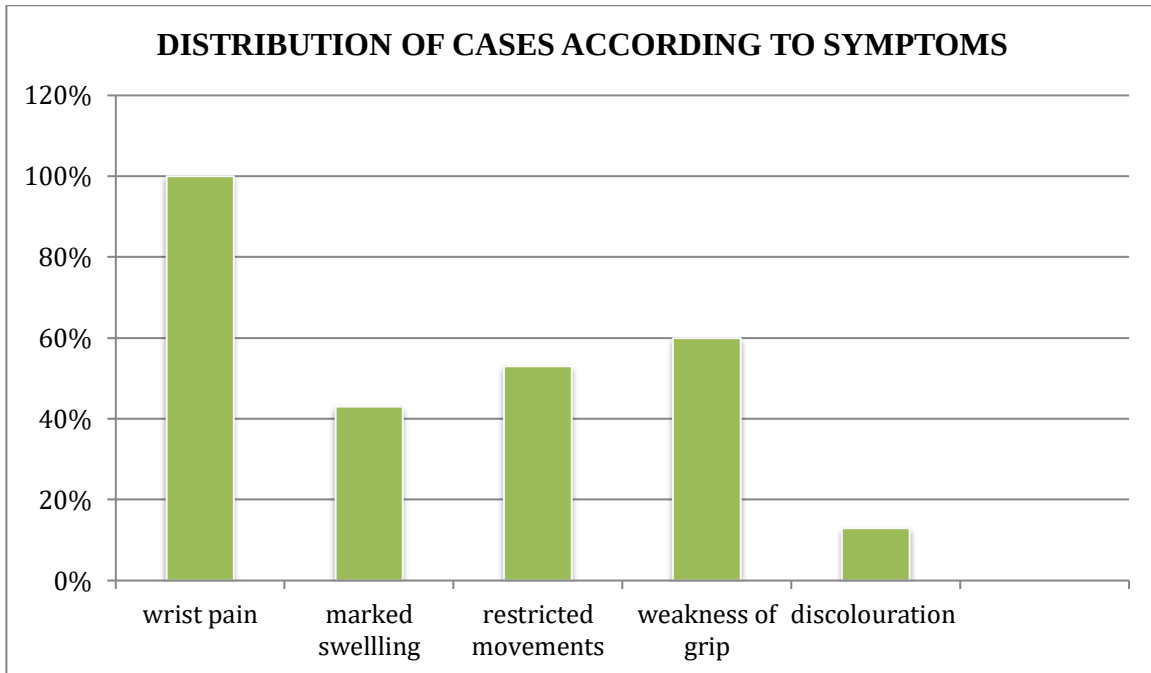
GRAPH 3:



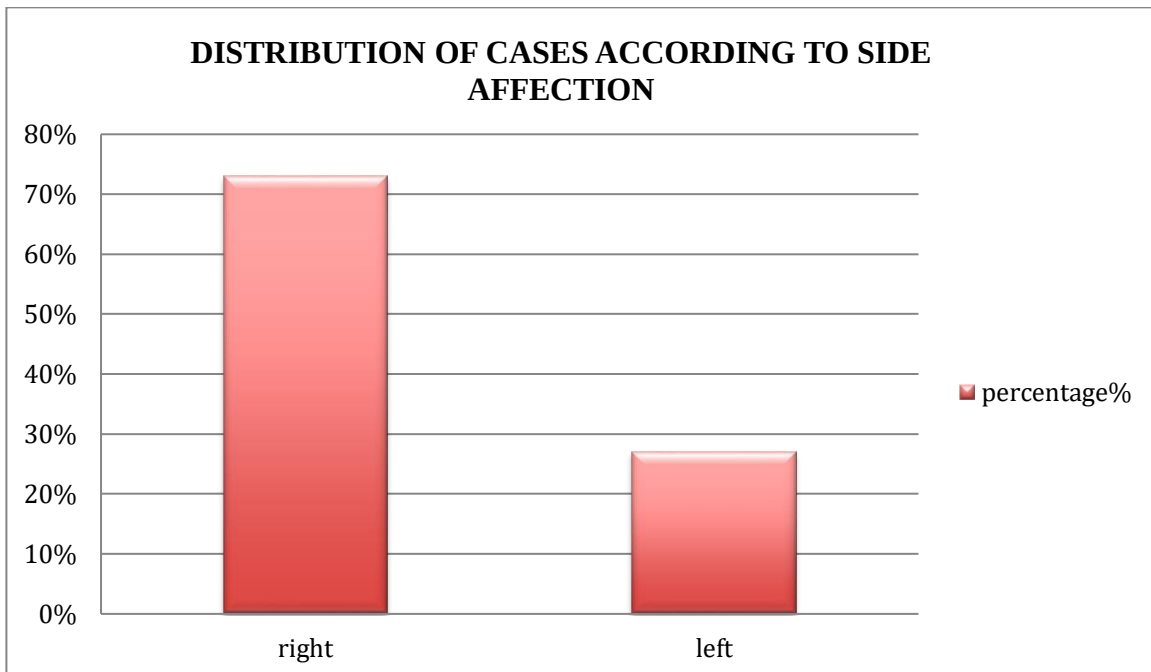
GRAPH 4:



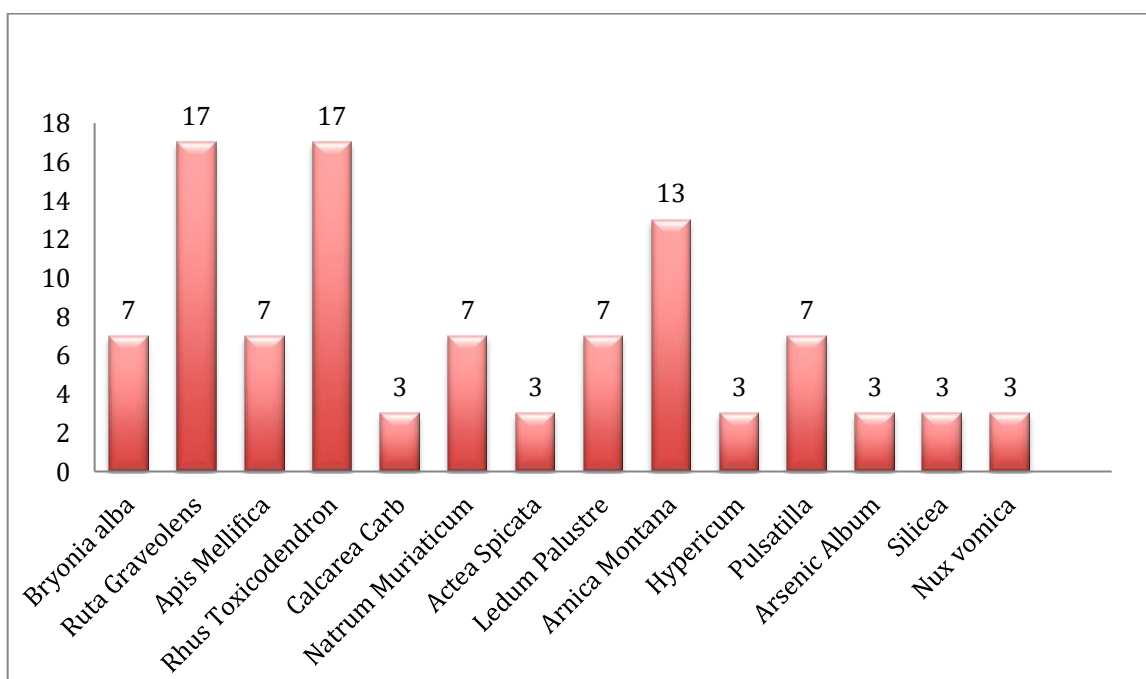
GRAPH 5:



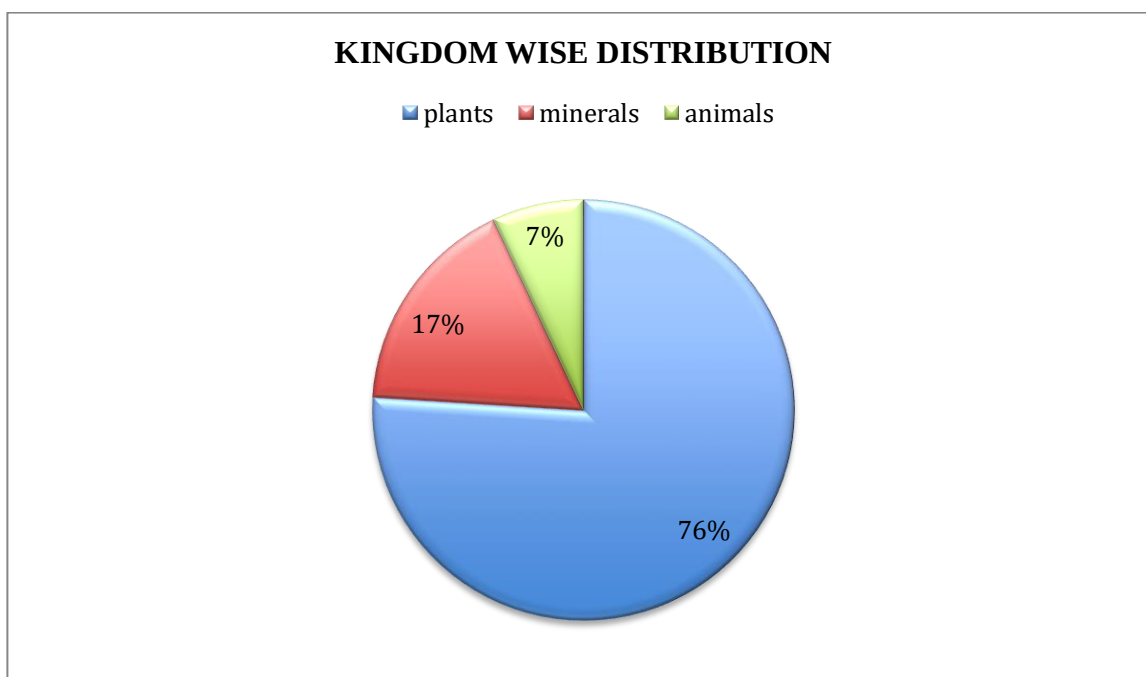
GRAPH 6:



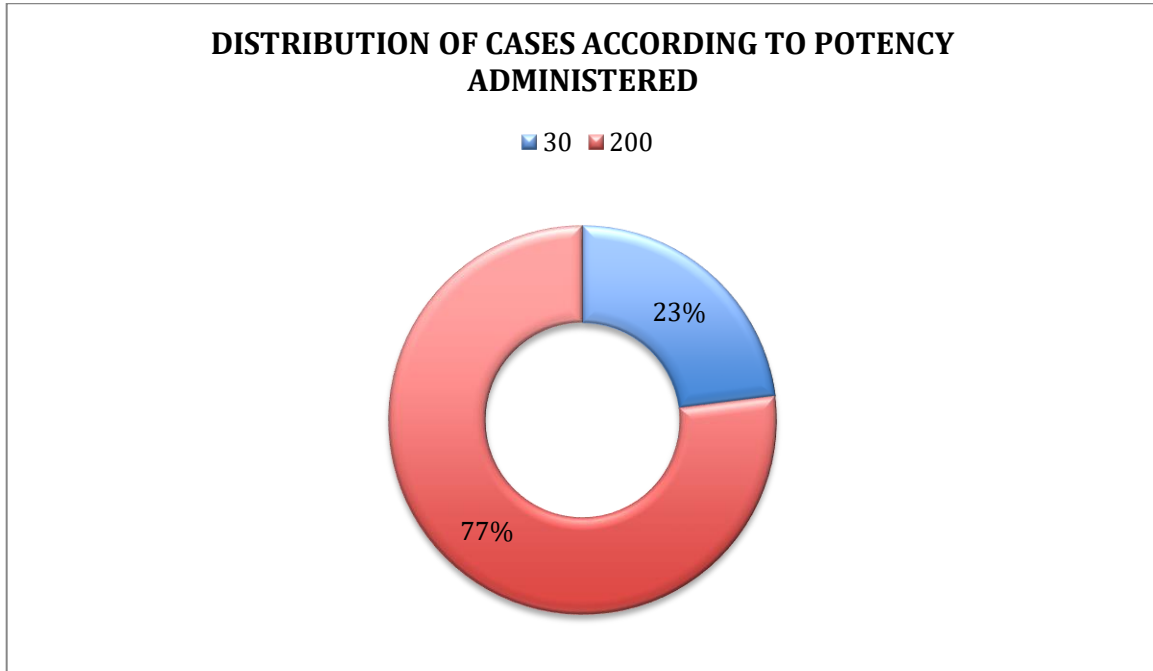
GRAPH 7: DISTRIBUTION OF CASES ACCORDING TO HOMOEOPATHIC MEDICINES INDICATED



GRAPH 8:



GRAPH 9:



GRAPH 10:

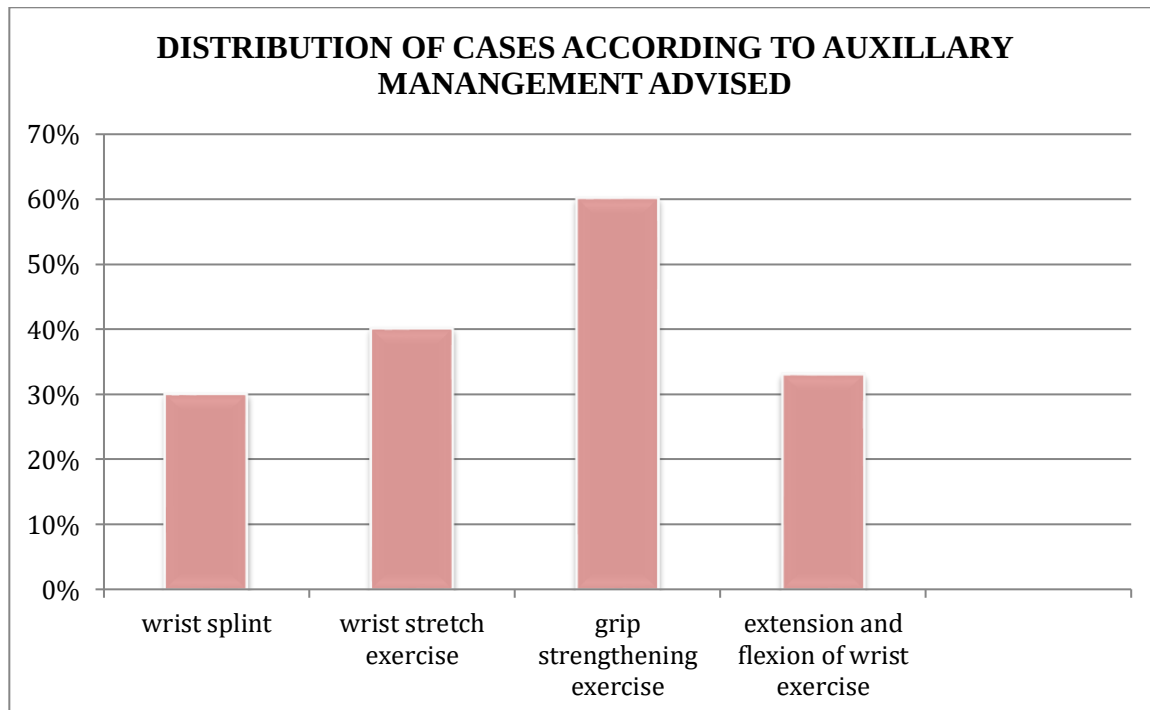
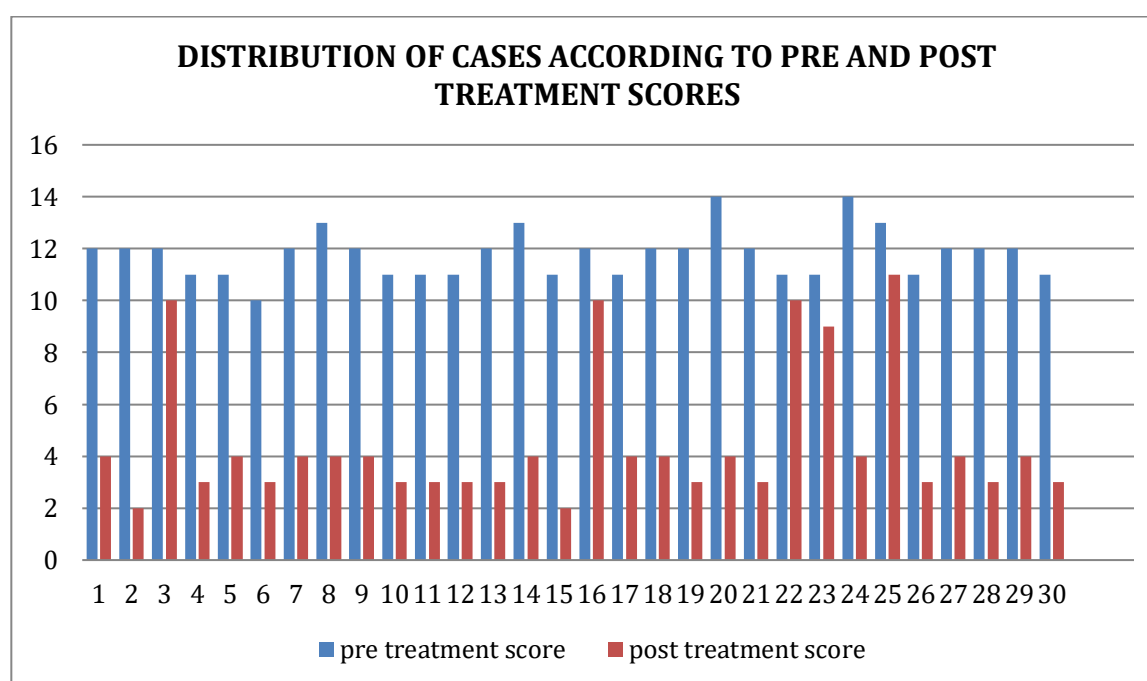


TABLE 4: DISTRIBUTION OF CASES ACCORDING TO PRE AND POST TREATMENT SCORES (ASSESSMENT OUTCOME FOR SEVERITY OF DISEASE)

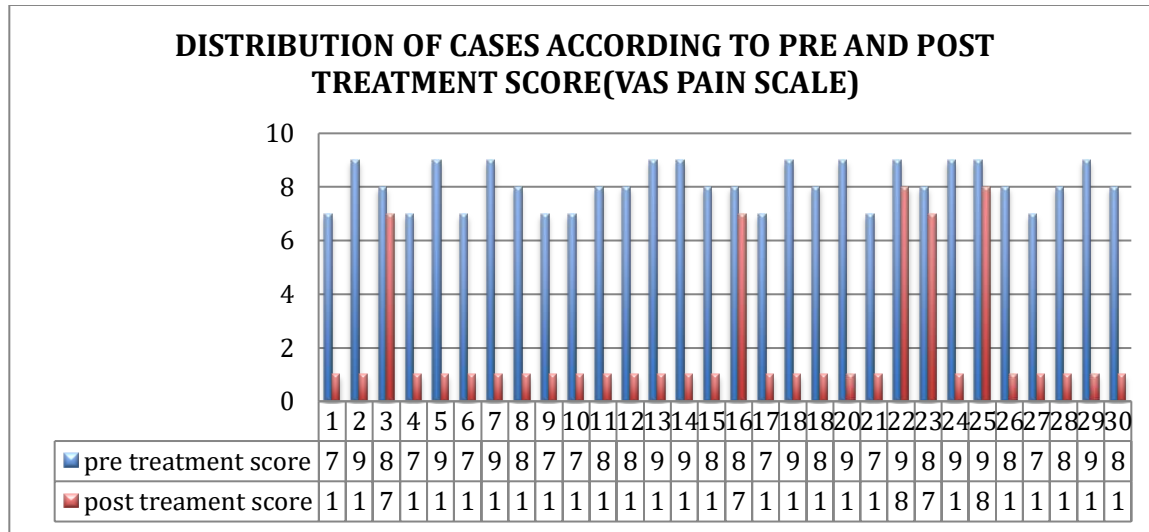
CASE NO.	PRE-TREATMENT SCORE	POST TREATMENT SCORE	RESULT
1	12	4	Improved
2	12	2	Improved
3	12	10	Not-improved
4	11	3	Improved
5	11	4	Improved
6	10	3	Improved
7	12	4	Improved
8	13	4	Improved
9	12	4	Improved
10	11	3	Improved
11	11	3	Improved
12	11	3	Improved
13	12	3	Improved
14	13	4	Improved
15	11	2	Improved
16	12	10	Not-Improved
17	11	4	Improved
18	12	4	Improved
19	12	3	Improved
20	14	4	Improved
21	12	3	Improved
22	11	10	Not-improved
23	11	9	Not-improved
24	14	4	Improved

25	13	11	Not-improved
26	11	3	Improved
27	12	4	Improved
28	12	3	Improved
29	12	4	Improved
30	11	3	Improved

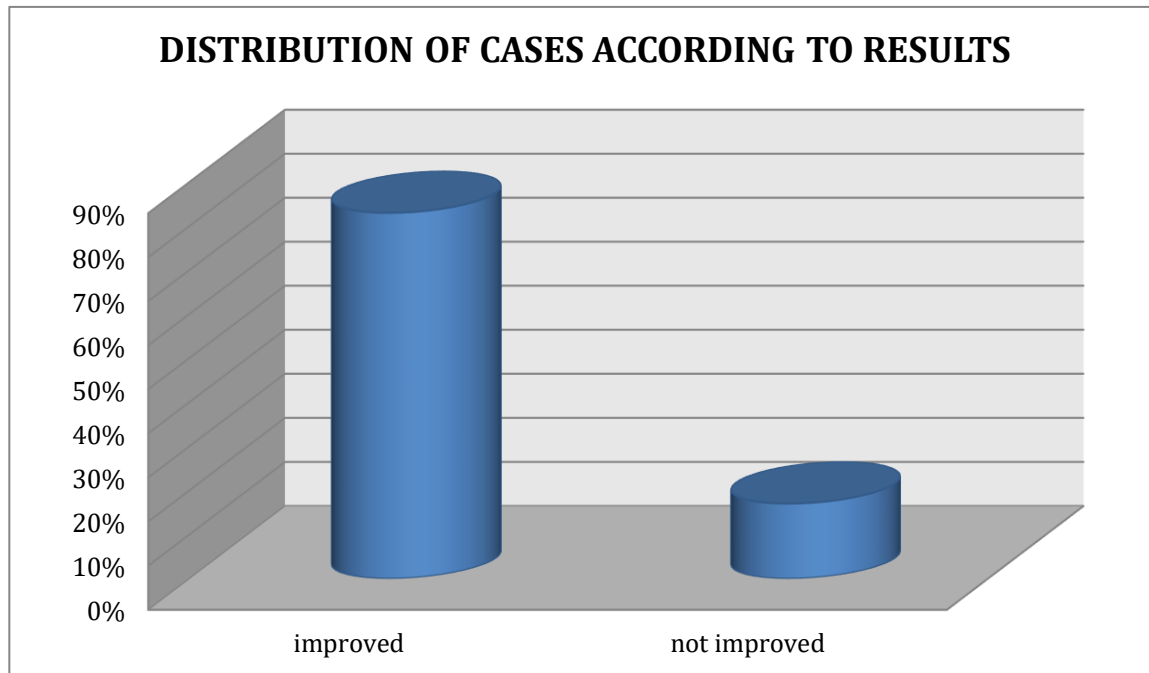
GRAPH 11:**GRAPH 12:****STATISTICAL ANALYSIS**

Null hypothesis: Homeopathic medicines are not useful in the treatment of tenosynovitis of wrist in the age group of 19 to 65 years

Alternate hypothesis: Homeopathic medicines are not useful in the treatment of tenosynovitis of wrist in the age group of 19 to 65 years.



GRAPH 13:



The data was not normally distributed; it was checked through Shapiro- Wilk test. Hence, non-parametric test Wilcoxon signed rank test was applied. Statistical analysis was done using Social Science Statistics Online Tools.

TABLE 5: MEAN, MEDIAN AND MODE (ASSESSMENT OUTCOME FOR SEVERITY OF DISEASE)

	Pre-treatment score	Post-treatment score
Mean	11.8	4.53
Median	12	4
Mode	12	4.3

STEPS OF WILCOXON TEST:**STEP 1:**

Null hypothesis (H_0): homoeopathic medicines are not useful in the treatment of tenosynovitis of wrist in the age group 19 to 65 years

Alternate hypothesis (H_A): homoeopathic medicines are useful in the treatment of tenosynovitis of wrist in the age group 19 to 65 years

STEP 2: Find the difference and absolute difference between each pair.

TABLE 6: ABSOLUTE VALUES FOR ASSESSMENT OUTCOME SCORE FOR SEVERITY OF DISEASE

CASE NO.	PRE-TREATMENT (X)	POST TREATMENT (Y)	X-Y	ABSOLUTE (X-Y)
1	12	4	8	8
2	12	2	10	10
3	12	10	2	2
4	11	3	8	8
5	11	4	7	7
6	10	3	7	7

7	12	4	8	8
8	13	4	9	9
9	12	4	8	8
10	11	3	8	8
11	11	3	8	8
12	11	3	8	8
13	12	3	9	9
14	13	4	9	9
15	11	2	9	9
16	12	10	2	2
17	11	4	7	7
18	12	4	8	8
19	12	3	9	9
20	14	4	10	10
21	12	3	9	9
22	11	10	1	1
23	11	9	2	2
24	14	4	10	10
25	13	11	2	2
26	11	3	8	8
27	12	4	8	8
28	12	3	9	9
29	12	4	8	8
30	11	3	8	8

STEP 3: Arrange the pairs by the absolute differences from the smallest to largest absolute differences. Assign the rank to each value and if the mean difference is 0 then assign them the mean value

STEP 4: Find the sum of the positive ranks and the negative ranks.

TABLE 7: SUM OF POSITIVE RANK FOR ASSESSMENT OUTCOME SCORE FOR SEVERITY OF DISEASE

CASE NO.	PRE-TREATMENT (X)	POST TREATMENT (Y)	X-Y	ABSOLUTE (X-Y)	RANK	sum of positive rank	sum of negative rank
1	12	4	8	8	14.5	14.5	
2	12	2	10	10	29.5	29.5	
3	12	10	2	2	3.5	3.5	
4	11	3	8	8	14.5	14.5	
5	11	4	7	7	7	7	
6	10	3	7	7	7	7	
7	12	4	8	8	14.5	14.5	
8	13	4	9	9	24.5	24.5	
9	12	4	8	8	14.5	14.5	
10	11	3	8	8	14.5	14.5	
11	11	3	8	8	14.5	14.5	
12	11	3	8	8	14.5	14.5	
13	12	3	9	9	24.5	24.5	
14	13	4	9	9	24.5	24.5	
15	11	2	9	9	24.5	24.5	
16	12	10	2	2	3.5	3.5	
17	11	4	7	7	7	7	
18	12	4	8	8	14.5	14.5	

19	12	3	9	9	24.5	24.5	
20	14	4	10	10	29.5	29.5	
21	12	3	9	9	24.5	24.5	
22	11	10	1	1	1	1	
23	11	9	2	2	3.5	3.5	
24	14	4	10	10	29.5	29.5	
25	13	11	2	2	3.5	3.5	
26	11	3	8	8	14.5	14.5	
27	12	4	8	8	14.5	14.5	
28	12	3	9	9	24.5	24.5	
29	12	4	8	8	14.5	14.5	
30	11	3	8	8	14.5	14.5	
					SUM	465	

STEP 5: Reject or except the null hypothesis.

The test statistic, W is the smaller value of the absolute values of the positive ranks and negative ranks.

In this case:

W-value: 0

Mean Difference: 9.8

Sum of positive ranks: 465

Sum of negative ranks: 0

To determine if we should reject or fail to reject the null hypothesis, we can reference the critical value found in the Wilcoxon Sum Rank Test Critical Values Table that corresponds with n and our chosen alpha level.

If our test statistic, W , is less than or equal to the critical value in the table, we can reject the null hypothesis. Otherwise, we fail to reject the null hypothesis.

W-value-The value of W is 0. The critical value for W at $N = 30$ ($p < .05$) is 137.

The result is significant at $p < .05$

The shortcut to the hypothesis testing of the Wilcoxon signed rank-test is knowing the critical z -value for a 95% confidence interval (or a 5% level of significance) which is $z = 1.96$ for a two-tailed test and directionality.

Z -value: -4.7821

Mean (W): 232.5

Standard Deviation (W): 48.62

Sample Size (N): 30

Z-value-The value of z is -4.7821. The p -value is $< .00001$.

The result is significant at $p < .05$.

Result- Hence, the test is significant so the null hypothesis is rejected and alternative hypothesis is accepted. Homoeopathic medicines are effective in the treatment of tenosynovitis of wrist in age group 19- 65 years.

DISCUSSION

From this study following observations were made:

1. Prevalence of tenosynovitis of wrist is more among the age group 19-43 at 80%. This shows that tenosynovitis of wrist is more common in young age group. 16 % cases were found in age group 43 to 55 years. 3% case was found in 55 to 67 years age group.
2. In this study, gender distribution was found to be more in female at 60%. This shows that tenosynovitis of wrist affects females more. 40% cases were males.
3. Among 30 cases, it was found that student's are most affected with tenosynovitis of wrist at 30% and housewives at 28%. It was found that the maintaining cause for wrist pain in students was due to constantly using

laptops and mobiles which involves repeated motion of hands. In housewives the main cause seen was due to washing and cleaning hence “washer women sprain”. 10% cases were accountants, 7% cases were drivers, caterers and 3% cases each were tailor, IT worker, fabricator, mason, mechanic and teacher.

4. In this study, out of 30 cases, it was found that physical exertion was the main cause for wrist pain at 50%. 30% cases were due to injuries and 20 % cases did not have any specific cause.
5. Out of 30 cases, 100% cases had wrist pain, 43% case had marked swelling, 53% cases had restricted movements, 60% cases had marked weakness of grip and 13% cases had discoloration of affected part.
6. Rhus toxicodendron, Ruta Graveolens and were leading as indicated remedies with 17% each, followed by Arnica Montana with 13%. Out of 30 cases, those cases that had ailments from physical exertion and overstraining of tendons responded well to Ruta graveolens and Rhus toxicodendron which shows that these remedies have action on tendons and fibrous tissue. Those cases that had ailments from accidents and injuries responded well to Arnica Montana.. The other remedies prescribed are Bryonia Alba (2 cases, 7%), Natrum Muriaticum (2 cases, 7%), Pulsatilla (2 cases, 7%), Ledum Palustre (2 cases, 7%), Apis Mellifica (2 cases, 7%), Silicea (1 case, 3%), Calcarea Carb (1 case, 3%), Hypericum (1 case, 3%), Arsenic Album (1 case, 3%), Actea Spicata (1 case, 3%), Nux Vomica (1 case 3%).
7. Out of 30 cases it is observed that the remedies belonging to plant kingdom were indicated in 76% cases, mineral kingdom were indicated in 17% cases and animal kingdom were indicated in 7% cases.
8. Potency selection was done based on susceptibility, sensitivity of the patients. 77% cases required 200th potency and 23% cases required 30th potency.
9. Out of 30 cases, 60% patients were advised grip strengthening exercise, 40% patients were advised for wrist stretch exercise, 33% patients were advised extension and flexion of wrist exercise and 30% cases were advised to put

wrist splint which helped the patients in increasing strength and mobility of wrist.

10. Out of 30 cases, with the help of pre-treatment and post treatment scores, it was seen that 83% cases showed improvement and 17% cases did not showed improvement.

CONCLUSION

A total of 30 cases were taken for study during a period of 18 months from a homoeopathic college OPD and IPD based on inclusion and exclusion criteria. In this study conducted, majority of the cases were aged between 19 to 43 years. Students involved in sports and gyms were more affected. The diagnosis of the patient was evaluated, based on clinical examination (Finklestein test and wrist hyper flexion and abduction of thumb test). After thorough case taking, evaluation and analysis, acute cases were prescribed homoeopathic medicines based on causation and symptom severity and chronic cases based on constitution and recurrence of symptoms. Regular follow ups were taken at every visit for general condition and symptom improvement. Assessments for severity of symptoms, including VAS pain scale were utilized during every follow up. Overall improvement was noted by using pre treatment and post treatment score. The frequently indicated homoeopathic medicines for tenosynovitis of wrist are Ruta Graveolens, Rhus toxicodendron and Arnica Montana and 200 was the potency frequently used. The data from before and after treatment scores were statistically analyzed using Wilcoxon Signed Rank test and the result shows that that the test is significant. Thus, this study reveals that homoeopathic treatment is effective in management of tenosynovitis of wrist in age group 19 to 65 years.

Aknowledgement: None

Ethical approval: Approved

Conflict of interest: None

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