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## **Fingertip-to-floor test and Straight leg raising test: Validity, responsiveness and predictive value in patients with acute/sub-acute low back pain.**

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Running head: Validity of range of motion tests

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2 Fingertip-to-floor test and Straight leg raising: Validity, responsiveness and predictive value  
3 in patients with acute/sub-acute low back pain.

#### 4 ABSTRACT

##### 5 Objective

6 To investigate the validity over time of Fingertip-to-floor test (FTF) and Straight leg raising  
7 test (SLR) using Roland Morris disability Questionnaire (RMDQ) and correlation coefficient  
8 ( $r$ ) and to assess the predictive value of factors related to the change in RMDQ over 12  
9 months using multivariate regression analysis.

##### 10 Design

11 Longitudinal study.

##### 12 Setting

13 Out-patient physical therapy clinic.

##### 14 Participants

15 Sixty-five subjects with acute/sub-acute low back pain ( $\leq 13$  weeks' symptom duration).  
16 Thirty-eight (58%) had radicular pain as determined by the Slump test.

##### 17 Interventions

18 Not applicable

##### 19 Main Outcome Measures

20 Self-reported disability was used as reference variable and was measured using RMDQ at  
21 baseline and after 1 & 12 months. FTF and SLR were measured at baseline and after 1 month.  
22 Responsiveness and imprecision were assessed by using effect size (ES) and minimum

23 detectable change (MDC). The sample was stratified by presence/absence of radicular pain  
24 (categorized by the Slump test).

## 25 Results

26 The change in FTF was significantly correlated to the one-month-change in RMDQ, both in  
27 the entire sample ( $r=0.63$ ) and in the group with radicular pain ( $r=0.66$ ). Similar analysis for  
28 SLR showed a weak relationship to RMDQ. FTF showed adequate responsiveness (ES range  
29 0.8-0.9) in contrast to SLR (ES range 0.2-0.5). MDC, for FTF and SLR were 4.5 cm and  $5.7^\circ$ ,  
30 respectively. Change in FTF over one month was independently more strongly associated  
31 with the 12-month ( $R^2=0.27-0.31$ ) change in RMDQ than any of the other variables and  
32 multivariate combinations.

## 33 Conclusions

34 Our results suggest that the FTF test has good validity in patients with acute/sub-acute LBP  
35 and even better validity in those with radicular pain. The change in FTF over the first month  
36 was a valid predictor of the change in self-reported disability over one year. In contrast, the  
37 validity of SLR can be questioned in the present group of patients.

## 38 Key Words

39 Low back pain; Range of motion; Disability; Prognostic factors

## 40 List of Abbreviations

41 AUC            Area under the curve

42 BL             baseline

43 ES             effect size

|    |      |  |
|----|------|--|
| 44 | FTF  | fingertip-to-floor test                |
| 45 | LBP  | low back pain                          |
| 46 | MDC  | minimal detectable change              |
| 47 | MRI  | magnetic resonance imaging             |
| 48 | RMDQ | Roland-Morris disability questionnaire |
| 49 | ROC  | Receiver operating characteristics     |
| 50 | SEM  | standard error of measurement          |
| 51 | SLR  | straight leg raising                   |
| 52 | VAS  | visual analogue scale                  |

53

54 Physical impairment tests, such as Fingertip-to-floor test (FTF) and Straight leg raising  
55 (SLR), are highly reliable measures<sup>1,2</sup>. Both tests measure specific physical incapacity. Since  
56 patients with chronic non-specific low back pain (LBP) lack such a specific dysfunction, the  
57 tests are consequently proven to have low validity in this population<sup>3,4</sup>. However, in patients  
58 with a specific dysfunction such as LBP with radicular pain, FTF and SLR show good  
59 relationship to self-reported disability, and thus appropriate validity for this particular group<sup>5</sup>.  
60<sup>6</sup>. Moreover, FTF and SLR have been used successfully as outcome measures in patients with  
61 radiculopathy after lumbar tranforaminal epidural steroid injection<sup>7,8</sup>. Although these two  
62 tests have been widely used, the tests are not thoroughly investigated regarding: firstly, the  
63 criterion validity over time; secondly, the measurement properties and thirdly, the predictive

64 value for different subgroups such as subjects with and without radicular pain or with  
65 acute/sub-acute ( $\leq 13$  weeks of symptoms) and chronic LBP.

66 The criterion validity of a test describes whether test scores are meaningfully related to other  
67 valuable measures, e.g. self-reported disability. Roland Morris disability questionnaire  
68 (RMDQ) is such a validated, reliable and responsive measure<sup>9,10</sup>. Along with criterion  
69 validity, responsiveness and minimal detectable change are essential psychometric properties  
70 to establish the usefulness of measurements<sup>11,12</sup>. Once validity is determined, the mode of  
71 usage needs validation, in this case, the ability of the tests to predict outcome.

72 Early prognostic signs in an episode of LBP can contribute to an improved management of a  
73 specific disorder<sup>13</sup>. As the population with LBP is heterogenic and the prognostic outcomes  
74 might not be equally useful for the entire population, it is essential to distinguish a patient  
75 subgroup with a specific disorder<sup>13,14</sup>, e.g. acute/sub-acute radicular pain, for which outcome  
76 measures are valid. The frequently used dichotomous slump test<sup>15</sup>, previously proven to  
77 distinguish such a subgroup<sup>5</sup> and to predict lumbar disc surgical outcome<sup>16</sup>, has successfully  
78 been used to determine radicular pain<sup>15,17</sup>.

79 The aims of this study were: 1) to distinguish a subgroup of subjects with radicular pain from  
80 a sample of non-specific acute/sub-acute LBP using the slump test, 2) to investigate the  
81 differences in patient characteristics, disability, pain, FTF and SLR between these two groups,  
82 3) to investigate psychometric properties and criterion validity over time (one month) of FTF  
83 and SLR using RMDQ as reference, 4) to assess the predictive value of the factors above  
84 related to the change in RMDQ over one month and over 12 months in patients with non-  
85 specific LBP and in the subgroup with radicular pain.

86 We hypothesized that: 1) there is a stronger association between RMDQ and functional  
87 impairment in subjects with radicular pain and 2) in the latter population, the FTF and SLR  
88 show stronger relationship to the change in RMDQ over time than in the entire sample.

89

## 90 METHODS

### 91 Subjects

92 We consecutively recruited patients with acute (< 6 weeks' symptom duration) or sub-acute  
93 (6-13 weeks' symptom duration) LBP in a primary care out-patient physiotherapy clinic in the  
94 south of Sweden. Recruitment started in December 2006 and ended in March 2008 when 82  
95 patients had consented to participate. Sixty-five subjects (35 women, 30 men) were included  
96 in the present study and 63 percent (n=41) of these subjects were also included in a previous  
97 cross-sectional report where identical inclusion and exclusion criteria were used <sup>5</sup>. Enrolment  
98 of the present study is shown in Figure 1.

99 All included patients were seen in the clinical setting at baseline and after one month. An  
100 additional follow-up was performed over the phone after 12 months where only self-reported  
101 disability was obtained. During the 12-month-period, all patients received individual  
102 treatment (median 6 [range 2-16] visits) by the same physiotherapist (HE) using the  
103 McKenzie method<sup>18</sup>, manual therapy and stabilizing exercises. Ethical aspects (according to  
104 the Declaration of Helsinki) were documented and followed prior to the initiation of the trial.

### 105 Outcome measure

106 At baseline (BL) and after one month, assessment was performed by the same physiotherapist  
107 (HE) using an identical structure. Firstly, the fingertip-to-floor test was performed, secondly  
108 the slump test and thirdly the SLR were obtained. Finally, a neurologic assessment was

109 performed. After clinical assessment, pain measures and demographic history were taken and  
110 last the self-reported disability questionnaire (RMDQ) was filled out <sup>5</sup>. The clinical  
111 examination, including time to fill out self-reports, took approximately 25 minutes.

112 *Fingertip-to-floor test (FTF)* was performed according to the published instructions and the  
113 vertical distance between the tip of the index finger and the floor was measured in  
114 centimetres<sup>2</sup>.

115 *Straight leg raising test (SLR)* was performed according to the published instructions and the  
116 angle between the tibial crest and the horizontal plane was measured using a goniometer in  
117 (non-rounded) degrees <sup>4</sup>.

118 *The Slump test*, a validated dichotomous test to assess the presence/absence of radicular pain  
119 <sup>19</sup>. The occurrence of neural tissue mechanosensitivity was assessed through a combination of  
120 sitting thoracolumbar flexion, cervical flexion, ankle dorsiflexion and knee extension,  
121 performed in this order according to published instructions<sup>19</sup> and in agreement with the theory  
122 of sequencing<sup>20</sup>. The results from this test also determined which leg (left/right) was affected  
123 and this information was used in the analysis of SLR results.

124 *Neurologic sign* was determined if patellar reflex, Achilles reflex, strength of large toe in  
125 dorsiflexion or sensibility in a specific dermatome area were asymmetrically deranged.

126 *Roland and Morris disability questionnaire (RMDQ)*, a reliable, responsive and valid test of  
127 self-reported disability among patients with LBP <sup>3,9,10</sup>, is available in a validated Swedish  
128 version <sup>21</sup> and was self-reported by the patient. The RMDQ consists of 24 dichotomous  
129 (yes/no) statements about activities of daily living likely to have an impact on patients with  
130 LBP. A total score is compiled by summing the “yes” answers (1 point each), ranging from 0  
131 (no disability) to 24 (extremely severe disability).



132 Three different measures of pain were obtained using a horizontal VAS, with 0 mm indicating  
133 no pain, and 100 mm the worst imaginable pain<sup>22</sup>. The measures, low back pain (lumbar and  
134 gluteal region) at present (Pain VAS lumbar), leg pain (thigh or more distal) at present (Pain  
135 VAS leg) and the worst lumbar/leg pain during the last three days (Pain VAS high), were self-  
136 rated.

### 137 Statistical analysis

#### 138 *Entire group / radicular pain group*

139 Statistical analysis were made using SPSS (15.0). A subgroup of subjects with radicular pain  
140 was determined from the entire sample by the use of the slump test at baseline. A cross-  
141 sectional comparison between the entire sample and those with radicular pain was done at  
142 baseline (Table 1), one-month and 12-month follow-up. Statistical comparisons were made  
143 between those with radicular pain and the entire sample using the T-test (normally distributed  
144 variables) or the Chi-square test (dichotomous variables).

#### 145 *Longitudinal validity over four weeks*

146 For validity testing, we used the change in each outcome from baseline to one month to  
147 calculate the effect size (ES), the standard error of measurement (SEM), and the minimal  
148 detectable change (MDC). To provide a frame of reference for effect size values: A small  
149 effect size is approximately 0.20, a medium is 0.50 and a large effect size is  $\geq 0.80$ <sup>23</sup>. We  
150 calculated the SEM as the standard deviation of the mean change (SD)  $\times \sqrt{1 - \alpha}$ , where  $\alpha$  is  
151 the coefficient of test-retest reliability. Since we did not perform test-retest measurements in  
152 the present study, we used values from previous reports;  $\alpha = 0.88$  for RMDQ<sup>21</sup>,  $\alpha = 0.98$  for  
153 FTF<sup>24</sup> and  $\alpha = 0.95$  for SLR<sup>4</sup>. In a second step, we calculated the MDC using the formula  
154  $1.96 \times \text{SEM}$ <sup>11</sup>. The criterion validity was assessed by relating the one-month individual

155 changes in RMDQ to the individual changes in FTF and SLR using the Pearson's coefficient  
156 of correlation (Spearman's correlation gave similar results).

### 157 *Predictive value*

158 Univariate linear regression was performed for all explanatory variables. Multivariate linear  
159 regression was performed for the variables that significantly contributed to the model  
160 ( $p < 0.05$ ).  $R^2$  was used to describe the approximate proportion of the variation in the response  
161 that is explained by the model. Baseline characteristics (Table 1) and one-month changes in  
162 continuous variables (i.e. SLR, FTF and Pain VAS scores) were related to the one-month  
163 longitudinal change in RMDQ and to the 12-month change of RMDQ. Due to obvious inter-  
164 relationship among the Pain VAS and the FTF variables, each variable was analyzed  
165 separately in the multivariate analysis. Receiver operating characteristics (ROC) analysis was  
166 performed to assess the discriminative ability of the predictive variable (i.e. FTF, a cut-off  
167 point of 4.5 cm was chosen). The validity analysis, the regression analyses and the ROC  
168 analysis were made for the entire sample as well as for the subgroup with radicular pain.

169

## 170 RESULTS

### 171 *Entire group / radicular pain group*

172 Thirty eight subjects (58%) had radicular pain as determined by a positive slump test. Those  
173 with radicular pain had significantly increased number of neurologic signs ( $p < 0.001$ ),  
174 increased pain VAS leg ( $p = 0.029$ ), decreased lumbar flexion ROM ( $p = 0.006$ ) and decreased  
175 SLR angle in left leg ( $p = 0.041$ ) in comparison to the entire sample at BL (table 1). At the one-  
176 month follow-up, however, the only difference between these groups was an increased  
177 number of neurologic signs among those with radicular pain ( $p < 0.001$ ). At 12 months, no

178 difference was found in RMDQ between the entire sample (Mean 3.6, SD 4.8) and those with  
179 radicular pain (3.1, 3.8,  $p=0.28$ ). Furthermore, no significant differences were seen between  
180 the two groups regarding number of treatment visits or type of treatment received (data not  
181 shown).

#### 182 *Longitudinal validity over four weeks*

183 In the entire sample as well as in those with radicular pain, RMDQ and FTF displayed a large  
184 effect size ( $ES=1.0$  and  $1.1$ ,  $0.8$  and  $0.9$ , respectively) whereas SLR of the affected side  
185 displayed a medium effect size ( $ES = 0.5$ , Table 2).

186 In the entire sample, the change in RMDQ correlated well to the change in FTF ( $r=0.63$ ,  
187  $p<0.001$ ) but poorly to the change in SLR (SLR left  $r=0.13$ , SLR right  $r=0.15$ ).

188 In patients with radicular pain, the change in RMDQ correlated well to change in FTF  
189 ( $r=0.66$ ,  $p<0.001$ ) but poorly to SLR of the affected side ( $r=0.28$ ,  $p=0.10$ ).

#### 190 *Predictive value*

191 Age (years), gender (male/female), BMI ( $\text{kg}/\text{m}^2$ ), smoker (yes/no), neurologic signs (yes/no),  
192 pain VAS lumbar, pain VAS leg and all SLR variables showed no independent (crude)  
193 relationship to change in RMDQ over one month ( $p>0.16$  for entire sample and  $p>0.18$  for  
194 radicular pain group) or over 12 months ( $p>0.07$  and  $p>0.06$  respectively). In the entire  
195 sample, symptom duration (days), pain VAS high at BL, and change in pain VAS high over  
196 one month were independently and significantly associated with the one-month and 12-month  
197 change in RMDQ ( $0.08 \leq R^2 \leq 0.31$ ). In the radicular group however, these variables only  
198 showed significant relationships to the one-month ( $0.18 \leq R^2 \leq 0.25$ ), but not the 12-month  
199 change in RMDQ (Table 3). FTF at BL and the one-month change in FTF were significantly

200 associated with both one-month and 12-month change in RMDQ for the entire sample as well  
201 as for the radicular group with crude  $R^2$  values ranging from 0.12-0.43 (Table 3).

202  
203 In the multivariate analysis of the entire sample, the combination of symptoms duration plus  
204 pain VAS high at BL was associated with the change in RMDQ over one month ( $p < 0.023$ ,  
205  $R^2=0.25$ ) and 12 months ( $p < 0.048$ ,  $R^2=0.15$ ). In those with radicular pain however, the same  
206 combination of variables showed a better relationship to the one-month change ( $p < 0.010$ ,  
207  $R^2=0.35$ ) but a non-significant relationship to the 12-month change ( $P > 0.05$ ) in RMDQ. Still,  
208 change in FTF over one month was independently more strongly associated with the one-  
209 month and 12-month change in RMDQ than any of the multivariate combinations and  
210 explaining 27-43% of the variance in RMDQ variables (Table 4). ROC analysis in subjects  
211 with radicular pain showed a higher discriminative value of FTF (cut-off point 4.5 cm) in  
212 predicting change in RMDQ over one month and over 12 months (AUC = 0.92 and  
213 AUC=0.85 respectively [95% CI 0.70-1.00]) versus the entire sample (AUC = 0.80 and  
214 AUC=0.77 [95% CI 0.65-0.91]). A cut-off point larger or smaller than 4.5 cm decreased  
215 AUC.

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217

218

## DISCUSSION

219 This is to our knowledge the first study to assess the criterion validity over time of FTF and  
220 SLR in patient with acute/sub-acute LBP before and after stratification using the slump test.

221 We have shown that the change in FTF, but not in SLR, is strongly related to the change in  
222 self-reported disability (RMDQ) over the same period of time. Our results also suggest that  
223 early change in FTF is a good and valid predictor of long-term changes in disease specific

224 disability among patients with non-specific low back pain, and an even better predictor in  
225 those with radicular pain.

226 Recommendations about clinical selection of LBP patients in primary care are unclear but  
227 ignoring the heterogeneity of these patients was suggested as a suboptimal strategy<sup>13</sup>.

228 Consequently, we stratified the population according to radicular pain (classified by the slump  
229 test) and found that 58% was presented with radicular pain. This frequency is well in line with  
230 earlier studies using this classification<sup>19,25</sup>. In agreement with earlier results<sup>26</sup>, we showed  
231 that LBP in subjects with radicular pain is more greatly influenced by impairment. We  
232 therefore suggest a different underlying cause of LBP in the subjects with positive slump test  
233 and in agreement with earlier reports<sup>16,27</sup> we recommend clinicians to use the slump test to  
234 distinguish the painful structure and accordingly make treatment decisions.

235 The responsiveness of FTF was stated to be low in subjects with lower initial disability in one  
236 report<sup>3</sup> but, in agreement with other reports,<sup>2,28</sup> our results suggest a good responsiveness for  
237 FTF as well as adequate precision (MDC). The low MDC for FTF in this study was in  
238 consequence of relatively high reliability coefficient, suggesting a precision of < 4.5 cm. In  
239 accordance with several other reports<sup>28-31</sup>, the criterion validity was analysed not by the use  
240 of baseline values but by the use of changes in the measures and thus ruling out the  
241 contribution of the individual baseline variation of the impairment measures. The FTF test  
242 was previously shown to have a weak to moderate correlation ( $r < 0.50$ ) to disability in subjects  
243 without nerve root involvement<sup>28,31</sup>, but was suggested to correlate better to self-reported  
244 disability in samples with higher frequencies of radiating pain<sup>29</sup> and even more so in patients  
245 with verified radiculopathy<sup>7,30</sup>. This agrees well with our findings where FTF was shown to  
246 have good criterion validity, particularly in subjects with radicular pain. For SLR, in contrast

247 to FTF, we failed in establishing criterion validity, not only in the entire sample but also in the  
248 radicular pain group.

249 A great number, although not the majority, of patients are at risk of persistent back problems  
250 and in order to reduce this risk, guidelines suggest early identification of risk factors and then,  
251 multifaceted therapy<sup>13</sup>. In agreement with previous results<sup>32</sup> we showed that symptom  
252 duration and Pain VAS were factors contributing significantly in explaining the longitudinal  
253 change in self-reported disability. However, we looked at several additional variables and  
254 found that their contribution were only minor in comparison to the changes in FTF, the  
255 strongest predictor in this and a previous<sup>29</sup> study. Our results suggest that a large  
256 improvement or a lack of improvement in FTF over the first month is a valid and good  
257 predictor of improvement, or non-improvement, in the patient's own opinion of disability at  
258 one month and at 12 months. Furthermore, the change in disability over 12 months can be  
259 predicted by the change in FTF over one month in 77% of the cases in the entire sample and  
260 in 85% of the cases in the radicular pain group when using a cut-off point of 4.5 cm. An  
261 increase in FTF of >4.5 cm predicts improvement in disability and seems to be an applicable  
262 value for clinical use.

263 Thus, we recommend clinicians to use the validated FTF test rather than the SLR (or both in  
264 combination) when assessing patients with acute/sub-acute LBP and radicular pain.

#### 265 *Study limitations*

266 Our study had limitations. Firstly, although the study group in the present study mirrors the  
267 population in similar studies<sup>14, 25, 32</sup> regarding self-reported disability, pain symptoms and  
268 radicular pain, our sample included patients with acute/sub-acute LBP recruited from primary  
269 care, and therefore our results are best generalized to such patients. Secondly, the sample size  
270 was determined for analysis on the entire sample whereas sub-group analysis was limited by a

271 small sample size. Thirdly, the MDC in our study was based on previous results of the  
272 reliability coefficients thus the precision might be slightly inaccurate for the present study  
273 group. Finally, psychological factors, previously shown to be associated with LBP<sup>33</sup> and fear-  
274 avoidance beliefs, previously linked to a reduced ability to flex forward<sup>31</sup> were not assessed.  
275 Therefore, to better understand the transition from acute to long-term LBP, we suggest future  
276 research to explore the relationship between different prognostic factors and the impairment  
277 tests in a larger sample with radicular pain.

### 278 CONCLUSION

279 In this study on patients with acute/sub-acute non-specific LBP, more than half of the sample  
280 had radicular pain as classified by the slump test. Our results suggest that the FTF test has  
281 good validity in patients with acute/sub-acute LBP, and even better validity in those with  
282 radicular pain. The change in FTF over the first month was a valid predictor of the change in  
283 self-reported disability over one year. In contrast, the validity of SLR can be questioned in the  
284 present group of patients.

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Table 1. Baseline characteristics for the entire population and for those with and without radicular pain. Statistical comparison was made between the entire population and those with radicular pain. All values are mean (SD) except Gender, Smoker, Neurological sign [n (%)]

| Variable                  | All<br>(n=65)     | Pos slump<br>(n=38) | Neg slump<br>(n=27) | Group comparison † |
|---------------------------|-------------------|---------------------|---------------------|--------------------|
| Age (years)               | 45 (11)           | 46 (11)             | 42(11)              | 0.172              |
| Gender (men) [n (%)]‡     | 30 (46)           | 16 (42)             | 14(52)              | 0.520              |
| BMI                       | 25(3.6)           | 26(3.8)             | 25(3.6)             | 0.345              |
| Smoker (yes) [n(%)]‡      | 12 (18)           | 7(18)               | 5(19)               | 0.752              |
| Symptoms of LBP (days)    | 24 (23)           | 22 (20)             | 27(27)              | 0.386              |
| Neurological sign [n(%)]‡ | 7 (11)            | 7 (18)              | 0(0)                | <b>&lt;0.001**</b> |
| Disability (RMDQ)         | 11.2 (5.6)        | 12.0 (5.3)          | 10.0(5.9)           | 0.161              |
| Pain VAS lumbar (mm)      | 23 (18)           | 20 (16)             | 27(20)              | 0.152              |
| Pain VAS leg (mm)         | 7(15)             | 10 (16)             | 2(11)               | <b>0.029*</b>      |
| Pain VAS high (mm)        | 56 (24)           | 54 (23)             | 59(25)              | 0.408              |
| FTF (cm)                  | 24 (16)           | 28 (16)             | 17(15)              | <b>0.006**</b>     |
| SLR left (°)              | 64 (15)           | 61 (14)             | 68(15)              | <b>0.041*</b>      |
| SLR right (°)             | 65 (13)           | 63 (13)             | 68(13)              | 0.087              |
| †T-test                   | ‡ Chi-square test | *P<0.05             | **p<0.01            |                    |

Table 2. Change in RMDQ, Fingertip-to-floor test (FTF) and Straight leg raising test (SLR) over the first month. The effect size (ES) and minimum detectable change (MDC) are presented for the entire population (n=65) and for those with radicular pain (n=38). All values are mean (SD).

| Variable           | Entire sample (n=65) |               |          |             |     | Radicular group (n=38) |               |           |             |     |
|--------------------|----------------------|---------------|----------|-------------|-----|------------------------|---------------|-----------|-------------|-----|
|                    | BL value             | Change at 4 w | p-value† | Effect size | MDC | BL value               | Change at 4 w | p-value † | Effect size | MDC |
| RMDQ               | 11.2 (5.6)           | 5.2(5.4)      | < 0.001  | 1.0         | 3.8 | 12.0(5.3)              | 5.3(6.2)      | < 0.001   | 1.1         | 3.6 |
| FTF (cm)           | 24 (16)              | 12(13)        | < 0.001  | 0.8         | 4.5 | 28 (16)                | 15(14)        | < 0.001   | 0.9         | 4.5 |
| SLR left (°)       | 64 (15)              | 2.8(9.5)      | 0.021    | 0.2         | 6.6 | 61 (13)                | 2.3(9.7)      | 0.009     | 0.4         | 6.1 |
| SLR right (°)      | 65 (13)              | 1.9(5.6)      | 0.008    | 0.2         | 5.7 | 62 (13)                | 2.0(5.3)      | 0.002     | 0.2         | 5.7 |
| SLR aff side (°) ‡ |                      |               |          |             |     | 57 (12)                | 3.3(7.9)      | 0.001     | 0.5         | 5.7 |

† Using T-test to test significant change after one month. ‡Affected side according to slump testing.

Table 3. The crude relationship between the one-month and 12-month change in self-reported disability (RMDQ) and baseline characteristics, one-month change in Fingertip-to-floor test (FTF) and Pain VAS high in the entire population(n=65) and in patients with radicular pain (n=38).

| Variable†               | Entire sample ( n=65)       |                            |                               |                            | Radicular group (n=38)     |                            |                               |                            |
|-------------------------|-----------------------------|----------------------------|-------------------------------|----------------------------|----------------------------|----------------------------|-------------------------------|----------------------------|
|                         | Change in RMDQ over 1 month |                            | Change in RMDQ over 12 months |                            | Change in RMDQ over 1month |                            | Change in RMDQ over 12 months |                            |
|                         | β- coeff. (95%CI)           | p- value (R <sup>2</sup> ) | β- coeff. (95%CI)             | p- value (R <sup>2</sup> ) | β- coeff. (95%CI)          | p- value (R <sup>2</sup> ) | β- coeff. (95%CI)             | p- value (R <sup>2</sup> ) |
| Symptoms (days)         | -0.75(-0.13-0.02)           | 0.010 (0.10)               | -0.08(-0.15-0.02)             | 0.014 (0.09)               | -0.12(-0.21-0.03)          | 0.008 (0.18)               | -0.07(-0.16-0.02)             | 0.115(0.07)                |
| Pain VAS high baseline  | 0.91(0.45-1.49)             | <.001 (0.18)               | 0.80(0.11-1.40)               | 0.022 (0.08)               | 1.20(0.43-1.98)            | 0.003 (0.22)               | 0.74(0.00-0.15)               | 0.060(0.09)                |
| Change in Pain VAS high | 1.09(0.68-1.49)             | <.001 (0.31)               | 0.82(0.29-1.35)               | 0.003 (0.13)               | 1.14(0.48-1.80)            | 0.001 (0.25)               | 0.53(-0.15-1.22)              | 0.125(0.06)                |
| FTF baseline            | 0.14(0.06-0.21)             | 0.001 (0.18)               | 0.17(0.09-0.26)               | <.001 (0.20)               | 0.13(0.01-0.25)            | 0.035 (0.12)               | 0.15(0.04-0.26)               | 0.007 (0.19)               |
| Change in FTF           | 0.26(0.18-0.34)             | <.001 (0.39)               | 0.25(0.15-0.36)               | <.001 (0.27)               | 0.29(0.18-0.40)            | <.001 (0.43)               | 0.23(0.11-0.34)               | <.001 (0.31)               |

† Four pain variables, all SLR variables and remaining characteristics not shown due to minor relationship to dependent variable (p>0.06)

Table 4 Multivariate linear regression analysis; change in self-reported disability (RMDQ) at one - month follow-up and at 12-month follow-up as dependent variables, comparing patients characteristics, changes in Fingertip-to-floor test (FTF) and Pain VAS high at one-month follow-up in all patients (n=65) and in patients with radicular pain (n=38) i.e. positive slump test.

| Variable                 | Entire sample (n=65) |                               |                      |                               | Radicular group (n=38) |                               |                      |                               |
|--------------------------|----------------------|-------------------------------|----------------------|-------------------------------|------------------------|-------------------------------|----------------------|-------------------------------|
|                          | Change in RMDQ 1 mo  |                               | Change in RMDQ 12 mo |                               | Change in RMDQ 1 mo    |                               | Change in RMDQ 12 mo |                               |
|                          | p                    | Multivariate R <sup>2</sup> ‡ | p                    | Multivariate R <sup>2</sup> ‡ | p                      | Multivariate R <sup>2</sup> ‡ | P                    | Multivariate R <sup>2</sup> ‡ |
| Symptoms (days)          | 0.023*               | } 0.25                        | 0.048*               | } 0.15                        | 0.010*                 | } 0.35                        | 0.158                | Excl                          |
| Pain VAS high baseline†  | 0.001**              |                               | 0.020*               |                               | 0.004**                |                               | 0.082                | Excl                          |
| Symptoms (days)          | 0.054                | Excl                          | 0.049*               | } 0.18                        | 0.052                  | Excl                          | 0.243                | Excl                          |
| Change in Pain VAS high† | <.001**              | 0.31                          | 0.011**              |                               | 0.001**                | 0.25                          | 0.267                | Excl                          |
| Symptoms (days)          | 0.043*               | } 0.23                        | 0.068                | Excl                          | 0.008**                | 0.18                          | 0.259                | Excl                          |
| FTF baseline†            | 0.002**              |                               | <0.001**             | 0.20                          | 0.088                  | Excl                          | 0.007**              | 0.19                          |
| Symptoms (days)          | 0.109                | Excl                          | 0.119                | Excl                          | 0.318                  | Excl                          | 0.978                | Excl                          |
| Change in FTF †          | <.0001**             | 0.39                          | <.0001**             | 0.27                          | <.0001**               | 0.43                          | <.0001**             | 0.31                          |

\*p<0.05. \*\*p<0.01. † Due to multicollinearity Pain and FTF variables were analyzed separately. ‡ Level for inclusion in model p<0.05. Excl Excluded due to not significant association (p>0.05)