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Evaluation of Varying Shoulder Postures with External Loads using a Psychophysical Method

Taebeum Ryu*, Young-Ju Park**, Seokhee Na*, Min K. Chung*, Dohyung Kee***

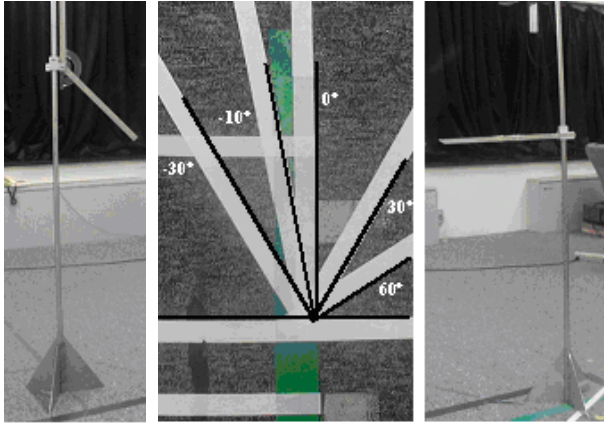
ABSTRACT

The purpose of this study is to quantitatively investigate perceived discomfort of complex shoulder postures with external loads and to propose a preliminary evaluation scheme of shoulder postures. Twelve healthy male adults participated in an experiment to rate their perceived discomfort of shoulder postures. The independent variables were shoulder flexion angle (45, 90 and 150°), adduction/abduction angle(-30, -10, 0, 30 and 60°), and external load(0, 1.5 and 3.0kg). The results revealed that the flexion angle, external load and their interaction significantly affected the perceived discomfort(p<0.05) but the effect of adduction/abduction angle on the discomfort was not significant(p>0.05). The effect of external load was much larger than that of any other factor with explaining about 81% of the total variation of discomfort scores. Based on the experimental results a preliminary scheme was presented to evaluate the stress of shoulder postures with external loads.

Keyword: WMSDs, Shoulder posture, External load, Perceived discomfort

1. (Hignett & McAtamney, 2000)
가
2003 148% 가 , , 가
가 (, , 가가
2004). 2002 가
(degree of freedom)
가 (flexion), (lateral flexion),
(rotation) 3 , RULA,
가 OWAS(Karhu et al., 1981), RULA(McAtamney & Corlett, 1993), REBA REBA 가

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(a) (b) (c)

2.

가
(
2(a)), /
(2(b)). ,
가 가
(2(c)).
0, 1.5 3kg

2.4 가

가 magnitude
estimation(ME) . ME
가
가 (numeric estimation)
(line production)
가 (Han et al., 1999). Modulus ME
(extremely discomfort) 100
가 가 가

2.5

가 , ME
가 가
ME 가 Han et al.
(1999)

ME
가 45
(3 × 5 / × 3 (3).
) , 5
5
1
가 . 2

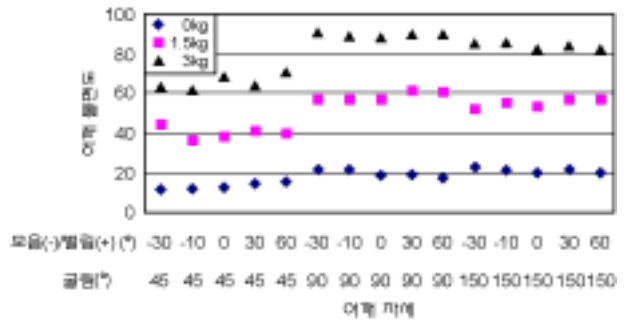


3. 가 ()

3.

3.1

45 12
4 .



4.

3.2

(F), / (A), (L) (three - way ANOVA) (2). (p<0.05). / (F x A, A x L, F x A x L) (, SNK) (Student Newman - Keuls test) SNK (5), 45 가 90° 150° (p<0.05), 90° 150° (p>0.05). , SNK (6), (0, 1.5, 3kg) 가

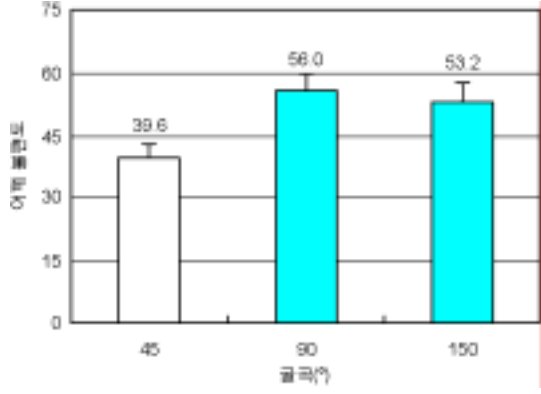
가 가 (p<0.05). R² 0.99 가 가 7 가 가

2.

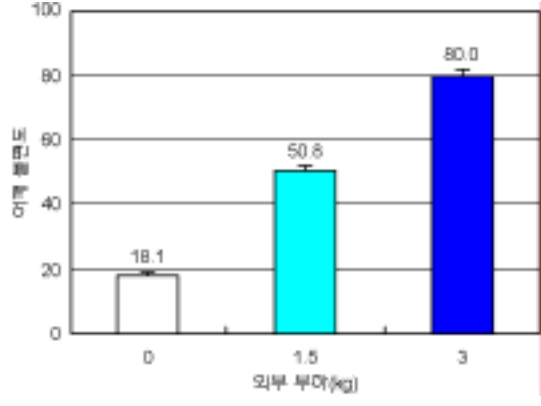
Source	DF	SS	MS	F	p
Subject(S)	11	11073.16	1006.65	-	-
Flexion (F)	2	27858.18	13929.09	78.15	0.0001 [*]
F x S	22	3891.47	176.88	-	-
Ad/abduction(A)	4	231.41	57.85	1.55	0.21
A x S	44	1646.81	37.43	-	-
Load (L)	2	344892.54	172446.27	586.77	0.0001 [*]
L x S	22	6465.63	293.89	-	-
F x A	8	518.95	64.87	1.61	0.13
F x A x S	88	3552.96	40.37	-	-
F x L	4	4874.98	1218.74	9.77	0.0001 [*]
F x L x S	44	5486.04	124.68	-	-
A x L	8	313.53	39.19	0.94	0.49
A x L x S	88	3673.85	41.75	-	-
F x A x L	16	1077.84	67.36	1.27	0.22
F x A x L x S	176	9318.25	52.94	-	-
Total	539	424875.60			

* α = 0.05

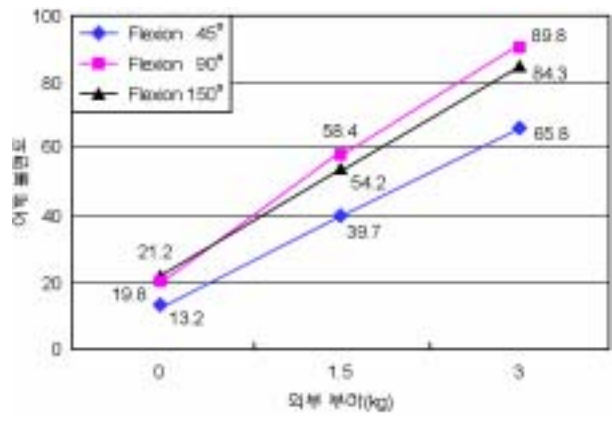
가 , 가 45° 90° 150° 가 150° , 90° .



5. ()



6. ()



7.

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