International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2024: 7.101

A Study to Compare the Placebo Effect of Therapeutic Ultrasound with Rehablitation Exercise Versus Effect of Therapeutic Ultrasound with Rehablitation Exercise on Dequervain's Tenosynovitis

P. Hema[1], D. Thiagarajan[2], P. Kishore Kumar[3]

[1]Professor, Tagore College of Physiotherapy, Medical College & Hospitals, Rathinamangalam, Chennai, India (Corresponding Author)

[2]Principal & HOD, Tagore College of Physiotherapy, Medical College & Hospitals, Rathinamangalam, Chennai, India

[3]Physiotherapist, the Preventia Ventures Private Limited, India

Abstract: ***Dequervain's tenosynovitis is an inflammation of the synovial inner lining of the tendon sheath. The hand is the most frequent site of tenosynovitis. The patient may experience tenderness and Soreness at the radial aspect of the wrist near the radial styloid process. Data will be collected from early elderly age homes in and around Chennai. The subjects of thirty in total were randomly divided into GROUP A & GROUP B. GROUP A receives placebo effect of ultrasound with rehabilitation exercise and GROUP B effect of ultrasound with rehabilitation exercise. Study Duration: Total - 4 weeks and 5 days / week. Treatment Duration - 20 minutes. There is significant difference between two treatment [A (-1.24) and B (-4.07)] In terms of improvement in Effect of Ultrasound with Rehabilitation exercise (t = 10.90). where the P value is (P = 0.000<0.05). In addition, The mean improvement in the value of Visual Analogue Scale by treatment B is greater than that of Treatment A. There is significant difference between two treatment [A (-2.87) and B (-15.67)]. In term of improvement in Effect of Ultrasound (t = 10.07). Where the P value is (P = 0.000<0.05) in addition, The mean improvement in the value of Quick Dash by treatment B is greater than that of Treatment A. On comparison between the two groups of A and B, this study concludes that the treatment Group B is greater improvement than treatment Group A in terms of Visual Analogue Scale (VAS) and Quick Dash (QD).***

Keywords: Ultrasound, Pain, Placebo, Exercise.

1. Introduction

Dequervain's tenosynovitis is an inflammation of the synovial inner lining of the tendon sheath. The hand is the most frequent site of tenosynovitis. The patient may experience tenderness and Soreness at the radial aspect of the wrist near the radial styloid process.

Involved muscles: Abductor Pollcis Longus (APL), Extensor Pollcis Brevis (EPB).

Activities in Daily Living: They might experience trouble in executing activities in daily living which run or grip the thumb and wrist. Women had a much higher rate of Dequervain's Tenosynovitis at 2.8 cases per 1000 person - years, compared to men at 0.6 per 1000 person - years. Tenosynovitis is probably caused by repetitive movements and overuses that stressing the wrist or thumb finger, with over tightness of Abductor Pollcis Longus and Extensor Pollcis Brevis Muscles. It is occurred among 30 - 50 year category peoples in general.

The placebo effect is a therapeutic outcome derived from an inert treatment. It was discussed in 18th - century psychology, but gained prominence in the 20th century due to an influential study, published in 1955. The placebo effect occurs when a person's physical or mental health appears to improve after receiving a placebo, or "dummy" treatment. Physiotherapeutic ultrasound was introduced into clinical practice in the 1950s, with lithotripsy following in the 1980s. It is commonly used to detect and treat various musculoskeletal issues, including pain, tissue injuries, and muscle spasms. Ultrasound therapy is particularly exciting because it employs high - frequency sound waves to relieve pain. These sound waves generate heat, which can penetrate deeply into painful tissue. In therapeutic ultrasound, the intensity is typically set at 1 MHz and the frequency at 1.0 W/cm² in continuous mode.

Continuous mode Therapeutic Ultrasound produces heat (thermal effect) that helps to reduce pain and swelling, while improving blood circulation. Ultrasound applied at higher intensities creates deep heat, which can ease muscle spasms, relax muscles and increase muscle elasticity, prior to stretching and exercise. Rehabilitation is a form of care that can help individuals regain, maintain, or enhance the abilities they need for daily life. These abilities may be physical, mental, or cognitive (involving thinking and learning). Individuals may lose these abilities due to disease, injury, or as a side effect of medical treatment. Exercise is beneficial as it provides pain relief, reduces inflammation, improves mood, and alleviates anxiety and fatigue. The aim of this is to study the placebo effect of Therapeutic Ultrasound with rehabilitation exercise versus effect of Therapeutic Ultrasound with rehabilitation exercise on Dequervain's tenosynovitis.

2. Design and Methodology

Data will be collected from early elderly age homes in and around Chennai. Subjects around the age group of 30 to 50 years with any neurological and musculoskeletal impairment are included in this study. They are included in the study of the fulfillment of inclusion criteria. The subjects of thirty in total were randomly divided into GROUP A & GROUP B. GROUP A receives placebo effect of ultrasound with rehabilitation exercise and GROUP B effect of ultrasound with rehabilitation exercise.

The subjects are taken by using Frankenstein's test. **Frankenstein's test:** bend your thumb across the palm of your hand and bend your fingers down over your thumb. Then you bend your wrist toward your little finger. If this causes pain on the thumb side of your wrist, you likely have de Quervain tenosynovitis.

Study Duration: Total - 4 weeks and 5 days / week. Treatment Duration - 20 minutes. Inclusion Criteria are AGE: 30 – 50, Both male and female, Patients diagnosed with dequervain's tenosynovitis. Exclusion Criteria are below age of 18, Fracture around the wrist joint, Wound around the wrist joint, Skin allergy, Recent injuries of wrist, Infections, Loss of skin sensation, Over drugs users and Hypersensitivity.

3. Procedure

Protocol for Group A

Placebo effect of ultrasound with Rehabilitation exercise
Placebo effect of Ultrasound:
The placebo effect is when a person's physical or mental health appears to improve after taking placebo or 'dummy (Fake) ' treatment. Used for placebo effect – Motivation, Emotion, Expectation, Learning, Conditioning, Verbal cues. Contextual cues. The parameters of the treatment are **Frequency –** 1MHz. **Mode** – continuous, **Intensity** - O. O w/cm^2, **Duration** - 10mins.

Patient position Sitting

Instruction: Position the patient comfortably with the treatment area is exposed. Patient is asked to keep the part to be treated still and relaxed and to report any increase pain or other sensation immediately.

Preparation of treatment part
The couplant should be applied to the skin surface.

Rehabilitation exercise:
Rehabilitation is care that can help you get back, keep, or improve abilities that you need for daily life. These abilities may be physical, mental, and/or cognitive (thinking and learning). You may have lost them because of a disease or injury, or as a side effect from a medical treatment. exercise provides to pain relief, reduces inflammation, improves mood, reduces anxiety and fatigue.

1) **Opposition Stretch:**
   Patient position: Sitting or standing. Rest your hand on a table, palm up. Touch the tip of your thumb finger to little finger. **Hold time:** 6 seconds and then release. **Repetition:** 10 times. **Do**: 3 sets. **Timing:** 2 min 30 seconds.
2) **Wrist stretch:**
   Patient position: Standing. Press the back of the hand on your injured side with your other hand to help (or) WRIST EXTENSION STRETCH: stand at a table with your palm down, fingers flat and elbow straight lean your body weight forward. WRIST FLEXION STRETCH: stand with the back of your hands on a table, palm facing up fingers pointing towards your body, and elbow straight. Lean away from the table. **Hold time:** 6 seconds. **Repetition:** 10 times. **Do:** 3 sets. **Timing:** 2 min 30 sec.
3) **Grip strengthening:**
   Patient position: Sitting or standing. **Pinch type** – place ball between the thumb and index finger squeeze together hold and relax repetition. **Hold time:** 6 seconds. **Repetition:** 10 times. **Do:** 3 sets. **Timing:** 2 min 30 sec
4) **Radial deviation and ulnar deviation:**
   Patient position: Sitting or standing. **Radial deviation:** Hold hand a weight in your hand. Keep your arm straight down at side. Bend your wrist forward to lift the weight. **Ulnar deviation:** Hold hand a weight in your hand. Keep your arm straight down at side. Bend your wrist backward to lift the weight. **Hold time:** 6 seconds. **Repetition:** 10 times. **Do:** 3 sets. **Timing:** 2 min 30 sec.

Protocol for Group B

Effect of ultrasound with Rehabilitation exercise
Ultrasound: The parameters of the treatment are Frequency - **1Mhz,** Mode – **Continuous,** Intensity - **1.0 w/cm^2,** Duration - **10mins.**

Patient position Sitting **Instruction**

Position the patient comfortably with the treatment area is exposed. Patient is asked to keep the part to be treated still and relaxed and to report any increase pain or other sensation immediately.

Preparation of treatment part
The couplant should be applied to the skin surface.

Procedure
The treatment head is moved continuously over the surface while even pressure is maintained in order to iron out the irregularities in the sonic field. The emitting surface must be kept parallel to the skin surface to reduce reflection and pressure sufficiently firmly to exclude any air. The pattern of movement can be a series of overlapping parallel strokes, circle of figures of eight.

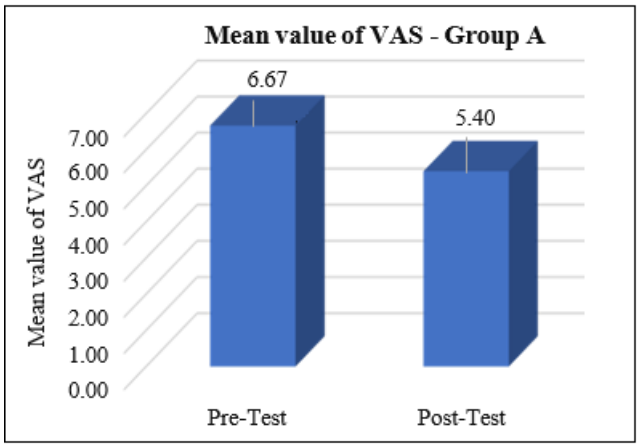
Rehabilitation exercise:
Rehabilitation is care that can help you get back, keep, or improve abilities that you need for daily life. These abilities may be physical, mental, and/or cognitive (thinking and learning). You may have lost them because of a disease or injury, or as a side effect from a medical treatment. exercise provides to pain relief, reduces inflammation, improves mood, reduces anxiety and fatigue. The exercise are as same

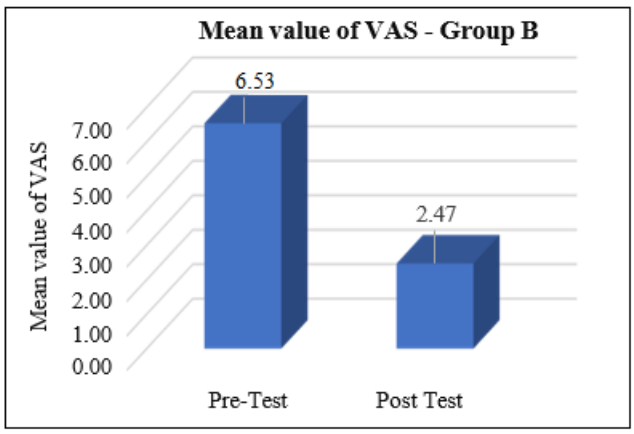
as Group A, Opposition stretch, wrist stretch, Grip strengthening, Radial deviation and ulnar deviation.

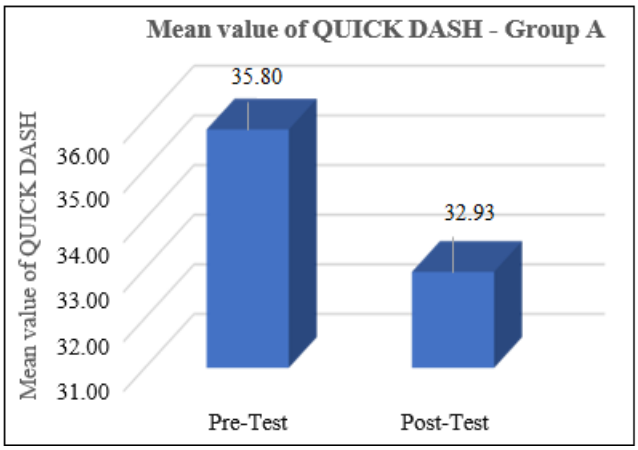
4. Methodology

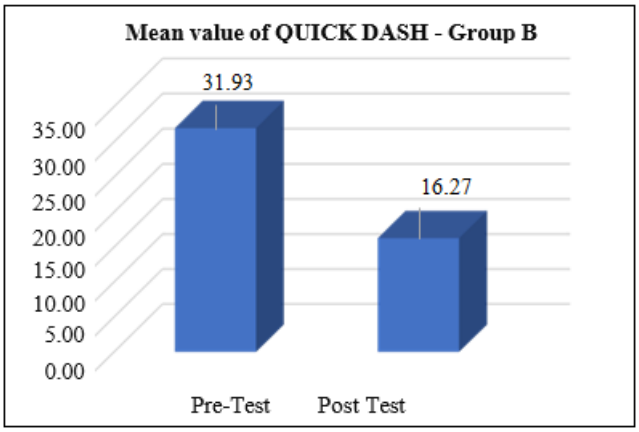
Group A & Group B – Patients Outcome Measures Details

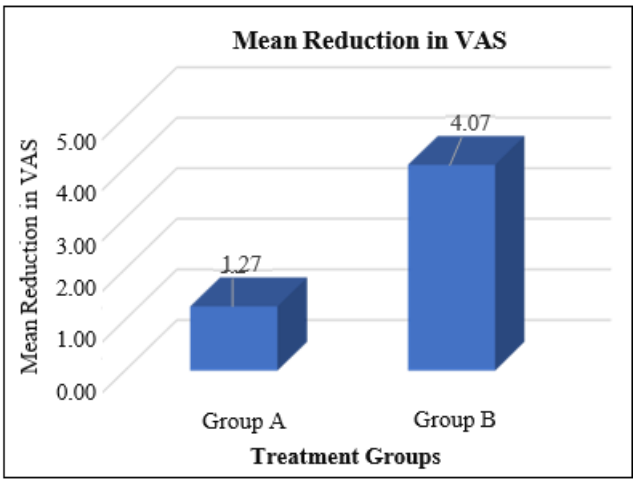
Group A							Group B			
S. NO	Age	Sex	Pre Test		Post Test		Pre Test		Post Test	
			VAS	Quick Dash	VAS	Quick Dash	VAS	Quick Dash	VAS	Quick Dash
1.	36	M	6	23	5	20	7	39	4	19
2.	32	M	6	27	6	22	6	34	2	20
3.	48	M	6	20	5	18	6	30	3	18
4.	33	M	8	59	8	58	8	56	4	29
5.	41	M	7	41	5	37	7	33	2	18
6.	39	M	6	19	4	15	7	29	2	12
7.	46	M	7	46	5	45	6	28	3	14
8.	40	M	7	43	5	40	6	29	2	13
9.	35	M	6	29	5	26	5	20	1	9
10.	37	M	8	56	7	54	7	34	3	11
11.	34	M	7	39	5	38	6	26	2	16
12.	44	M	6	30	5	27	7	33	2	23
13.	49	M	6	27	4	24	7	31	2	18
14.	42	M	7	40	6	36	7	30	3	14
15.	47	M	7	38	6	34	6	27	2	10

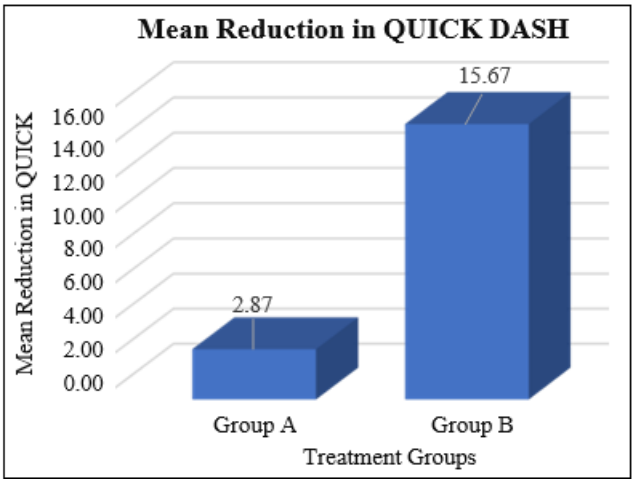












5. Discussion

Dequervain's tenosynovitis is an inflammation of Inner lining of tendon sheath. Affected muscles are (APL) Abductor Pollcis Longus and (EPB) Extensor Pollcis Brevis. Lack (or) absence of wrist movements especially ulnar deviation and radial deviation. Reducing the pain requires regular Rehabilitation exercise and Ultrasound sound therapy. To make sure that the pain is proper assessed by measuring the Visual analogue scale (VAS) and Quick Dash (QD). Physiotherapist use wide variety of treatment technique to reducing the pain. In the study we took 30 Dequervain's tenosynovitis patients with pain. The sample was divided to groups of each into 15 subjects who fulfill the selection criteria have randomized into Group A of 15 subjects and Group B 15 subjects. All participants were clearly explained about their treatment procedure. GROUP A – Placebo effect of Ultrasound with Rehabilitation exercise for 4 weeks (weekly 5days). GROUP B – Effect of ultrasound with Rehabilitation exercise for 4 weeks (weekly 5 days). The informed consent was obtained from all the participants of both Groups.

The outcome measures were recorded by using, VAS – visual Analogue Scale and QD – Quick Dash.

Group A – Placebo Effect of Ultrasound with Rehabilitation Exercise
The Baseline mean difference of Visual Analogue Scale (VAS) for Placebo effect of ultrasound with Rehabilitation exercise (Table 3) was 6.67 after the end of four weeks the mean difference was Decreasing the value of 5.40. The paired t - test done in comparison of pre & post – test mean score showed that t = 6.97, P = 0.000<0.05.

The Baseline mean difference of Quick Dash (QD) for effect of Ultrasound with Rehabilitation exercise (Table 4) was 35.80 after the end of four weeks the mean difference was Decreasing the value of 32.93. The paired t - test done in comparison of pre & post – test mean score showed that t = 8.91, P = 0.000<0.05.

Onur Armagan, I Fulya Bakilan, I Merih Ozgen, I Ozlem Mehmetoglu, II and Setenay Oner III: Dertermine that the results of placebo and pulsed or continuous ultrasound have similar effects on clinical improvement. Patients treated with Continuous and pulsed ultrasound showed electrophysiological improvement; however, the results Were not superior to those of the placebo.

Lene Vase, Karolina Wartolowska: Determine to the perception of an Intervention is central to the modern understanding of placebo mechanisms. We have also Illustrated how the understanding of placebo mechanisms may not only improve the understanding Of pain processing but also help develop better control of new treatments. As a result of this, it Would be possible to specify and 'personalise' the placebo control to each type of pain and each Type of intervention, which would enable a more precise test of treatment efficacy. Such knowledge Will lead to approval of more effective treatments and to better optimisation of these treatments in Clinical practice, which ultimately will benefit chronic pain patients.

Borg - Stein J, Dugan SA. Determine that the therapeutic intervention is needed to prevent Pain. The information collected showed that alternative and complementary methods Decrease the Intensity of pain and in addition help to improve musculoskeletal function. Although There is clear Evidence of the effectiveness of exercise therapy it is not possible to specify exactly what kind of exercises are suitable for each the exercises being different in the studies.

Group B – Effect of Ultrasound with Rehabilitation Exercise
The Baseline mean difference of Visual Analogue Scale (VAS) for Effect of Ultrasound with Rehabilitation exercise (Table 5) was 6.53. After the end of four weeks the mean difference was Decreasing the values of 2.47. The paired t - test done in comparison of pre & post test mean score showed that t = 22.38, P = 0.000<0.05.

The Baseline mean difference of Quick Dash (QD) for Effect of Ultrasound with Rehabilitation exercise (Table 6) was 31.93. After the end of four weeks the mean difference was Decreasing the value of 16.27. The paired t - test mean score showed that t = 12.74, P = 0.000<0.05.

Klaiman MD, Shrader JA, Danoff JV, Hicks JE, Pesce WJ, Ferland J. Determine that US Results in decreased pain and increased pressure tolerance in these selected soft tissue injuries. The Addition of PH with fluocinonide does not augment the benefits of US used alone. Ultrasound (US)

Is a physical modality which has been used for over 40 yr in the treatment of soft - tissue injuries Such as tendinitis, tenosynovitis, epicondylitis, bursitis, and osteoarthritis (14, 16, 22, 29, 36, 40, 42). US transmission occurs when a high frequency potential field (1 - 3 MHz) is applied to a crystal in The US "sound head" or "transducer" which then vibrates to produce a high frequency acoustic Wave.

Ritu Goel and Joshua M. Abzug: OT treatment methods for de Quervain's tenosynovitis Assists with the healing of this disease through activity modification with patient education, Splinting, manual treatment, use of modalities, edema, and scar management, as well as Desensitization and therapeutic exercises.

Analysis Group A Versus Group B

On comparison between the two groups of A and B based on Influence from (Table 5 & 6). The P value was found to be statistically significant for treatment Group B than treatment Group A in terms of Visual Analogue Scale (VAS) and Quick Dash (QD).

There is significant difference between two treatment [A (-1.24) and B (-4.07)] In terms of improvement in Effect of Ultrasound with Rehabilitation exercise (t = 10.90). where the P value is (P = 0.000<0.05). In addition, The mean improvement (Table 5) in the value of Visual Analogue Scale (VAS) by treatment B is greater than that of Treatment A.

There is significant difference between two treatment [A (-2.87) and B (-15.67)]. In term of improvement in Effect of Ultrasound (t = 10.07). Where the P value is (P = 0.000<0.05) in addition, The mean improvement (Table 6) in the value of Quick Dash by treatment B is greater than that of Treatment A.

Domenica A. Delgado, BA, Bradley S. Lambert, PhD, Nickolas Boutris, MD, Patrick C. McCulloch, MD, Andrew B. Robbins, BS, Michael R. Moreno, PhD, and Joshua D. Harris, MD: Determine that The visual analog scale (VAS) is a pain rating scale1, 2, 3, 4, 5, 6, 7, 8, 9 first used by Hayes and Patterson in 1921.2 Scores are based on self - reported measures of symptoms that are recorded with A single handwritten mark placed at one point along the length of a 10 - cm line that represents a Continuum between the two ends of the scale—"no pain" on the left end (0 cm) of the scale and The "worst pain" on the right end of the scale (10 cm).10 Measurements from the starting point (left end) of the scale to the patients' marks are recorded in centimeters and are interpreted as their Pain.

Cecilie Rud Budtz, corresponding author1 Johan Hviid Andersen, 1 Nils - Bo de Vos Andersen, 2 and David Høyrup Christiansen1, 3T: Determine that the Quick - DASH demonstrated adequate ability To measure changes in disability over 3 and 6 months in patients with shoulder disorders Undergoing primary care physiotherapy treatment. Minimal important change values in ROC Estimates were 9.1 and 13.6 points at 3 and 6 months respectively and did not exceed the MDC95 Value in the present study. To insure that individual change scores will exceed measurement error, The MIC 95% upper limit of 21 and 28 or the relative change scores of 33% or 41% may be more Preferable when interpreting clinical importance of individual changes in Quick Dash. From the outcome measures the finding shows the Effect of Ultrasound with Rehabilitation exercise on Dequervain's tenosynovitis. Treatment B is effective than Treatment A.

6. Conclusion

The inter group analysis showed that both the treatments are effective in terms of improvement in terms of Visual Analogue Scale (VAS) and Quick Dash (QD). However, the inter group analysis showed that group B significantly effective than Group A in terms of Visual Analogue Scale (VAS) and Quick Dash (QD).

7. Limitations and Recommendations

Limitations: Relatively small sample size was taken for this study and the duration of the was limited

Recommendations: The future study can be done in larger group and longer study duration.

References

[1] **Wong RA, Schumann B, Townsend R, Phelps CA.** A survey of therapeutic ultrasound use by Physical therapists who are orthopaedic Certified specialists. *Phys Ther.2007; 87 (8): 986–94.*

[2] **Klaiman MD, Shrader JA, Danoff JV, Hicks JE, Pesce WJ, Ferland J.** Phonophoresis versus Ultrasound in the treatment of common Musculoskeletal conditions. *Med Sci Sports exercise 1998; 30 (9): 1349–55.*

[3] **Baker KG, Robertson VJ, Duck FA.** A review of therapeutic ultrasound: biophysical effects. *Phys Ther.2001; 81 (7): 1351–8.*

[4] **Currier DP, Greathouse D, Swift T.** Sensory nerve conduction: effect of ultrasound. *Arch Phys Med Rehabil.1978; 59 (4): 181–5.*

[5] **Barrett B, et al.** Placebo, meaning, and health. Perspect. *Biol. Med.2006; 49: 178–198.*

[6] **Walsh BT, Seidman SN, Sysko R, Gould M.** Placebo response in studies of major depression: Variable, substantial, and growing. JAMA.*2002; 287: 1840–1847.*

[7] **Schenk LA, Sprenger C, Geuter S, Buchel C.** Expectation requires treatment to boost pain Relief: an fMRI study. *Pain.2014; 155: 150–157.*

[8] **Rohsenow DJ, Marlatt GA.** The balanced placebo design: methodological considerations. Addict. *Behav.1981; 6: 107–122.*

[9] **Beedie CJ, Foad AJ.** The placebo effect in sports performance. *Sports Med.2009; 39: 313–329.*

[10] **Anderson M, Tichenor CJ.** A patient with de Quervain's tenosynovitis: a case report using an Australian approach to manual therapy. *Phys Ther.1994; 74 (4): 314–326.*

[11] **Jaworski CA, Krause M, Brown J.** Rehabilitation of the wrist and hand following sports Injury. *Clin Sports Med.2010; 29 (1): 61–80. Doi: 10.1016/j.*

csm.2009.09.007.

[12] **Rettig AC.** Wrist and hand overuse syndromes. *Clin Sports Med.2001; 20 (3): 591–611. Doi: 10.1016/S0278 - 5919 (05) 70271 - 4.*

[13] **Robinson BS.** Rehabilitation of a cellist after surgery for de Quervain's tenosynovitis and Intersection syndrome. *Med Probl Performing artists.2003; 18 (3): 106–112.*

[14] **Wolf JM, Sturdivant RX, Owens BD.** Incidence of de Quervain's tenosynovitis in a young, Active, population. *J Hand Surg.2009; 34 (1): 112–115. Doi: 10.1016/j. jhsa.2008.08.020.*

[15] **Hudak PL, Amadio PC, Bombardier C:** Development of an upper extremity outcome Measure: The DASH (disabilities of the arm, Shoulder and hand) [corrected]. The Upper Extremity Collaborative Group (UECG). *Am JInd Med.1996, 29: 602 - 608.10.1002/ (SICI) 1097 - 0274 (199606) 29: 6<602:: AID - AJIM4>3.0. CO; 2 - L.*

[16] **Beaton DE, Katz JN, Fossel AH, Wright JG, Tarasuk V, Bombardier C:** Measuring the Whole or the parts? Validity, reliability, and Responsiveness of the disabilities of the Arm, Shoulder and hand outcome measure in Different regions of the upper extremity. *J Hand Ther.2001, 14: 128 - 146.*

[17] **Gummesson C, Atroshi I, Ekdahl C:** The Disabilities of the arm, shoulder and hand (DASH) Outcome questionnaire: longitudinal Construct validity and measuring self - rated Health change After surgery. *BMC Musculoskelet Disord.2003, 4: 11 - 10.1186/1471 - 2474 - 4 - 11.*

[18] **Atroshi I, Gummesson C, Andersson B, Dahlgren E, Johansson A:** The disabilities of The Arm, shoulder and hand (DASH) outcome Questionnaire: reliability and validity of the Swedish Version evaluated in 176 patients. *Acta Orthop Scand.2000, 71: 613 - 618.10.1080/000164700317362262.*

[19] The DASH outcome measure. Institute for Work & Health, Toronto, Canada. *[http: //www.Dash. iwh. on. ca].*

[20] **Boonstra AM, Schiphorst Preuper HR, Reneman M, Posthumus JB, Stewart RE:** Reliability And validity of the visual analogue scale for disability in patients with chronic musculoskeletal Pain. *Int J Rehabil Res 2008; 31: 165 - 169.*

[21] **Couper M, Tourangeau R, Conrad F, et al.:** Evaluating the effectiveness of visual analog Scales: A web experiment. *Soc Sci Comput Rev 2006; 24: 227 - 245.*

[22] **Farrar JT, Berlin JA, Strom BL:** Clinically important changes in acute pain outcome Measures: A validation study. *J Pain Symptom Manag 2003; 25: 406 - 411.*

[23] **McCormack HM, Horne DJL, Sheather S:** Clinical applications of visual analogue scales: A Critical review. *Psychol Med 1988; 18: 1007 - 1019.*

[24] **Zealley AK, Aitken RC.** Measurement of mood. *Proc R Soc Med.1969; 62: 993–996.*

[25] **Aitken RC.** Measurement of feelings using visual analogue scales. *Proc R Soc Med.1969; 62: 989–993.*

[26] **Zung WW.** A Self - Rating Depression Scale. *Arch Gen Psychiatry.1965; 12: 63–70.*

[27] **Price DD, Harkins SW, Baker C.** Sensory–affective relationships among different types of Clinical and experimental pain. Pain.1*987; 28: 297–307. Doi: 10.1016/0304 - 3959 (87) 90065 - 0.*

[28] **Breivik H, Borchgrevink PC, Allen SM, et al. .** Assessment of pain. *Br J Anaesth.2008; 101: 17–24.*

[29] **Williamson A, Hoggart B.** Pain: a review of three commonly used pain rating scales. *J Clin Nurs.2005; 14: 798–804.*

[30] **Jensen MP, McFarland CA.** Increasing the reliability and validity of pain intensity Measurement in chronic pain patients. *Pain.1993; 55: 195–203. Google ScholarCrossrefPubMed*