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Exploration of the validity and reliability of the "backache disability index" (BADIX) in patients with non-specific low back pain

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Abstract.
BACKGROUND AND OBJECTIVES: In clinical examinations of a patient with non-specific low back pain (LBP), there is a need to dispose over a valid and quick to perform rating system. The "Backache Disability Index" for LBP or BADIX includes rating of 5 trunk movements in erect position and a "Morning Back Stiffness" score, whereof the sum gives the BADIX (max. 20 points). The objective of this study was to explore the reliability, responsiveness and concurrent validity of the BADIX. Patients with LBP ($n = 100$) were randomly assigned into a "control" group ($n = 40$) in function of validity studies, and a "treatment" group ($n = 60$) in function of responsiveness studies. The treatment group underwent two weekly sessions of in total 30 minutes of deep cross-friction on the thoraco-lumbar Erector spinae and gluteals. All patients completed the Oswestry Disability Questionnaire validated Dutch version (ODQ), the McGill Pain Questionnaire (MPQ). The impairment examination consists, besides current orthopaedic and neurologic examinations, of the new BADIX scoring system.
RESULTS: In our study the retest reliability after 3 days of the BADIX was perfect ($n = 039$, $r = 0.95$). A good correlation ($p < 0.001$) was found between BADIX at baseline, and Oswestry Disability Index (ODI) ($n = 93$, $r = 0.76$), and McGill-Quality of Life Index ($r = 0.74$). Similar discriminative ability and effect size of measures was found for BADIX and ODI ($n = 54$). It is proposed that the minimal detectable change should be equal or more than 2 points.
CONCLUSIONS: The "Backache Disability Index" appears to be a reliable and a valid assessment tool of morning stiffness and restricted spinal movements, and discriminates between successful and unsuccessful treatment outcome. The BADIX will allow patients to take snapshots of their daily treatment evolution, save them on their computer or tablets (apps) and share the results with their doctors and/or therapists.

Keywords: Low back pain, validity, reliability, disability index, impairment

1. Introduction

The physical examination of patients with non-specific low back pain (NSLBP) consists -besides current orthopedic and neurological examinations- mainly of passive range of movement (PROM), facilitating the assessment of spinal function. Various methods of quantification of PROM have been advocated [1–5]. These measures vary in complexity and include observation, tape measurement, goniometry (electrical, electromagnetic and mechanical), inclinometry (electrical and mechanical), flexible curve lineals and roentgenographic analysis [6–16]. Clinicians require a simple, quick to perform and non-invasive test procedure for evaluation of physical impairment in patients with LBP [17–19]. For this purpose the authors developed the "Backache Disability Index" (BADIX, 20 points) consisting of the combination of the Backache Index (BAI, 15 points) [20,21] and the "Morning Back Stiff-

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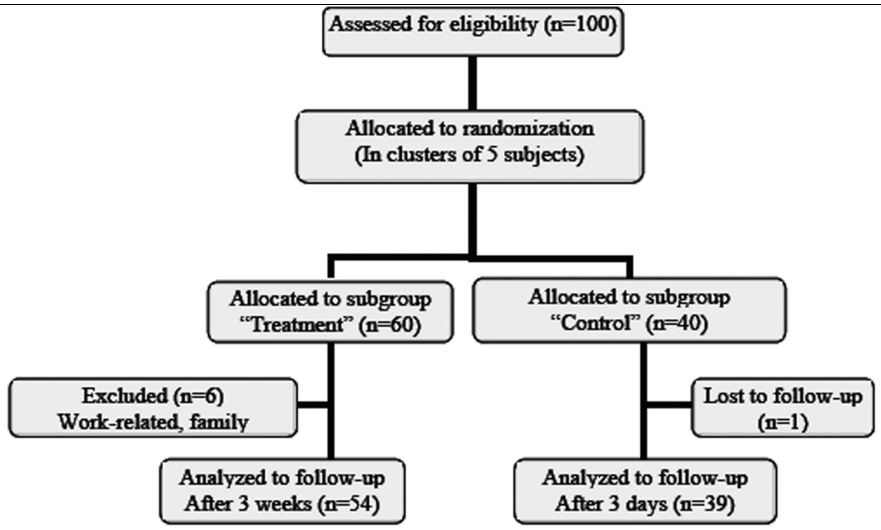

Fig. 1. Diagram of the total group and subgroups: allocation, randomization and follow-up.

ness" score (MBS, 5 points, as recommended for clinic practice based on published evidence and expert opinion [22–28]. The objective of this study was to assess the reliability, validity and sensitivity through comparison with other 'gold standard' disability questionnaires, and exploring the discriminative ability of the BADIX (Appendix-1) as a physical impairment index during treatment follow-ups of patients with LBP.

2. Materials and methods

2.1. Participants

The study period included two observation years and was approved by the Internal Ethics Committee of the Faculty of Physical Education and Rehabilitation Sciences of the Vrije Universiteit Brussel (VUB). Following a routine check-up in a pain center, adult subjects were identified as patients with NSLBP (48% females) by GPs. The demographic and anthropometric characteristics were recorded and all patients were assessed by means of a routine orthopedic and neurologic examination. Inclusion criteria for the participants were patients between the ages of 20 and 75 years with subacute NSLBP (3–12 weeks) LBP. The patients must have to be able to speak and read Dutch fluently. The trial subjects had not participated in previous research and had received verbal and written explanations detailing the experimental course and procedure before signing a consent form. The exclusion criteria were acute ($<$ 3 weeks) and chronic ($>$ 12 weeks), LBP combined with lumbar radiculopathy (sciatica or severe root compression), medication use, psychological treatment, pregnancy, and the presence of any significant pathology (reported abnormal spinal X-ray findings, e.g. spinal fracture, tumor, infection, structural deformity, and inflammatory disorders). The sequence of ranking was organized by a statistician and a total of 100 patients were enrolled in this study. Two clinicians, with more than 2 years of experience in functional examinations of the trunk, took part in the study and were changed in a sequential list order per five trial subjects. The examiners were blinded to each other's scoring until data collection was completed. The patients were assessed at baseline in order to verify the validity by means of correlation coefficients between the BADIX form results and other baseline measures.

Of this group, patients were randomly allocated per consecutive blocks of five subjects, in a subgroup "control" in function of the validity ($n = 40$), and a subgroup "treatment" in function of the responsiveness studies ($n = 60$) (Fig. 1).

The reliability was checked in subgroup "control", with one drop-out during the first session by means of a retest follow-up after 3 days without any treatment ($n = 39$). They were told that this was a routine examination followed by a treatment start at the second visit. Patients of the second subgroup were examined at the first visit and myotherapy was directly started. They received deep cross friction myotherapy or "Roptrotherapy" [29–33] on both sides of the Erector spinae mass from T6 to L5 and the gluteal area for a total of 30 min. in each session. Because the purpose was not to assess

treatment effectiveness, the detailed description of the treatment is not relevant to this study. With six drop-outs for work related and/or family reasons, the remaining patients ($n = 54$) were reassessed in the week after the last treatment session (3rd week). This follow-up was done to verify the responsiveness of the BADIX by testing the discriminative ability of measures after two roptrotherapy sessions whereof the same sequencing order and time schedule of both patients and examiners were followed. At the time of the clinical measurements were taken, the assessor was blinded to the data obtained from the questionnaires.

2.2. Baseline measurements

All patients completed the standard "Informed Consent", the Oswestry Disability Questionnaire validated Dutch version (ODQ) and a Pain Visual Analogue Scale (VAS in mm) [34], The McGill Pain Questionnaire [33,34], Dutch Language Version (MPQ-DLV) [35] short-form was used with respect to the total group at baseline resulting in the calculation of the Quality of Life Index (MPQ-QLI), the total number of words chosen in the sensory, affective and evaluative subscales (MPQ-NWC-T) and the total pain-rating index (MPQ-PRI-T).

In the first part of the measurements, the BAI was calculated. The two clinicians were blinded to each other's scoring until data collection was completed. In the second part of the measurement, the patient was asked to make a choice of 5 possible phrases concerning the level of pain and impairment when standing up from bed after 6 hours of sleep (score within the first 30 minutes). The outcome gives the "Morning Back Stiffness" score or MBS with a maximum of 5 points. The sum of the BAI and the MBS yields the BADIX.

2.3. Statistical analysis

Descriptive statistics will be used to describe clinical characteristics, demographic and outcome measurements at baseline. The Spearman's Test (Rho) was calculated to examine the bivariate correlation among the tests, between each test and the BADIX, and the outcomes were calculated at baseline in function of their internal consistency [36]. The total group was also studied for construct validity of the BADIX using correlation coefficients (Spearman's rho) between the baseline BADIX and other measurements e.g. the ODI, the MPQ-QLI, the MPQ-PRI-T, the MPQ-NWC-T and the VAS [37].

Subgroup "control" ($n = 39$) was studied for test-retest reliability (absolute agreement definition) with two-way inter-class correlation coefficients (ICC) and their 95% confidence intervals (CI). The differences in mean values for the test-retest follow-up were examined using the paired t-tests. The standard error of measurement (SEM) was used to indicate the mean detectable change (MDC) [38–41] in order to determine the "real change or not" for the ODI, VAS, MBS and the BADIX. The SEM and 95% Confidence Interval (CI) as the minimum detectable change (MDC = 95% of SD paired differences) of the outcomes scores at baseline were calculated as recommended by Beaton [42]. The degree of change as being a 'real change' is defined as SEM $\times$ 2.77. The significance level has been fixed at $\alpha = 0.05$.

Subgroup "treatment" ($n = 54$) was explored for the responsiveness after the retest in the 3rd week having two weekly sessions of myotherapy. The comparisons were made with the one-way ANOVA test between the measures at baseline and those in the follow-up period. The effect sizes (general linear model: repeated measurements) were calculated following the Cohen's d [43] and the discriminative ability of the BADIX was examined by calculating the receiver operating characteristics curve (ROC) and the greatest area under the curve (AUC) [44] for each of the 2 components, BAI and MBS, and of the BADIX itself, followed by results for the ODI, the VAS, the MPQ-QLI, the MPQ-PRI-T and the MPQ-NWC-T. The true area for the null hypothesis = 0.05 and the asymptotic significance of AUC, standard error (S.E.) and the 95% confidence interval (CI) was calculated.

The statistical analyses were done using version 17.0.1 for Windows of the SPSS program (SPSS Inc. Headquarters, 233s, Wacker Drive, Chicago, Illinois 60606, USA).

3. Results

Baseline outcome data in patients with LBP and subgroups are expressed in Table 1. The mean BADIX in patients with LBP (8.0 ± 3.5) showed a normal distribution and had a range of 1–16.

3.1. Internal consistency

In order to verify the internal consistency, bivariate correlations were explored of the whole group ($n = 94$) and ranged from 0.16 to 0.75 among the overall

Table 1
Baseline descriptive data for the whole group and subgroups with nonspecific low back pain

Characteristics: Study population	Total group	Subgroup "treatment"	Subgroup "Control"
	$n = 93$	$n = 54$	$n = 39$
Age (21–70 years)	43 ± 13	43 ± 12	43 ± 13
Body mass index (Weight/Length^2)	23.6 ± 3.4	24.6 ± 3.8	23.8 ± 2.9
Gender: males-females (%)	49–51	44–56	56–44
Oswestry disability index: ODI	36.7 ± 12.8	35.0 ± 12.1	39.2 ± 13.7
Visual analogue scale: VAS	53.6 ± 21.0	56.3 ± 23.2	50 ± 17
McGill pain questionnaire: MPQ-QLI	10.9 ± 4.0	10.0 ± 3.8	–
McGill pain questionnaire: MPQ-NWC-T	8.1 ± 2.6	8.2 ± 2.5	–
McGill pain questionnaire: MPQ-PRI-T	12.4 ± 5.3	13.4 ± 5.5	–
Backache index (BAI)	5.7 ± 2.6	4.7 ± 1.9	7.1 ± 2.3
Morning back stiffness score (MBS)	2.3 ± 1.2	2.4 ± 1.2	2.1 ± 1.2
Backache disability index (BADIX = BAI + MBS)	8.0 ± 3.5	7.1 ± 2.9	9.3 ± 3.8

Table 2
Bivariate Correlation Matrix (*Rho*) between the separate backache outcomes ($n = 94$): the Backache Index (BAI), the Morning Back Stiffness Score (MBS) and the sum of the latter two, the Backache Disability Index for LBP (BADIX). Spearman rank correlation is significant *at the 0.05 level and **at the 0.01 level (2-tailed)

Outcomes Tests	Flexion	Left lateral flexion	Right lateral flexion	Extension combined with left side bending	Extension combined with right side bending
Flexion	1.00	0.27**	0.16	0.30**	0.39**
Left lateral flexion	0.27**	1.00	0.64**	0.30**	0.39**
Right lateral flexion	0.16	0.64**	1.00	0.18	0.48**
Extension combined with left side bending	0.30**	0.30**	0.18	1.00	0.33**
Extension combined with right side bending	0.39**	0.39**	0.48**	0.33**	1.00
Backache index (BAI)	0.62**	0.75**	0.69**	0.28**	0.73**
Morning back stiffness score (MBS)	0.52**	0.24*	0.14	0.59**	0.50**
Backache disability index (BADIX)	0.65**	0.65**	0.59**	0.55**	0.76**

Table 3
Bivariate correlations between BADIX, ODI, MPQ-indexes and VAS at baseline in patients with LBP ($n = 94$)

Baseline measurements	BADIX	VAS	ODI	MPQ-QLI	MPQ-NWC-T
VAS	0.47**	1.00			
ODI	0.76**	0.34*	1.00		
MPQ-QLI	0.74**	0.27*	0.65**	1.00	
MPQ-NWC-T	0.56**	0.46**	0.49**	0.45**	1.00
MPQ-PRI-T	0.52**	0.43**	0.49**	0.46**	0.72**

*Pearson's correlation coefficient is significant at the 0.01 level and **at the 0.001 level. BADIX = Backache Disability Index for LBP (sum of BAI and MBS).

outcomes and from 0.55 to 0.76 between the separate outcomes and the BADIX ($p < 0.001$) (Table 2). Some items showed no correlation with others: flexion, extension combined with left lateral flexion, MBS and right lateral flexion.

3.2. Validity

The validity of the BADIX was explored by using the Spearman Rank correlation coefficients between the BADIX and the other 'Gold standard' measures assessed at baseline e.g. pain sensitivity, pain descriptions and disability indexes (Table 3). A very good and significant correlation was found between the BADIX and the ODI ($r = 0.76$, $p < 0.001$), followed by the MPQ-QLI ($r = 0.74$, $p < 0.001$). The correlation between the BADIX and the MPQ-NWC-T and -PRI-T were moderate (resp. $r = 0.56$ and $r = 0.52$, $p < 0.001$) and rather moderate to weak with the VAS ($r = 0.47$, $p < 0.001$).

3.3. Test-retest reliability

There was no significant difference ($p = 0.65$) between the mean BADIX (9.31 ± 3.79) and the results of retesting the group of 39 patients after 3 days without any treatment (9.72 ± 3.39) (Table 5). The test-retest agreement was excellent for the MBS with an ICC = 0.948 (95% CI = 0.902 − 0.973), the BAI with an ICC = 0.926 (95% CI = 0.859 − 0.961) and even so

Table 4
Inter-test reliability of the subgroup "control" retested after 3 days without any treatment ($n = 39$): The ICC and 95% CI of examined Pain and/or Disability indexes

Indexes	Test	Retest paired t-test	Comparison p-value	ICC	95% CI	S.E.M 95% CI	SEM as % of mean score
ODI	$39.3 + 13.7$	$41.3 + 11.4$	$p = 0.10$	0.91	0.83–0.95	1.12	6.74
VAS	$50.2 + 17.3$	$52.9 + 13.8$	$p = 0.10$	0.90	0.79–0.94	1.55	9.21
BAI	7.1 ± 2.9	7.5 ± 2.6	$p = 0.09$	0.93	0.86–0.96	0.23	1.08
MBS	2.13 ± 1.2	2.2 ± 1.1	$p = 0.21$	0.95	0.90–0.97	0.08	0.48
BADIX	9.3 ± 3.8	9.7 ± 3.4	$p = 0.11$	0.95	0.90–0.97	0.25	1.50

ICC = Intra-class Correlation Coefficient; 95% CI = Confidence Interval. BAI = Backache Index; MBS = Morning Back Stiffness score; BADIX = Backache Disability Index for LBP (sum of BAI and MBS).

Table 5
Comparison of the measurements between baseline and a 3-week post-treatment follow-up period ($n = 54$)

Variables	Baseline Mean Mean $\pm$ S.D.	p-values*	Post treatment follow-up Mean $\pm$ S.D.
ODI	35.0 ± 12.1	< 0.001	19.9 ± 9.5
VAS	56.3 ± 23.2	< 0.001	22.2 ± 13.0
MPQ-QLI	10.0 ± 3.8	< 0.001	6.7 ± 3.1
MPQ-NWC-T	8.2 ± 2.5	< 0.001	5.1 ± 1.5
MPQ-PRI-T	13.4 ± 5.5	< 0.001	8.3 ± 3.4
BADIX	7.3 ± 3.0	< 0.001	3.65 ± 1.7

*Wilcoxon-test (significance level $\alpha \geqslant 0.05$). BADIX = Backache Disability Index for LBP (sum of BAI and MBS).

for the BADIX with an ICC = 0.947 (95% CI = 0.899 − 0.972). The MDC for the ODI = 6.7, the VAS = 9.2, the BAI = 0.1, the MBS = 0.50 and for the BADIX = 1.5 (Table 5). These results indicate that a change in 1.5 points on the BADIX should be considered as the minimal clinically important change.

3.4. Discriminative ability

The difference between the measures of LBP patients ($n = 54$) at baseline and the ones after being treated twice with myotherapy was evident: the ODI, VAS, MPQ-NWC-T and MPQ-PRI-T sections as well as the BADIX decreased significantly (t-test, $p < 0.001$) in the 3rd week-retest follow-up (Table 5).

The effect sizes (Cohen) and the responsiveness figures of the BADIX and other outcomes calculated by means of the AUC, are expressed in Table 6.

In this study, the MBS score and the VAS had equal areas under the curve values (AUC = 0.87) and a minimal better ability to distinguish patients who have progressed from those who remained stable than the other outcomes. The BADIX and the ODI showed nearly the same areas (resp. AUC = 0.83 and 0.82) while the MPQ-NWC-T and PRI-T and the BAI have close results (AUC between 0.78 and 0.84) (Fig. 2).

For the expression of the cut-off results for each of the scores, the sensitivity is taken to be 100%. In this study, the cut-off point for the BAI was 1 point, for the MBS with 0.5 point, and for the BADIX was 1 point, gives an overall specificity equal to 96%. The same is found for the other measurements: 9 points for the ODI, 9 mm for the VAS with 9 mm, 3.5 points for the MPQ-PRI-T, 2.5 points for the MPQ-NWC-T, resulting in an overall specificity of 96%. The cut-off point for the MPQ-QLI with sensitivity of 0.96% with 5.5 points, gives specificity equal to 54%.

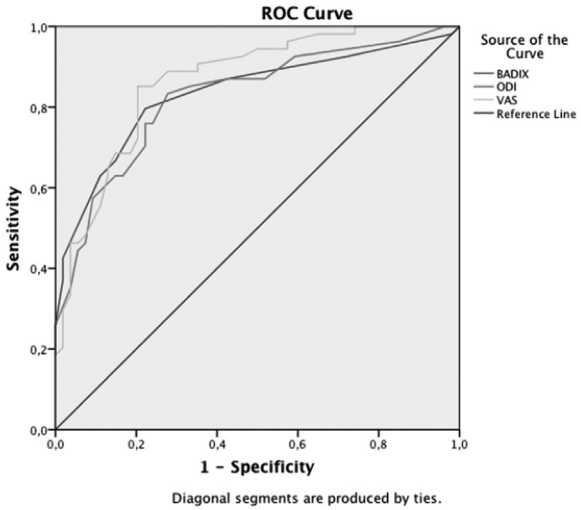

Fig. 2. Discriminative ability of measurements between baseline and a 3-week post-treatment follow-up period ($n = 54$). Receiver Operating Characteristic curve (ROC) for the Backache Disability Index (BADIX), the Oswestry Disability Index (ODI) and the Visual Analogue Scale (VAS). (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/BMR-130405)

4. Discussion

The present study provides evidence favouring the internal consistency, construct validity, test-retest reliability, sensitivity and discriminant validity of the BADIX. The minimal clinically important difference for the BADIX was established as more than 2 points.

The overall correlation among the seven outcomes for the BADIX showed borderline sufficient homo-

Table 6
Effect size (repeated measurements, Cohen'sd) and discriminative ability of measurements between baseline and a 3-week post-treatment follow-up period ($n = 54$): the receiver operating characteristics curve (ROC) and Area Under the Curve (AUC), Standard Error (S.E.), Significance (Sign.) and 95% Confidence Interval (95%CI)

Measurement	Effect size (Cohen'sd)	AUC	S.E.	Sign.	95% CI
ODI	1.39	0.82	0.04	$p < 0.001$	0.75–0.90
VAS	1.81	0.87	0.03	$p < 0.001$	0.80–0.93
MPQ-QLI	0.96	0.79	0.04	$p < 0.001$	0.70–0.87
MPQ-NWC-T	1.48	0.84	0.04	$p < 0.001$	0.77–0.92
MPQ-PRI-T	1.12	0.80	0.04	$p < 0.001$	0.72–0.89
Backache index (BAI)	1.26	0.78	0.05	$p < 0.001$	0.70–0.87
Morning stiffneSS (MBS)	1.72	0.87	0.04	$p < 0.001$	0.80–0.93
Backache disability index (BADIX = BAI + MBS)	1.44	0.83	0.04	$p < 0.001$	0.76–0.91

geneity and is acceptable as an index for clinical examinations of patients with LBP. As mentioned in books of medical statistics [36,37] it is indicated that sufficient items examining the same impairment concept should be included in a scale. In our study the moderate to good consistency of the BADIX (0.55–0.76) was proved and represented a sufficient index construction. The validity of the BADIX was explored through correlations with other measures of pain e.g. the VAS and disability indexes as a result of questionnaires e.g. standard MPQ-DLV and ODQ.

In our study, the BADIX correlated better with the ODI in case of patients with sub-acute LBP ($n = 93$, $r = 0.76$, $p < 0.001$), than when compared with the "Physical Impairment Index" (PII) of Fritz and Piva [45] in case of patients with acute LBP ($n = 78$, $r = 0.43$, $p < 0.001$).

The BADIX correlated in the same order with the VAS ($r = 0.47$, $p < 0.001$) as it has been shown to in similar studies comparing the VAS with the ODI [5]. In the latter study the authors mentioned that the correlation between LBP-related disability and VAS ratings is expected to be good, but it should not be extremely high otherwise it would suggest that the instruments are carrying identical information.

The test-retest reliability with respect to the BADIX of the subgroup ($n = 39$) after 3 days without any treatment between baseline and follow-up, showed a high reliability. In our study the test-retest ICC of the BAI and the MBS between baseline and follow-up, were both perfect ($r \geqslant 0.93$). The test-retest reliability of the BADIX was also perfect ($r = 0.95$). The MDC of the BADIX did not exceed 1.5 points, which means that the precision of the scoring of the BADIX is valid in case of a clinical important change of 2 points.

The ability to detect changes in pain rating, disability and assessment of lumbar impairment, between baseline variables and after two myotherapy sessions (once a week) and retested at the 3rd week follow-up, was detected by means of the ROC curve and calculating the AUC. In this study the responsiveness of the BADIX was nearly equal to that of the ODI and the MPQ-NWC-T, but was better than the MPQ-PRI-T and the MPQ-QLI. The greatest discriminative ability of the measures was found for the Morning Back Stiffness score and the VAS, followed by the BADIX and the ODI. Our findings confirm the results of earlier studies [5,46–49], that the VAS was more responsive to clinical change than the MPQ subscales in rehabilitation retest procedure. Besides the results of the responsiveness of the BADIX, we noted in this study that the ODI has a cut-off equal to 9 points (calculated from the AUC), and a MDC = 7 points which is nearly the same as the MDC reported in earlier studies: 10 points [5,49], and 6 points [50] for the modified ODI. In our study, the BADIX showed a nearly equal effect size and responsiveness as the ODI.

The precision of the BADIX was found in the minimal clinical change value (MDC = 1.50) and, in combination with the best cut-off values of responsiveness found in the study, it has been proposed that the *minimal clinically important difference* should be *equal or more than 2 points.*

In the serial of the "Back Performance Scale" (BPS) [51] and PII physical impairment tests [45], the patient with LBP has to change positions often, while in our BADIX method the tests are administrated to the patient in the upright standing position making it more comfortable for the patient and easier to administer for the evaluator. The MBS is also an easy to report measure. In fact the BPS and PII each take a minimum of five minutes to complete, while our BADIX method typically can be completed in less than one. The BPS and PII are also evaluated for the relationship between the 'Gold standard' questionnaires and pain scales. The BADIX correlates higher than those other standards and even the responsiveness is nearly equal to that of the ODI demonstrating its validity. In rou-

tine clinical practice complex ROM procedures, time-consuming questionnaires and potentially aggravating movement indexes can be replaced by one simple instrument, the BADIX. It can be used further as a non-invasive guideline index for treatment follow-ups in clinical practice.

Although the BADIX test is quite easy to perform, health professionals with less experience in doing the test may misclassify the outcome, which potentially compromises the risk score's predictive performance. At this stage, we cannot exclude the possibility that the thoraco-lumbar and hip muscles increased their contraction level to compensate for an increasing LBP by executing different trunk movements. Other studies of passive structure mechanical properties are warranted to better understand the instability mechanisms underlying the LBP response. Moreover, studies involving clinical populations are needed to assess whether the changes observed in this experiment have any link to lower back and pelvic conditions.

Future studies should include kinematic software programs with a video capture console with protractor views and standard orders [52,53]. Those video capture consoles e.g. tablet-computers and/or other their applications (apps), will probably allow the patients with LBP to watch their actions in real time and also save five of their original trunk movements for use as daily back-up in the self-control of their backache disability. Compared to other physical examination indexes, the BADIX has the advantage that the patient can stand still in an upright position and execute simple directed trunk movements, rather than changing positions many times. For this reason, future studies should explore refinements of reliability and validity and prediction capacity of a more advanced system that could be used in work-related screenings for LBP.

5. Conclusion

The new "Backache Disability Index" or "BADIX", (max. 20 points) appears to be reliable (test-retest after 3 days), and measures the pain and mobility outcome as an assessment score of physical impairment and morning backache stiffness. The BADIX is valid in case of a clinical important change of 2 points. The current study demonstrates that the BADIX has similar discriminating ability, effect size, and sensitivity for assessing impairment in patients with LBP as compared to the Oswestry Disability Index. It is easy to apply in routine clinical examinations and can be completed in less than one minute. Further research should be carried out not only for NSLBP, but also in specific LBP syndromes e.g. rheumatoid arthritis. Future plans to create a new BADIX kinematic software programs with a video capture console and/or applications (apps), will allow patients to take snapshots of their daily treatment evolution, save them on their computer and share the results with their doctors and/or clinicians.

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APPENDIX-1 The "Backache Disability Index" or BADIX form

The BADIX is also available via website: http://www.roptrotherapy.info ... in the following languages: Dutch, French, Spanish, Portuguese, Italian, Turkish, Russian, Hebrew, Chinese, Japanese and Thai.

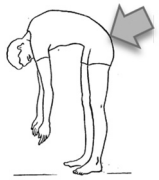
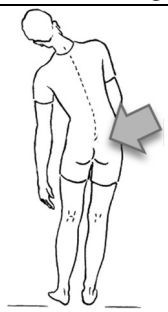
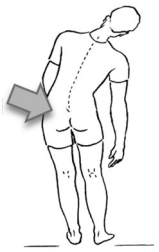
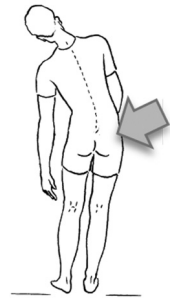
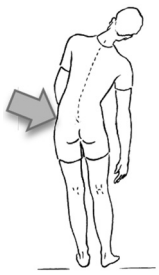
BACKACHE DISABILITY INDEX (BADIX)

Name:	M/F:	Age:	Weight:	Length:
1. Central LBP	2. Bilater LBP	3. LBP + RP to one hip: L/R	4. LBP + RP to one leg: L/R	

1. The BACKACHE INDEX (BAI) = 1st series of tests (The Spine Journal, 2007):

Instructions: The patient is standing at ease in erect position, arms next to the body and feet's not together. The rater notes down the extent of active motions and quote the intensity of pain according to a scale from 0 to 3. In total there are 5 trunk movements and outcomes. The sum of 5 scores = the BACKACHE INDEX (BAI).

Examination of the trunk	**Scores**
No irritation and normal end feel	**0**
Irritation but normal end feel	**1**
Pain and nearly normal end feel	**2**
Severe pain and reduced end feel (additionally muscular contractions)	**3**

TEST nr 1 Flexion	TEST nr 2 L side bending	TEST nr 3 R side bending	TEST nr 4 **EXT.** + L side bending	TEST nr 5 **EXT.** + R side bending	BAI =
					Sum of 5 Scores =
Pain: Mid Lumbar Score = ...	Mid Lumbar and R side Score = ...	Mid Lumbar and L side Score = ...	Mid Lumbar and R side Score = ...	Mid Lumbar and L side Score = ...	**BAI =** = **...../15**

2. The MORNING BACK STIFFNESS SCORE (MBS):

After 6 hours of sleep, what phrase corresponds mostly to your feeling concerning your lower back pain when you want to stand up from your bed (max. first 30 minutes):

Can stand up from my bed **without restriction** and I feel **no irritation**	**0**	**ONLY ONE SCORE!**
Can stand up from my bed without restriction but I feel **irritation**	**1**	**BMS =**
Can stand up from my bed **with restriction** and I feel **irritation**	**2**	**= ...../5**
Can stand up from my bed **with restriction** and I feel **pain**	**3**	**BADIX =**
Can stand up from my bed alone with **many restriction** and I feel much **pain**	**4**	**= ...../20**
Cannot stand up alone from my bed (need help) and I feel **severe pain**	**5**	

SUM OF SCORES BAI + MBS = BADIX $\leqslant$