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Abstract

Analysis of Shoulder Range of Motion in Shoulder Myofascial Pain Syndrome

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Objective: This study was carried out to investigate if the measurement of range of motion(ROM) could be applied in the diagnosis of Myofascial Pain Syndrome(MPS) and to determine the severity by analyzing ROM in MPS patients.

Methods: The study subjects were 476 female telephone number information service workers. Southampton Protocol and Pittsburgh Protocol were used to diagnose MPS and to measure ROM. ROMs were measured by 2 inclinometers exercising each shoulder passively and actively in 5 directions ; abduction, forward flexion, extension, external rotation, and internal rotation.

Results: Compared to the normal group (n=147), the mean of right side ROM in the subjects (n=270) with same side MPS was 2.1° (SD=11.5) lesser in active extension and 1.7° (SD=10.4) lesser in passive extension. Compared to the mild group (n=210), the mean of right side ROM in the patients with same side severe MPS (n=58) was lesser in all directions. Especially in active forward flexion, passive forward flexion, active extension, passive extension and active external rotation, ROM in the subjects with severe MPS was lesser by 6.5° (SD=13.1), 5.1° (SD=12.8), 5.9° (SD=11.8), 5.0° (SD=10.6) and 3.9° (SD=9.8), respectively, than those of the subjects with mild MPS. Compared to the subjects with left side mild MPS(n=172), ROM in the subjects with left side severe MPS (n=59) was 5.3° (SD=13.3) lesser in active forward flexion.

Conclusions: In this study, ROMs in the subjects with severe MPS tended to be lesser than those in mild patients. This tendency was more prominent in the right side than the left, active range of motion than passive and forward flexion and extension than others. The results of this study are expected to help diagnose shoulder MPS and determine severity.

Key Words: Myofascial Pain Syndrome, Range of Motion

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2001

2004   4, 112

(9, 183)   44. 8%

(Ministry of
Labor, 2005).   (Myofascial Pain
Syndrome, MPS)

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30%   74%   ,
(Kim, 2001).

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Kaergaard   Andersen(2000)

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15. 2%   ,

Jang   (2000)

31. 3%   1.

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, Jang   (2000)   2002   2   2003   8

60%   ,   ,

Jang   (2001)   521   .

43. 1%

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(13) 2)

.   (15)

1)   3)   (17)

2)   (trigger point) 3)   476   .

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.   3   2.

,   (taut band),   ,'   ','   1)

,   ,   ,   ,   Simons   (1999)

(Harden   , 2000).   Southampton Protocol - The
Southampton examination schedule for the diag-
,   nosis of musculoskeletal disorders of the upper
,   ,   (limb - (Palmer   , 2000; Walker-Bone   , 2002)
)   .

(Kim, 2001).   Pittsburgh Protocol   .

,

,   (Pressure algometer)   1Kg
.

4 Kg   ,

                    4   (3 ,
        1)   .
    3   protocol

              .

    2)

                        Southampton Protocol - The
Southampton examination schedule for the diag-
nosis of musculoskeletal disorders of the upper
limb - (Palmer   , 2000; Walker-Bone   , 2002)
                              .

(Inclinometer)

                    (A : 0 ~ 360)

                            (B: +180 ~ -
180)   ,   A   B
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=0)   ,
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                476   329 (69.1%),
        147 (30.9%)   .

                    232 (48.7%),   270
(56.7%)   .

                            172 (36.1%),
          59 (12.4%),   210
(44.1%),   58 (12.2%)   .
                        25   30
      41.6%(137),   38.1%(56)
                        20   23
      38.6%(110),   42.5%(54)
                  .   94.6%(388)
          53.9%(194)
        82.4%(295)
                  .   65.8%(252)
59.6%(239)   .

                            (Table 1).
                                        3
20.1%(66), 4   50.9%(167)
3   12.9%(19), 4   43.6%(64)
                                  .   1

                    35.0%(100)
  22.7%(29)   .

                                  67.3%(175)
      57.7%(64)   .
63.3%(262)
98.0%(391)   .

                            4.2%(18)
      ,
27.6%(113)   .

                                  86.8%(367)
                        .

(Table 2).　　　　　　　　　　　　　　　　　　.　　　　　,

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　2.　　　　　　　　　　　　　　　　　　　.

　　　　(n=147)　　　　　　　　　　　　　　　　　　　　2. 1°
,　　,　　,　　,　　　　　　　　148. 5°　(SD=11. 5), 1. 7°(SD=10. 4)　　.　,　　　,
(SD=14. 0),　152. 5°(SD=12. 5),　66. 9°(SD=10. 3),
89. 3°(SD=9. 1),　90. 4°(SD=7. 3)　　　　　　　　　3. 3°,　　　　　　2. 9°　　(Table 3).
　　　　　　　8-12°　　　　157. 9°(SD=14. 8),　　　(n=147)
161. 2°(SD=12. 6),　77. 5°(SD=9. 7),　99. 4°(SD=10. 5),　,　　,　　,　　,　　　　　150. 2°
102. 0°(SD=8. 7)　　　(Table 3).　　　　　　　　(SD=11. 5)　153. 8°(SD=15. 4)　64. 8°(SD=10. 5)　89. 6°
　　　　(n=270)　　　　　　　　　　　　　　　　(SD=9. 8)　90. 9°(SD=6. 3)
　　　　　　　　　　　　　,　　　　　　,　　　　　　　　8-12°　　　　159. 4°(SD=11. 9)　161. 8°
　,　　　　　,　　　　　,　　　　　(SD=15. 1)　74. 5°(SD=10. 0)　101. 5°(SD=9. 8)　104. 4°
(SD=6. 3)　　(Table 4).

Table 1. General Characteristics of Subjects   Unit : number (%)

Characteristics	Patient (n=329)	Normal (n=147)	Total (N=476)	p-value*
Age (years)				
<25	63 (19.2)	22 (15.0)	85 (17.9)	0.428
25 - 30	137 (41.6)	56 (38.1)	193 (40.6)	
30 - 35	77 (23.4)	41 (27.9)	118 (24.8)	
35	52 (15.8)	28 (19.1)	80 (16.8)	
BMI†				
<20	101 (35.4)	38 (29.9)	139 (33.7)	0.672
20 - 23	110 (38.6)	54 (42.5)	164 (39.8)	
23 - 25	38 (13.3)	20 (15.8)	58 (14.1)	
25	36 (12.6)	15 (11.8)	51 (12.4)	
Smoking				
Non-smoker	271 (95.4)	117 (92.9)	388 (94.6)	0.484
Ex-smoker	10 (3.5)	6 (4.8)	16 (3.9)	
Smoker	3 (1.1)	3 (2.4)	6 (1.5)	
Alcohol				
Non-drinker	95 (38.0)	49 (44.6)	144 (40.0)	0.346
Ex-drinker	14 (5.6)	8 (7.3)	22 (6.1)	
Drinker	141 (56.4)	53 (48.2)	194 (53.9)	
Exercise				
Yes	207 (83.8)	88 (79.3)	295 (82.4)	0.298
No	40 (16.2)	23 (20.7)	63 (17.6)	
Marriage				
Married	90 (34.1)	36 (30.3)	126 (32.9)	0.709
Unmarried	171 (64.8)	81 (68.1)	252 (65.8)	
Etc	3 (1.1)	2 (1.7)	5 (1.3)	
Education				
High school	160 (58.0)	79 (63.2)	239 (59.6)	0.498
College/University	116 (42.0)	46 (36.8)	162 (40.4)	

* : χ^2-test

† : Body Mass Index = Weight(kg)/Height(m)²

(n=232)

6. 5°
(SD=13. 1), 5. 1°(SD=12. 8), 5. 9°(SD=11. 8), 5. 0°
(SD=10. 6), 3. 9°(SD=9. 8)

(Table 4).

3.
8. 4°, 6. 2°,
3. 9° (Table 5).
(n=59)
(n=58) (n=172)
(n=210)

Table 2. Work-Related Characteristics of Subjects   Unit : number (%)

Characteristics	Patient (n=329)	Normal (n=147)	Total (N=476)	p-value*
Work Duration (years)				
<3	66 (20.1)	19 (12.9)	85 (17.9)	0.005
3 - 4	95 (29.0)	64 (43.5)	159 (33.5)	
4	167 (50.9)	64 (43.5)	231 (48.6)	
Employed State				
Regular	110 (38.7)	42 (32.3)	152 (36.7)	0.208
Irregular	174 (61.3)	88 (67.7)	262 (63.3)	
Shift Work				
No	267 (98.2)	124 (97.6)	391 (98.0)	0.728
Yes	5 (1.8)	3 (2.4)	8 (2.0)	
Occupational History1[†]				
No	284 (95.6)	127 (96.2)	411 (95.8)	0.779
Yes	13 (4.4)	5 (3.8)	18 (4.2)	
Occupational History2[‡]				
No	207 (72.4)	89 (72.4)	296 (72.4)	0.997
Yes	79 (27.6)	34 (27.6)	113 (27.6)	
Rest[§]				
No	186 (65.0)	99 (77.3)	285 (68.8)	0.013
Yes	100 (35.0)	29 (22.7)	129 (31.2)	
Chair Condition				
No	40 (13.6)	16 (12.4)	56 (13.2)	0.737
Yes	254 (86.4)	113 (87.6)	367 (86.8)	
Work Load[¶]				
No	85 (32.7)	47 (42.3)	132 (35.6)	0.075
Yes	175 (67.3)	64 (57.7)	239 (64.4)	

* : χ^2-test

[†] : Have you ever worked at non-computer-using department in your present job?

[‡] : Have you done computer work or repeating upper limb-moving work before you acquired this job?

[§] : Have you been not able to take a rest because of work at provided rest hours during last 1 week?

 : Do you use a chair with adjustable height and location of seat and back at work?

[¶] : Is there a noticeable increase of work after recent downsizing?

,   ,   (taut band)
                                                                                         ,

                          .   ,

,   ,   (trigger point)   (Simons   , 1999).
                                                    .   Simon   (1999)
                                                          Table 7   "
          5. 3° (SD=13. 3)   .   ,   "
    ,   .
            6. 0°   (Table 6).

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Table 3. Right Shoulder Range of Motion of Right Patient and Normal   Mean (SD) (Unit ; °)

Categories		ROM of Right Patient (n=270)	ROM of Normal (n=147)	Difference*	†
Abduction	Active	151.1 (14.1)	148.5 (14.0)	2.6 (14.1)	1.4
	Passive	160.9 (14.5)	157.9 (14.8)	3.0 (14.6)	1.6
Forward Flexion	Active	153.9 (13.3)	152.5 (12.5)	1.4 (13.0)	0.8
	Passive	162.4 (12.9)	161.2 (12.6)	1.3 (12.8)	0.5
Extension	Active	64.7 (12.0)	66.9 (10.3)	-2.1 (11.5)	-3.3‡
	Passive	75.8 (10.7)	77.5 (9.7)	-1.7 (10.4)	-2.9‡
External Rotation	Active	88.1 (10.0)	89.3 (9.1)	-1.1 (9.7)	-0.7
	Passive	98.9 (11.0)	99.4 (10.5)	-0.5 (10.8)	-0.2
Internal Rotation	Active	89.6 (8.1)	90.4 (7.3)	-0.8 (7.8)	-1.0
	Passive	102.2 (9.4)	102.0 (8.7)	0.2 (9.1)	-0.1

* : Difference between Right Patient and Normal

† : Adjusted for age, BMI, work duration

‡ : p<0.05

Table 4. Left Shoulder Range of Motion of Left Patient and Normal   Mean (SD) (Unit ; °)

Categories		ROM of Left Patient (n=232)	ROM of Normal (n=147)	Difference*	†
Abduction	Active	151.4 (15.5)	150.2 (11.5)	1.2 (14.1)	1.4
	Passive	160.5 (15.3)	159.4 (11.9)	1.1 (14.1)	1.0
Forward Flexion	Active	153.9 (13.4)	153.8 (15.4)	0.1 (14.2)	0.2
	Passive	162.7 (13.5)	161.8 (15.1)	0.9 (14.2)	1.1
Extension	Active	63.6 (11.6)	64.8 (10.5)	-1.3 (11.2)	-0.8
	Passive	73.8 (10.7)	74.5 (10.0)	-0.7 (10.4)	-0.1
External Rotation	Active	90.1 (9.0)	89.6 (9.8)	0.5 (9.3)	0.3
	Passive	101.1 (9.4)	101.5 (9.8)	-0.4 (9.5)	-0.8
Internal Rotation	Active	90.4 (7.2)	90.9 (6.3)	-0.4 (6.9)	0.0
	Passive	103.6 (7.9)	104.4 (6.3)	-0.8 (7.3)	-0.6

* : Difference between Left Patient and Normal

† : Adjusted for age, BMI, work duration

. Alvarez (2002)

2. 1°(SD=11. 5), 1. 7°(SD=10. 4)

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,   ,   .

.   Mannerkorpi   (1999)   1°

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Table 5. Right Shoulder Range of Motion of Right Severe Patient and Right Mild Patient　　　　　　　　Mean (SD) (Unit ; °)

Categories		ROM of Right Severe Patient (n=58)	ROM of Right Mild Patient (n=210)	Difference*	[†]
Abduction	Active	149.3 (18.9)	151.7 (12.7)	-2.4 (14.2)	-4.0
	Passive	159.4 (18.0)	161.4 (13.6)	-2.0 (14.6)	-3.0
Forward Flexion	Active	148.6 (18.4)	155.2 (11.4)	-6.5 (13.1)[§]	-8.4[§]
	Passive	158.4 (17.7)	163.5 (11.2)	-5.1 (12.8)[‡]	-6.2[§]
Extension	Active	60.0 (12.8)	65.8 (11.6)	-5.9 (11.8)[§]	-3.5
	Passive	71.8 (11.4)	76.8 (10.3)	-5.0 (10.6)[§]	-3.2
External Rotation	Active	84.9 (11.0)	88.8 (9.5)	-3.9 (9.8)[‡]	-3.9[‡]
	Passive	96.3 (11.9)	99.5 (10.7)	-3.2 (11.0)	-2.7
Internal Rotation	Active	88.0 (10.4)	90.0 (7.4)	-2.0 (8.1)	-1.3
	Passive	101.8 (11.7)	102.2 (8.7)	-0.4 (9.4)	0.4

* : Difference between Right Severe Patient and Right Mild Patient

[†] : Adjusted for age, BMI, work duration

[‡] : p<0.05

[§] : p<0.01

Table 6. Left Shoulder Range of Motion of Left Severe Patient and Left Mild Patient　　　　　　　　Mean (SD) (Unit ; °)

Categories		ROM of Left Severe Patient (n=59)	ROM of Left Mild Patient (n=172)	Difference*	[†]
Abduction	Active	152.6 (16.0)	150.9 (15.4)	1.7 (15.5)	0.7
	Passive	162.3 (15.9)	159.9 (15.1)	2.4 (15.3)	1.6
Forward Flexion	Active	149.9 (16.6)	155.2 (12.0)	-5.3 (13.3)[‡]	-6.0[§]
	Passive	160.2 (15.7)	163.5 (12.7)	-3.4 (13.5)	-3.9
Extension	Active	64.1 (13.9)	63.4 (10.9)	0.8 (11.6)	1.9
	Passive	75.7 (11.9)	73.2 (10.3)	2.5 (10.7)	3.4
External Rotation	Active	88.8 (9.0)	90.6 (9.0)	-1.8 (9.0)	-2.0
	Passive	99.8 (8.7)	101.6 (9.5)	-1.8 (9.3)	-1.7
Internal Rotation	Active	90.8 (6.7)	90.4 (7.3)	0.4 (7.2)	0.3
	Passive	104.2 (7.9)	103.5 (8.0)	0.7 (7.9)	1.0

* : Difference between Left Severe Patient and Left Mild Patient

[†] : Adjusted for age, BMI, work duration

[‡] : p<0.05

[§] : p<0.01

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6. 5°(SD=13. 1),   20- 30

5. 9°(SD=11. 8)   .

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(blind method)   .

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4   (taut band)

(3 ,   1)

Palmer (2000)   .   (taut

Walker-Bone (2002)   band)

Southampton Protocol

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.   (Kamanli

, 2005; Majlesi , 2004; Smania , 2003;

R hoades, 2002; E senyel , 2000; Hsueh ,

1997; Hong , 1997).

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Table 7. Recommended Criteria for Identifying a Latent Trigger Point or an Active Trigger Point*

Essential criteria

   1. Taut band palpable. (if muscle accessible)

   2. Exquisite spot tenderness of a nodule in a taut band.

   3. Patient's recognition of current pain complaint by pressure on the tender nodule. (identifies an active trigger point)

   4. Painful limit to full stretch range of motion.

Confirmatory observation

   1. Visual or tactile identification of local twitch response.

   2. Imaging of a local twitch response induced by needle penetration of tender nodule

   3. Pain or altered sensation (in the distribution expected from a trigger point in that muscle) on compression of tender nodule

   4. Electromyographic demonstration of spontaneous electrical activity characteristic of active loci in the tender nodule of a taut band

* : Simons DG, Travell JG, Simons LS. Myofascial pain and dysfunction : The trigger point manual. Vol 1, 2nd ed. Baltimore : Williams & Wilkins. 1999.

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476   .
Southampton Protocol   Pittsburgh
Protocol   ,
(Inclinometer)   ,
,   ,   ,   5   ,
.
:   (n=270)
(n=147)   ,

2. 1°(SD=11. 5),
1. 7°(SD=10. 4)   .   (n=58)
(n=210)

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,   ,

6. 5°(SD=13. 1), 5. 1°(SD=12. 8), 5. 9°(SD=11. 8),
5. 0°(SD=10. 6), 3. 9°(SD=9. 8)   .
(n=59)
(n=172)   ,

5. 3°(SD=13. 3)   .
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