UPPER EXTREMITY PAIN EVALUATION WITH THAI VERSION OF QUICKDASH AND NUMERIC PAIN SCALE IN OFFICE WORKERS

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ABSTRACT:

Background: Musculoskeletal pain in office workers is often localized in the shoulder area. Disturbed functions and quality of activities in normal living are consequences of such pain. Early screening to identify such pain and its effects can help promote efficient health-care.

Methods: The objective of this study was to evaluate the disability of upper extremity in office workers with pain and non-pain in their dominance upper extremity. In the Thai version of QuickDASH, Numeric pain scale with body chart for rating pain intensity and confirming pain area were used as screening tool and were conducted in parallel.

Results: One hundred and thirty six completed questionnaires were collected from 28 males and 108 females. Ages were between 20-58 years with mean (SD) of 34.5(7.7) years. Substantial positive correlation between pain intensity and disability from Thai version of QuickDASH questionnaire was observed. The average QuickDASH score (95%CI) was 25.2 (22.5-28.0) from 109 participants with pain and was 4.8 (2.9-6.7) from 28 participants with non-pain in upper extremity. Screening cutoff point between groups was defined at or above 11.4 QuickDASH score with 87.16% sensitivity and 89.29% specificity.

Conclusion: Thai version of QuickDASH and Numeric pain scale with body chart for rating pain intensity are appropriate screening tools. Depending upon feasibility of use, this screening tool can clarify disability from pain in upper extremity.

Keywords: QuickDASH, Numeric pain scale, Parallel test, Office workers

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INTRODUCTION

Musculoskeletal pain is the most common musculoskeletal disorder in this century [1]. It caused adverse effects on quality of life, more difficulty in mobility and activity in daily living [2]. Pain areas such as neck and shoulder pain were most commonly reported in working on repetitive task [3, 4]. Office workers also work on repetitive task such is a potential risk of musculoskeletal pain. Evidence revealed that office workers with pain on scapular area had significant lower quality of arm function than non-pain ones ($p<0.001$) [5]. For upper extremity, short form of Disability of arm shoulder hand (QuickDASH) is a qualified self-report questionnaire with 11 items and is 5 rating Likert scale. Full score is 100 points and higher score represented higher disability. The construct consisted of pain, ability to do daily activities, social participation and activity limited by pain. It is also consistent with 3 aspects of International Classification of Function (ICF) framework for health of World Health Organization, i.e., disability in impairment, activity limitation, and participation restriction. Only environment aspect is not included [6, 7]. Numeric rating scale (NRS) is a reliable unidimensional pain scale [8, 9]. QuickDASH and NRS were tools with reliability [10] score of intraclass correlation coefficient (ICC) 2,1 equals 0.90 (95%CI 0.58, 0.97) and 0.74 (95%CI 0.08, 0.92) respectively. Recently, cross cultured translation of Thai version of QuickDASH [11] is available for

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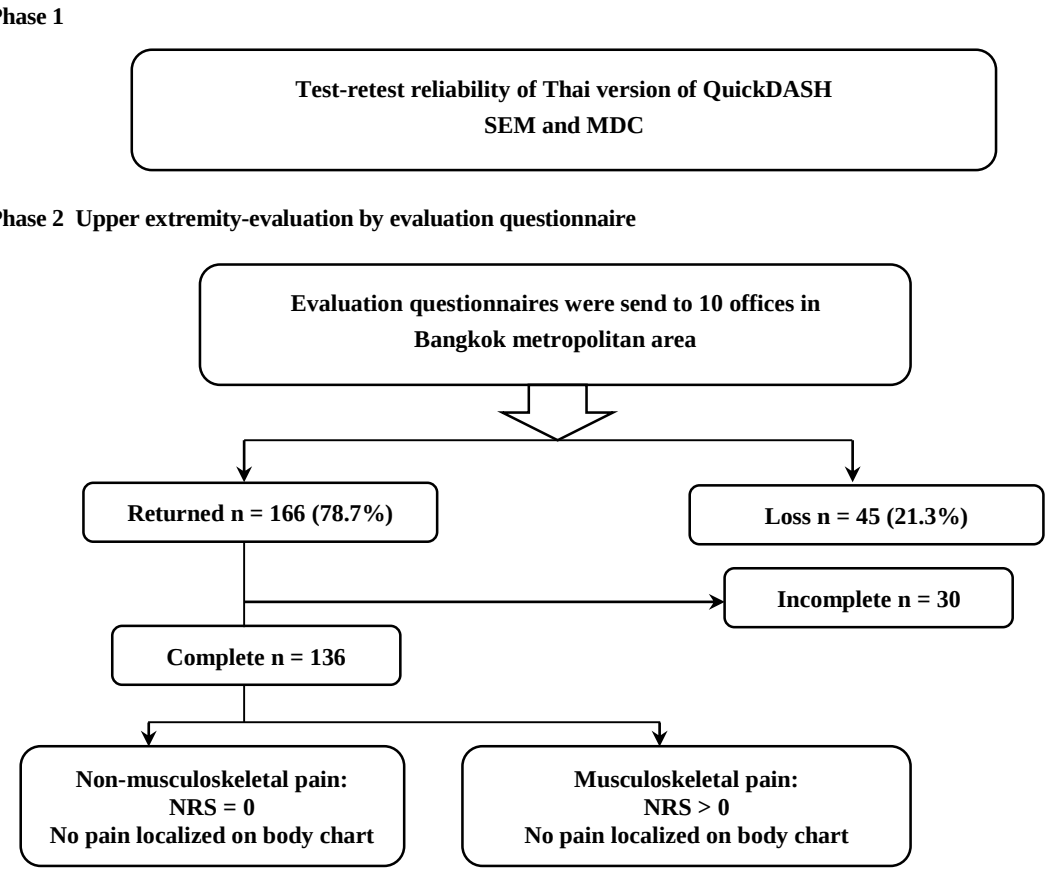

Figure 1 Flow chart showed phases of methods in study

citation [12]. However, its usage is still not widespread in Thai population because this Thai version of DASH was only published in 2014. The purposes of this study were to evaluate disability of upper extremity in office worker with pain and non-pain in dominance upper extremity. Screening tools were Thai version of QuickDASH and NRS with body chart for localizing pain area (NRS-pain area). Both questionnaires were implement in parallel. Additionally, QuickDASH cutoff point between pain and non-pain in upper extremity is also clarified.

METHODS

The evaluation questionnaire used in this study consists of 3 sections: 1) personal and working information, 2) NRS-pain area, and 3) Thai version QuickDASH questionnaire. The study was conducted in 2 phases (Figure 1). Phase 1, test-retest reliability of Thai version of QuickDASH was assessed from 14 healthy participants in 3 days remission. The participants were random from 3 education offices. Phase 2, 10 offices were purposive sampled from Bangkok Metropolitan area. The offices type include insurance business, education, and selling. Eligible criteria were right hand dominance participants aged between 20-60 years and good communication. All participants reported the evaluation questionnaire by themselves. Ethical approval was provided from a Human Research Ethics committee of Health Science Faculty of Srinakharinwirot University (HS2012-0010). Usage permission for Thai version of QuickDASH was received from Dr. Jeeranan Rapipong, Dr. Montana Buntragulpoontawee and Dr. Siam Tongprasert of Department of Rehabilitation Medicine, Faculty of Medicine, Chiang Mai University, Thailand [12].

Data analysis was based on completed questionnaires. Uncompleted questionnaires were questionnaires that NRS had not concurred with body chart or had more than 1 item missing in QuickDASH. Hypothesis testing difference between groups was tested by unpaired T-test and association between scales was tested by Spearman correlation coefficient. Cutoff point between pain and non-musculoskeletal pain was delivered from receiver operator characteristic curve (ROC) of QuickDASH score. The optimal cutoff point have to be greater than standard error of measurement (SEM) or minimal detectable change (MDC).

Intra class correlation (ICC 2.1) was 0.838

Table 1 Characteristics of eligible participants in this study (n=136) [a]

Data	n	$\bar{X}$ (SD)	range
Age (yrs.)	135	34.5 (7.7)	20.0-58.0
Weight (kg.)	134	59.7 (12.9)	35.0-100.0
Height (cm.)	135	160.9 (7.7)	145.0-180.0
Working duration (yrs.)	133	7.5 (7.1)	0.2-35.7
Work hour/day (hrs.)	131	8.5 (1.1)	5.0-12.0
Manual handing load (kg.)	93	1.2 (1.1)	0.1-5.5
		n (%)	
Sex	136		
Male/female		28(20.6) / 108(79.4)	
Dominance	136		
Left/Right		125(91.9) / 9(6.6)	
Both		2(1.5)	
Frequency of arm movement	93		
1 – 15 time/min.		77(82.8)	
16 – 40 time/min		14(15.1)	
1 – 15 and 16 – 40 time/min		2(2.1)	

[a] Only from participants who completed the Thai version of QuickDASH and Numeric pain scale with body chart for rating pain intensity

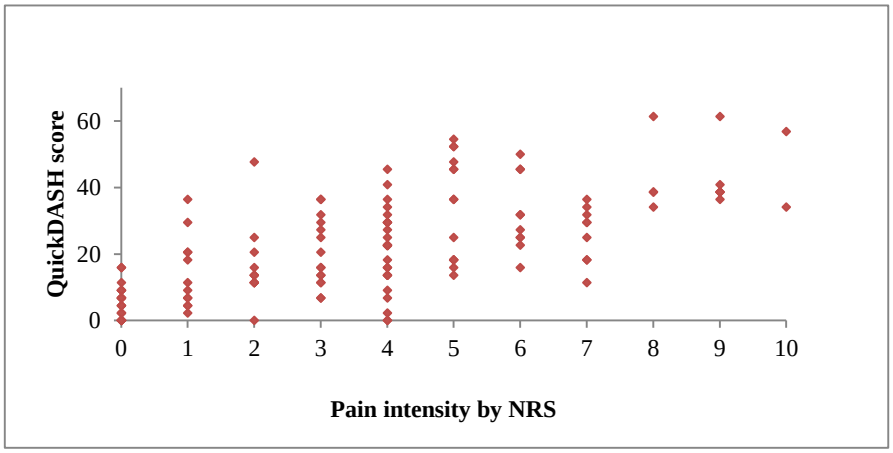

Figure 2 Correlation between QuickDASH score and pain intensity rated by NRS

(95% IC 0.515-0.947). Participants were classified into 2 groups as pain in upper extremity and non-pain group. Participants in pain group had localized pain area especially in scapular, shoulder, arm, elbow, hand or finger on the identical side that rated NRS greater than 0. Whereas non-pain group had NRS equal to 0 that concurred with no pain area on the rating side. SEM was $SD(1-R)^{1/2}$ [13] and was $0.79*(1-0.838)^{1/2} = 3.19$ score (SD was 0.79: delivered from first session of data from test-retest reliability of Thai version of QuickDASH of this study. ICC was 0.838). Then MDC_{90} [14] was $1.645*SEM*2^{1/2} = 7.4$ score.

RESULTS

One hundred sixty-six volunteers have signed informed consent and turn in the questionnaires. Response rate was 78.8% based on 211 evaluation questionnaires that was distributed. Accepted as completed questionnaires were 136 questionnaires, specifically the part of the Thai version of QuickDASH and NRS-pain area. Job description from participants were 77 computer typing, 16 administrative, 14 finance, 13 reception, 2 secretary, 1 drawing, 1 manager, 1 IT service, 1 sale, 1 warehouse, and 8 not specified. Participants' characteristics are shown in Table 1. The association between pain rated by NRS-pain area and QuickDASH score were presented with Spearman Correlation coefficient r = 0.733, P<0.001 (Figure 2). Comparison of QuickDASH score between non-pain and pain group shown substantial difference (p<0.001) with mean (95%CI) were 4.8 (2.9-6.7) and 25.2 (22.5-28.0) respectively (Table 2). Area under the ROC curve of QuickDASH was 0.924 (95% CI 0.870 – 0.964). Cutoff point at or

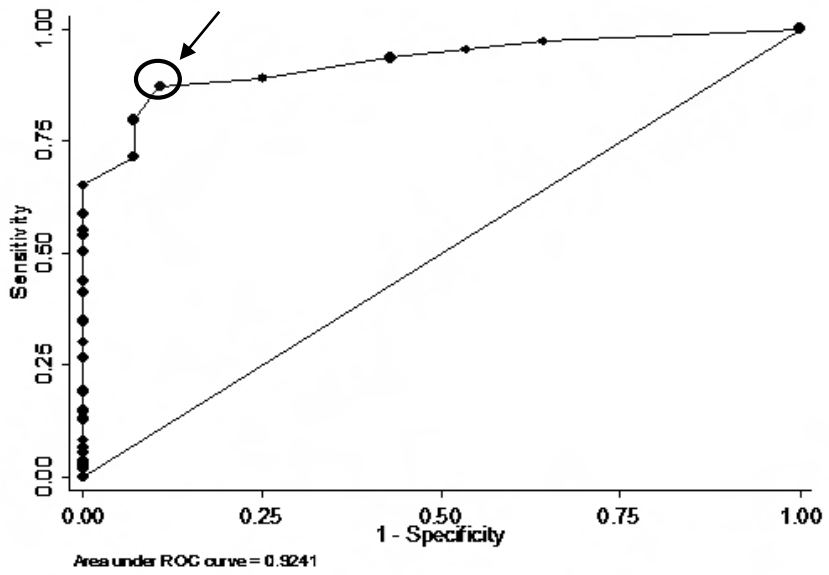

Figure 3 Receiver operator characteristic (ROC) of QuickDASH and cutoff point at 11.4 score

Table 2 QuickDASH score of all completed questionnaires (n=136)

	Non-musculoskeletal pain (28 arm)		Musculoskeletal pain (109 arm)[b]		*P-value*
	Range	**$\bar{X}$ (95% CI[1])**	**Range**	**$\bar{X}$ (95% CI[1])**	
QuickDASH (total score100)	0.0-15.9	4.8(2.9-6.7)	0.0-61.4	25.2(22.5-28.0)	0.001*
Cutoff point by QuickDASH score	**Sensitivity (%)**	**Specificity (%)**	**LR+**	**LR-**	
≥11.4	87.16	89.29	8.14	0.14	
≥15.9	71.56	92.86	10.02	0.31	

* p <0.05 [1] 95% Confidence Interval
[b] one participant specified dominant in both arms

above 11.4 score (Figure 3) gave sensitivity of 87.16 %, specificity % 89.29, LR+ = 8.135 and LR- = 0.144. Cutoff point at 11.4 score (Figure 3) gave of sensitivity 87.16 %, specificity % 89.29. Whereas cutoff point at or above 15.9 score gave sensitivity of 71.56 %, specificity % 92.86 (Table 2).

DISCUSSION

QuickDASH was designed for any persons who's affected from all disorders in the upper extremity. Office workers were recruited for this study as their work on repetitive task and had affected from musculoskeletal pain [5]. Proportion of participants that reported symptom on the upper extremity in this study was also higher than non-pain ones. However, type of office in this study were all from business sector. This may not directly infer to other sectors especially industrial sector.

Thai version of QuickDASH had good reliability (ICC 2,1= 0.838, 95% CI 0.515-0.947) and moderate correlation with NRS-pain area (r = 0.733). At or above 11.4 score was the optimal cutoff point as it was higher than summation of lower border score of 95%CI delivered from non-pain group with MDC_{90} = 2.9+7.4 = 10.3 score, consistent with value revealed in systematic review study that MDC_{90} was 11.58 score [14] and 17.2 score from Mintken, 2009 [15]. Likelihood ratios shown moderate impact on post-test probabilities as LR+ between 5-10 or LR- between 0.1-0.2 [16]. The classification in this study was validated by conducting NRS-pain area in parallel to Thai version of QuickDASH. False negative rate was 12.8 % (14/109) and false positive rate was 10.7 % (3/28) may resulted from any existing pain on the other area beside the dominance upper extremity and should be a concern in further study with QuickDASH. By using NRS-pain area, participants in this study had a practical method to provide self-reported pain and non-pain in upper extremity. This pain identification was more accurate than symptom severity justification. Parallel quantify QuickDASH

score by cutoff point over MDC_{90}=10.3 score also improved probability to identify individual affected by pain and disability association. Thus, individual whose screening results show positive NRP-pain area and QuickDASH at or above 11.4 score were presumed to have both symptom and functional disability on evaluated upper extremity.

A standard outcomes measurement tool has to certify psychometric properties. For original version of QuickDASH, its psychometric properties including reliability, validity, hypothesis testing and responsiveness. All of which were assessed to be strong positive evidences [14]. However, in only few instance were these properties reassessed in cross-cultural adaptation versions of QuickDASH. This study provides a reliable MCD and a valid cutoff point for Thai version QuickDASH. The result of this study were applicable for further study into change detection, responsiveness or minimal clinical importance of change should be conduct in further study.

CONCLUSIONS

QuickDASH is suitable for workforce population because it was developed for any disorders of the upper extremity. Disabilities of non-pain in upper extremities were less as compared to pain ones. Screening cutoff point between groups was defined at or above 11.4 QuickDASH score with 87.16% sensitivity and 89.29% specificity. In summary, Thai version of QuickDASH and NRS-pain area were practical and qualify for screening pain and non-pain in upper extremity. Office worker participated in this study were recruited from business office sector.

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