

## Effectiveness of rehabilitation programs for shoulder pain at King Chulalongkorn Memorial Hospital

Nada Chantathai\*

Jariya Boonhong\*

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**Objective** : *To study demographic data, diagnosis, treatment program and success rate of rehabilitation program for shoulder pain patient and identify factors associated with more than 50% improvement of clinical symptoms.*

**Study Design** : *Retrospective descriptive and case-control study.*

**Setting** : *Department of Rehabilitation Medicine, King Chulalongkorn Memorial Hospital.*

**Material and Method** : *All intra-department medical records of patients January 2004 to December 2007 were reviewed. Records of patients with shoulder pain who were prescribed physical therapy programs would be included into the study. Data related to physical therapy programs and durations of treatment were reviewed. Furthermore, their out-patient medical data recorded by physiatrists including demographic data, diagnosis, underlying diseases, other intervention, medication and the improvement of the clinical symptoms were also analyzed.*

- Result** : *Three hundred and seventy-eight patients were included into the study. There were 98 males (25.9%) and 280 (74.1%) females, with the mean age of  $55.29 \pm 12.30$  years and the highest frequency in the age category of 41-60 years old. Diabetes mellitus (26.1%) and cervical spondylosis (18.1%) were the common underlying diseases. Frozen shoulder or shoulder capsulitis was the most frequently recorded disorder (56.6%); followed by myofascial pain syndrome (15.1%), supraspinatus tendonitis (9.3%), impingement syndrome (8.7%) and bicipital tendinitis (6.9%), respectively. The treatment programs included physical modalities (96.6%), range of motion and stretching exercise with joint mobilization (73.8%), medication (65.1%), local injection (7.4%) and dry needling (3.4%). Treatment outcomes were categorized as "resolved" (10.1%), "more than 50% improvement" (79.6%), "less than 50% improvement" (9.3%) and "not improved" (1%). Cervical spondylosis was the only factor that had a tendency to has a negative affect for clinical improvement (adjusted OR = 2.5 : 95% CI= 0.99 - 6.33).*
- Conclusion** : *Female patients, aged from 41 to 60 years old, with underlying disease of diabetes mellitus had the highest prevalence of shoulder pain. More than half were diagnosed as frozen shoulder or shoulder capsulitis. Addition to physiotherapy method, the other procedures such as local injection and dry needling were also used. Ten percent and ninety-percent of the patients had their symptom completely resolved and more than 50% improved, respectively. Cervical spondylosis has a tendency to associated with clinical improvement in a negative way, although it was not statistically significant.*
- Keywords** : *Shoulder pain.*

Reprint request: Boonhong J. Department of Rehabilitation Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok 10330, Thailand.

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นงา จันทไทย, จริญญา บุญหงษ์. ประสิทธิผลของโปรแกรมการฟื้นฟูภาวะปวดไหล่ที่  
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- วัตถุประสงค์** : เพื่อศึกษาข้อมูลพื้นฐาน การวินิจฉัย ความหลากหลายของโปรแกรม  
รักษา และอัตราความสำเร็จ ของโปรแกรมฟื้นฟู ซึ่งให้การรักษาที่หน่วย  
กายภาพในผู้ป่วยที่มีภาวะปวดไหล่ และหาปัจจัยที่เกี่ยวข้องกับอาการ  
ที่ดีขึ้นของผู้ป่วย
- การออกแบบการศึกษา** : การศึกษาพรรณนาชนิดย้อนกลับ และการวิจัยเชิงวิเคราะห์แบบย้อนกลับ
- สถานที่** : หน่วยกายภาพบำบัด ฝ่ายเวชศาสตร์ฟื้นฟู โรงพยาบาลจุฬาลงกรณ์
- วัสดุและวิธีการ** : ทบทวนบันทึกการรักษาที่เก็บรวบรวมไว้ที่หน่วยทะเบียนของฝ่าย  
เวชศาสตร์ฟื้นฟู ตั้งแต่เดือนมกราคม 2547 ถึง ธันวาคม 2550 บันทึก  
การรักษาของผู้ป่วยปวดไหล่ที่แพทย์ส่งมารับโปรแกรมฟื้นฟูจะได้รับเลือก  
เข้าสู่งานวิจัย และได้รับการทบทวนข้อมูลรายละเอียดการรักษาที่ได้รับ  
จากหน่วยกายภาพ นอกจากนี้เวชระเบียนผู้ป่วยนอกของโรงพยาบาล  
จะได้รับการทบทวนด้วยเพื่อให้ได้ข้อมูลพื้นฐาน การวินิจฉัยโรค,  
โรคประจำตัว การได้รับยารับประทาน การทำหัตถการอื่น ๆ ที่เกี่ยวเนื่อง  
และผลการรักษา
- ผลการรักษา** : บันทึกการรักษาของผู้ป่วยปวดไหล่จำนวน 378 บันทึก ถูกนำมาศึกษา  
เป็นของผู้หญิง 280 บันทึก (74.1%) และผู้ชาย 98 บันทึก (25.9%)  
อายุเฉลี่ย  $55.29 \pm 12.30$  ปี แต่ อายุช่วง 41 - 60 ปีพบมากที่สุด โรคร่วม  
ที่พบบ่อยคือเบาหวานและภาวะกระดูกคอเสื่อม ผู้ป่วยปวดไหล่ได้รับการ  
วินิจฉัยเป็นข้อไหล่ยึดติด (frozen shoulder) 56.6%, myofascial pain  
syndrome 15.1%, supraspinatus tendinitis 9.3%, impingement  
syndrome 8.7% และ bicipital tendinitis 6.9% การรักษาที่ผู้ป่วยได้รับ  
ประกอบด้วย เครื่องมือกายภาพ 96.6% การออกกำลังยืดเหยียดข้อและ  
ดัดดึงข้อต่อ 73.8% ยารับประทาน 65.1% การฉีดยาเฉพาะที่ 7.4%  
และการใช้เข็มคลายจุด trigger point 3.4% ผลการรักษาพบว่าผู้ป่วย  
หายดี 10.1% ดีขึ้นเกินครึ่ง 79.6% ดีน้อยกว่าครึ่ง 9.3% และไม่ดีขึ้นเลย  
1% ปัจจัยที่มีแนวโน้มว่าจะให้ผลลบต่อการรักษาคือการมีภาวะกระดูก  
คอเสื่อมร่วมด้วย (OR = 2.5, 95% CI = 0.99 - 6.33)

**สรุป**

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ภาวะปวดไหล่และนำมาสู่การทำกายภาพ พบมากในผู้หญิง ช่วงอายุ 41 ถึง 60 ปี เบาหวานและกระดูกคอเสื่อมเป็นโรคที่พบบ่อยมากที่สุด มากกว่าครึ่งผู้ป่วยได้รับการวินิจฉัยว่ามีภาวะข้อยึดติด โปรแกรมฟื้นฟูที่ผู้ป่วยได้รับประกอบด้วยการใช้ยารับประทาน ยาฉีดเฉพาะจุด การใช้เข็มคลายจุด trigger point เครื่องมือกายภาพ และการออกกำลังกายรวมกับการดัดตั้งข้อต่อ ผลการรักษาพบว่า 10% ของจำนวนผู้ป่วยหายดี และ 90% อาการดีขึ้นมากกว่าครึ่ง และพบว่าภาวะกระดูกคอเสื่อมมีแนวโน้มว่าจะให้ผลลบต่อการรักษา

The shoulder pain is a common problem in general practice and rehabilitation clinics. The prevalence of shoulder pain varies from 4.7% to 67%.<sup>(1-6)</sup> This wide range of prevalence is due to a problem of different clinical diagnosis, difference in aging and various study population. Making a specific diagnosis for patients with shoulder pain is considered difficult because of a complex interrelation between the shoulder and adjacent areas, lacking a reliable test, and the frequent occurrence of referred pain from other organs.<sup>(7-9)</sup> Despite the absence of reliable diagnostic tests, the currently assumption is that in non-traumatic shoulder complaints, mostly the anatomical structures in the subacromial space are involved, the subacromial bursa, the rotator cuff tendons, and the tendon of the long head of biceps muscle.<sup>(9-12)</sup> Green *et al*<sup>(13)</sup> reviewed the diagnosis labels and/or definitions of the study population in shoulder pain problem and concluded that most trials can be categorized as adhesive capsulitis (which specific diagnosis also including peri arthritis and frozen shoulder) and/or rotator cuff tendonitis. Shoulder pain is associated with impair ability to do activity of daily living (e.g. eating, dressing, personal hygiene and work), ability to sleep, affecting mood and concentration. People with shoulder pain have been shown to score less than normal value on the SF-36 (a standardized measure of general health) for physical function, social function, physical role function, emotional role function and pain.<sup>(14-16)</sup> Effective treatment of shoulder disorders could decrease the risk of loss of independence or time loss from work.<sup>(17)</sup> There are many employed forms of rehabilitation treatment for shoulder pain, including, advice, analgesic and anti-inflammatory

medication, steroid injection, trigger point injection, nerve block, and physiotherapy. Physiotherapy consists of a board range of interventions which are often first-line of managements for shoulder pain.<sup>(14)</sup> Physiotherapy interventions include passive joint mobilization, stretching and strengthening exercise and physical modality. Modalities are superficial heat, shortwave diathermy, ultrasound, transcutaneous electrical nerve stimulation (TENS), laser and cervical traction. From literature reviewed, there is no consensus for the treatment of choice for shoulder pain and the effectiveness of physical therapy for painful shoulder could not be accurately assessed.<sup>(17)</sup> But from all of the reviews, there is no study that determined the effectiveness of combined rehabilitation treatment programs which include many methods such as education, medication, physical modality, exercise and local injection. In clinical practice, these combinations of treatment programs have been accepted and used as standard treatments in these patients. The Department of Rehabilitation Medicine at King Chulalongkorn Memorial Hospital is a tertiary care and educational hospital that has given a combined treatment programs to the shoulder pain patients prescribed by physiatrist staff or resident doctors in training and operated by physical therapists for more than two decades. Although there were many shoulder pain patients to take rehabilitation program at our physical therapy unit, the accurate data in term of number per year, demographic data of patients, diagnosis, prescribed interventions and improvement of symptom have not been explored.

The aim of this study was to assess demographic data, diagnosis, varieties of treatment programs and a success rate of rehabilitation

programs which were prescribed at physical therapy unit for patients with shoulder pain and to identify factors associated with the improvement of clinical symptoms.

### Material and Method

All of the patients with shoulder pain symptom and were prescribed physiotherapy programs at the Department of Rehabilitation Medicine, were recruited into the study. Stroke patients with shoulder pain on hemiplegic side and subjects who have uncompleted data will be excluded. Firstly, all of intra-department medical records from January 2004 to December 2007 at Registration Unit of Department of Rehabilitation Medicine were reviewed. Data related to physical therapy programs and durations of treatment were analyzed. Furthermore, out - patient medical data recorded by physiatrists including demographic data, diagnosis, underlying diseases, other intervention, medication and the improvement

of the clinical symptoms were also analyzed.

### Statistical Analysis

The SPSS statistic program version 13.0 was used to analyze the data. Quantitative and qualitative data were demonstrated in mean and standard deviation (SD), number and percentage. Unpaired t-test and Chi-square were used to compare these descriptive data between groups of patients with more than 50% improvement and group of patients with less than 50% improvement. Logistic regression model was used to analyze factors associated with more than 50% clinical improvement. The level of statistic significance was set at  $p < 0.05$ .

### Results

Three hundred and seventy-eight patients from January 2004 to December 2007 were included into the study. The demographic data: age, sex, and underlying disease were shown in Table 1. There was

**Table 1.** Demographic data of the included patients (N = 378).

Characteristics	n (%)
Number of patients (average cases / year)	378 (94.5)
Mean age (yrs) $\pm$ SD (range)	55.29 $\pm$ 12.30 (15 - 88)
Age group	
15-30 yrs.	16 (4.2)
31-40 yrs.	22 (5.8)
41-50 yrs.	86 (22.8)
51-60 yrs.	131 (34.7)
61-70 yrs.	78 (20.6)
71-88 yrs.	45 (11.9)
Sex: Male/ Female	98 / 280 (25.9/74.1)
Underlying disease: Yes / No	188 / 190 (49.7/50.3)
Diabetes mellitus	49 (26.1)
Cervical spondylosis	34 (18.1)
Cardiac	15 (8.0)

higher prevalence of shoulder pain in the fourth to seventh decade (78.1%) and female patients. Diabetes mellitus and cervical spondylosis were the most common diseases detected in these patients. Unilateral and non-injury shoulder pain were recorded in the major group of patients treated with physical therapy programs. More than fifty-percent of patients had shoulder pain about two months before visiting doctors and more than eighty-percent of them came to see doctor after having pain for about four months. The most common diagnosis was frozen shoulder, followed by myofascial pain syndrome. More detail was shown in table 2.

The treatments that patients received from physiatrists included non-steroidal anti-inflammatory drugs, muscle relaxants, local steroid injection, dry needling for myofascial trigger point and physical therapy. Physical modality and exercise programs with joint mobilization were mainly forms of physical therapy. In physical modalities, ultrasound and transcutaneous electrical nerve stimulation (TENS) were the most frequently prescribed respectively. Exercise programs consisted of mobilization, range

of motion, stretching and strengthening, and the average of treatment duration was approximately six weeks (Table3). All of these treatment programs were prescribed by physiatrist staffs and doctors who were training in residency program. Furthermore, in ordinary treatment processes all of the patients would be advised about a proper activity of daily living and followed up every one to two weeks with their doctors. Routinely, all patients were randomly allocated to physical therapists at the first visit and then they would continue their exercise programs by the same therapist on the every visit. Physical therapists would regularly record problems during treatment and improvement of patients' clinical symptoms in intra-department medical records for doctors to review on every follow-up visit. These records were separately kept at the Registration Unit of the Department of Rehabilitation Medicine. Ninety percent of the patients improved more than 50% of clinical symptoms but there were only approximately 10% who were completely cured (Table 4). Pain, range of motion and function were the main outcomes that were observed to determine the improvement.

**Table 2.** Clinical data of the included patients (N = 378).

Clinical characteristics	n (%)
Side of pain: Left / Right / Bilateral	168 / 177 / 33 (44.4/46.8/8.7)
Cause: Injury / Non-injury	31 / 347 (8.2 / 91.8)
Duration of pain before doing programs: Mean $\pm$ SD (wk)	13.7 $\pm$ 17.5
Median (IQR 25, 75) / Mode (wk)	8 (4, 16) / 4
Diagnosis:	
Frozen shoulder or shoulder capsulitis	213 (56.6)
Myofascial pain syndrome	59 (15.6)
Supraspinatus tendinitis	35 (9.3)
Impingement syndrome	33 (8.7)
Bicipital tendinitis	26 (6.9)

**Table 3.** Treatment programs and interventions that were prescribed to the patients (N = 378).

Treatment programs or interventions	n (%)
Medication: Yes / No	268 / 110 (70.9 / 29.1)
NSAID plus muscle relaxant drug	45 (11.9)
NSAID drug alone	110 (29.1)
Muscle relaxant drug alone	72 (19)
Other	41 (15.3)
Intervention: Yes / No	41 / 337 (10.84 / 89.1)
Local injection	28 (7.4)
Dry needling	13 (3.4)
Physical therapy programs	
Modality: Yes / No	365 / 13 (96.6 / 3.44)
Ultrasound	259 (68.5)
TENS	81 (21.4)
Shortwave diathermy	39 (10.3)
Cervical traction	28 (7.4)
Superficial heat	12 (3.2)
Exercise program	
ROM and stretching with joint mobilization	279 (73.8)
Strengthening	31 (8.2)
Duration of treatment: Mean $\pm$ SD (wk)	6.5 $\pm$ 6.5
Median (IQR 25, 75) / Mode (wk)	4 (2, 8) / 2

**Table 4.** Treatment outcomes of shoulder pain after rehabilitation treatment programs (N = 378).

Results	n (%)
Resolved	38 (10.1)
Improved more than 50%	301 (79.6)
Improves less than 50%	35 (9.3)
Not improve	4 (1.0)

The comparison of variables among group of patients who had more than 50% improvement of shoulder pain and less than 50% improvement revealed no statistically significant difference regarding age groups, genders, duration of pain before starting treatment program, underlying of diabetes mellitus, diagnosis of cervical spondylosis,

frozen shoulder, or myofascial pain syndrome, history of shoulder injury, and oral medication (Table 5). From univariate and multivariate analyses, there were no statistically significant risk factor that were less than 50% improvement as shown in Table 5.



**Table 5.** Univariate and multivariate analyses of variables associated with less than 50% improvement.

Variables	<50% Improvement (n = 39) n (%)	> 50% Improvement (n = 339) n (%)	p-value	Crude OR (95% CI)	Adjusted OR (95% CI)
Age: Mean $\pm$ SD	54.49 $\pm$ 14.65	55.38 $\pm$ 12.02	0.10	1.01 (0.98 - 1.00)	1.01 (0.51 - 1.01)
Sex					
Male (n = 98)	11 (11.2)	87 (88.8)	0.73	1	1
Female (n = 280)	28 (10.0)	252 (90.0)		0.88 (0.42- 1.84)	0.91 (0.43-1.94)
Duration of pain (wks)	10.77 $\pm$ 10.60	14.07 $\pm$ 18.06	0.11	1.02 (0.99-1.04)	1.02 (0.99-1.04)
Diabetes mellitus					
No (n = 329)	33 (10.0)	296 (90.0)	0.63	1	1
Yes (n = 49)	6 (12.2)	43 (87.8)		1.25 (0.50- 3.16)	1.26 (0.48- 3.32)
C-spondylosis					
No (n = 342)	32 (9.4)	310 (90.6)	0.06	1	1
Yes (n = 36)	7 (19.4)	29 (80.6)		2.34 (0.95 - 5.76)	2.50 (0.99 - 6.33)
Frozen shoulder					
No (n = 167)	18 (10.8)	149 (89.2)	0.80	1	1
Yes (n = 211)	21 (10.0)	190 (90.0)		0.92 (0.47 - 1.78)	1.02 (0.47 - 2.22)
Myofascial pain syndrome					
No (n = 319)	32 (10.0)	287 (90.0)	0.67	1	1
Yes (n = 59)	7 (11.9)	52 (88.1)		1.21 (0.51 - 2.88)	1.30 (0.46 - 3.70)
History of injury					
No (n = 347)	34 (9.8)	313 (90.2)	0.27	1	1
Yes (n = 31)	5 (16.1)	26 (83.9)		1.77 (0.64 - 4.91)	1.93 (0.68 - 5.48)
Oral medication					
No (n = 110)	11 (10.0)	99 (90.0)	0.90	1	1
Yes (n = 268)	28 (10.4)	240 (89.6)		1.05 (0.50 - 2.20)	1.04 (0.49 - 2.21)

C-spondylosis = Cervical spondylosis, Oral medication = NSAID or Muscle relaxant

## Discussion

All of the included subjects in the present study were patients who consulted the doctors of rehabilitation medicine and were prescribed physical therapy programs at the hospital. The patients who were instructed a home program or were not treated with physical therapy were not included into the study.

The demographic data of shoulder patients in this study are similar to other reports regarding age groups, genders and underlying diseases. Windt *et al.*<sup>(18)</sup> studied shoulder disorders in Dutch general practices and reported greater incidence among for woman than men and highest prevalence in the age category of 45 - 64 years old. Huisstede *et al.*<sup>(19)</sup> studied the prevalence of arm, neck and shoulder in 3,600 patients from general population and also reported that women aged 45 to 64 years old were most affected. Cole *et al.*<sup>(20)</sup> studied the association of shoulder pain and diabetes mellitus in a population based cohort and concluded that there is a higher prevalence of shoulder pain in people with diabetes mellitus. Cervical spondylosis was the second common underlying disease found in these patients. The high incidence of neck and upper extremity complaints was found for patients aged 40 to 60 years old. This is in agreement with other studies in general practice.<sup>(1,21 - 24)</sup> Bot *et al.*<sup>(1)</sup> suggested that the occurrence of neck and upper extremity complaints may be associated with working condition and age which were needed to be explored in additional research. Innervation of shoulder joint is another point to concern, it comes from the cervical nerve root level of C5 - 6 which is the most common level in cervical spondylosis, the association between neck pain from cervical radiculopathy and shoulder pain should be

an issue for investigation in the next study.

Frozen shoulder or shoulder capsulitis was the major group of diagnosis in this study. Myofascial pain syndrome and inflammation of structures in subacromial space including supraspinatus tendonitis, impingement syndrome, bicipital tendinitis were the second and third common diagnoses. The common diagnosis of shoulder capsulitis and inflammation of structures in subacromial space were accordance with other studies.<sup>(10-12,18)</sup> Myofascial pain syndrome, the second common diagnosis in this study was outstanding when compared to other studies. However, many authors<sup>(25 -26)</sup> have ever commented on this issue. Bron C *et al.*<sup>(9)</sup> has mentioned that in their clinical experience, myofascial trigger points (MTrPs) may contribute to the burden of shoulder complaints. Active MTrPs can produce referred pain and restrict range of motion that may be confused with the clinical symptoms of shoulder capsulitis , subacromial bursitis or rotator cuff tendinitis. This issue is interesting and deserves to be explored in other study.

The treatment programs in this study, included various methods; medication, local injection, dry needling, physical modality such as ultrasound, short wave diathermy, TENS, cervical traction, etc., exercise program comprising both stretching, joint mobilization and strengthening and education. Physiotherapy for the treatment of shoulder pain has been accepted as the first line of management but it encompasses a board range of interventions.<sup>(14)</sup> However, currently there is no obvious evidence of its benefits on shoulder pain. Green S *et al.*<sup>(14)</sup> suggested combinations of physiotherapy interventions adjunct to other non physiotherapy

interventions is more reflective of current clinical practice. This study explored the combination of physiotherapy and non-physiotherapy intervention which was all prescribed and followed up by psychiatrists. Nearly 90% of the patients had more than 50% improvement in their symptoms. However, only 10% reported complete resolution. From reviewing the previous trials about outcome of treatment, most studies measured and compared between groups with pain scores, ranges of motion and disability scores. However, a more appropriate end point was neglected in most studies. This study reviewed the data at the end point of treatment program so it was unable to compare the outcome. Further work is therefore needed to address these issues to improve the ability to interpret and compare the results of different studies.<sup>(14)</sup> From multivariate analysis, cervical spondylosis had a tendency to be associated with the clinical improvement (OR = 2.5, 95%CI 0.99 - 6.33). Due to small sample size in group of cervical spondylosis patients, the statistic power may be low. The prospective clinical trial is needed to clarify this association.

Limitation of this study is the retrospective study design, and assessments of the outcomes were not defined in careful and complete form. Furthermore, the number of subjects is low in some stratified subgroups for studying of the risk factors. The patients who were prescribed home program or could not get treatment programs at the hospital, they were not included into the study.

## Conclusion

Ninety-five cases per year of patients with shoulder pain were treated with combined programs

of physiotherapy and non-physiotherapy. Female patients, aged from 41 to 60 years old, with underlying disease of diabetes mellitus and/or cervical spondylosis had the highest prevalence of shoulder pain. Frozen shoulder or shoulder capsulitis was the most common diagnosis. Combination of medication, local injection, dry needling, physical modalities, and exercise program were used. Ten percent and ninety-percent of patients were completely resolved and more than 50% improved, respectively. Cervical spondylosis has a tendency to associate with clinical improvement in a negative way, although it was not statistically significant.

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