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**A comparison of repetitiveness assessment methods for hand intensive tasks**

**Abstract**

(Putz-Anderson, 1988; NIOSH, 1997).

가  
5 (Colombini, 1998; Silverstein et al.,  
30 가 1987). , Latko et al.(1999)  
가  
, 가 가 , NIOSH(1997)  
가 carpal tunnel syndrome(CTS)  
가 . ,  
가 Kuorinka and Forcier(1995)  
cumulative trauma disorders(CTDs)  
가  
(time) (frequency) .  
가 가  
가 가  
가 가  
가 / 가  
가 , 가  
가 ,  
가 .  
1. , Carey and  
Gallwey(2002) Yen and Radwin(2000) 3~6  
, Hansson et al.(2000) 1.9~3.6  
가 , 가  
가  
가



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가 . 0.28Hz 가  
 가 , 0.53Hz 가  
 10~20 . Marras  
 (Carey and Gallwey, 2002; Yen and Radwin, 2000) and Schoenmarklin(1993)  
 4~15 (Lin et al., 1997)가 . / 28.7~42.2 deg/sec,  
 Hansson et al.(2000) 가 17~25.9 deg/sec, / 67.7~91.3 deg/sec  
 mean power frequency(MPF) , 가 .

2. -

	CT <sup>1</sup> < 30s or same motions for CT > 50%	Silverstein et al. (1986)
	FCT <sup>2</sup> < 2s	Hansson et al. (1996)
	NM <sup>3</sup> > 20 motions/min	Carey and Gallwey (2002) Yen and Radwin (2000)
MPF <sup>4</sup>	MPF > 0.53Hz	Hansson et al. (2000)
	F/E <sup>5</sup> : VM <sup>7</sup> > 42.2 deg/sec	Marras and Schoenmarklin (1993)
	R/U <sup>6</sup> : VM > 25.9 deg/sec	
	2s < FCT < 10s	Hansson et al. (1996)
	10 motions/min < NM < 20 motions/min	Carey and Gallwey (2002) Yen and Radwin (2000)
MPF	0.28Hz < MPF < 0.53Hz	Hansson et al. (2000)
	F/E: 28.7 deg/sec < VM < 42.2 deg/sec	Marras and Schoenmarklin (1993)
	R/U: 17 deg/sec < VM < 25.9 deg/sec	
	30s < CT < 2min and same motions for CT < 50%	Rodgers (1986) Silverstein et al. (1986)
	10s < FCT < 30s	Hansson et al. (1996) Konz (1990)
	NM < 10 motions/min	Carey and Gallwey (2002) Yen and Radwin (2000)
MPF	MPF < 0.28Hz	Hansson et al. (2000)
	F/E: VM < 28.7 deg/sec	Marras and Schoenmarklin (1993)
	R/U: VM < 17 deg/sec	

(Notes) <sup>1</sup>Cycle time; <sup>2</sup>Fundamental cycle time; <sup>3</sup>Number of motions; <sup>4</sup>Mean power frequency; <sup>5</sup>Flexion/extension;

<sup>6</sup>Radial/ulnar deviation; <sup>7</sup>Velocity of motion

#### 4. 가

가 ,  
 가 ,  
 (Babski-Reeves and Crumpton-Young, 2002; Juul-Kristensen et al., 2001; Ketola et al., 2001)  
 (Carey and Gallway, 2002; Spieholz et al., 2001; Hansson et al., 2000)

가  
 database 30  
 가  
 가

(dimension)  
 (type of focus)  
 3 가  
 (time) (frequency),  
 가

,  
 가  
 ,  
 가  
 가  
 (Silverstein et al., 1986),  
 가

, Christensen et al.(2000)  
 /

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 ,  
 가  
 가 ,  
 가 ,  
 가  
 가 , , , 가  
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#### 3. 가

	(work)	(overall)
(time)	(rest)	(fundamental)
		(within task)
		(between tasks)
	W/R	(overall)
	(ratio)	(fundamental)
(frequency)	(work)	(overall)
	(body 가 (finger)	(hand and wrist)
	movement)	(hand and arm)
		가 (finger)
(joint motion)		(wrist)
		(elbow)
		(shoulder)
	Power	
	(force exertion)	Pinch

#### 5.

가  
 가

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, stopwatch(Babski-Reeves and Crumpton-Young, 2002; Ketola et al., 2001) video(Juul-Kristensen et al., 2001; Spielholz et al., 2001), electrogoniometer(Carey and Gallway, 2002; Hansson et al., 2000), visual analogue scale(VAS; Armstrong et al., 2002; Carey and Gallway, 2002; Latko et al., 1999, 1997)

spectral(spectral) (Juul-Kristensen et al., 2001; Hansson et al., 2000; Yen and Radwin, 2000, 1999)

가 . 가 가 (objective) (subjective)

electrogoniometer 가 Moore et al.(1991) electrogoniometer 가

11% cross-talk 가 , Coury et al.(2000) (error)

가 Coury et al.(2000) cross-talk

가 (Vander-Beek and Frings-Dresen, 1998; Winkel and

Mathiassen, 1994). 가 Juul-Kristensen et al.(2001) 가 , Spielholz et al.(2001) 가, 가 가

4.

	Stopwatch, video, electrogoniometer, electromyography (EMG)
가	Rating index (RI), checklist, visual analogue scale (VAS)

가 , spectral

Radwin and Lin(1993)

spectral 가 , sub-cycle , spectral

mean power frequency(MPF) power 가 가 가 , 가 (Hansson et al., 1996).

6.

- 가
- 가
- 가 가
- spectral
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