Urdu Version of Oswestry Disability Index; A Reliability and Validity Study

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Abstract

Background:

Although Oswestry Disability Index (ODI) is broadly used in clinical and research settings for assessing the disability level in patients with lumbar radiculopathy but it has not been translated into Urdu language according to the pre-established translation guidelines as well as the validity and reliability of ODI Urdu version has not been tested yet. The aim of this study was to translate ODI in native Urdu language (ODI-U) according to recommended guidelines and to measure its psychometric properties in Urdu speaking patients suffering from lumbar radiculopathy.

Methods:

The ODI-U was developed through previously described translation procedures. 108 participants were recruited, out of which 54 were healthy and 54 were patients of lumbar radiculopathy. ODI-U was filled by all participants. However, the patients were administered through ODI-U and visual analogue scales for disability (VAS disability) and pain intensity (VAS pain) at baseline and after 3 days. Reliability was investigated through test-retest method, internal consistency, standard error of measurement (SEM) and smallest detectable change (SDC) at 95% confidence level. ODI-U was assessed for exploratory factor analysis, construct (convergent and discriminative) validity and content validity. Alpha level <0.05 was considered statistically significant and psychometric standards were evaluated contrary to priori hypothesis.

Results:

The culturally adapted ODI-U revealed excellent test-retest reliability for total score (ICC=0.95) and for all item (ICC=0.72-0.98). Cronbach's alpha of 0.89 showed excellent internal consistency and a moderate correlation between ODI-U total score and each item was observed through spearman's correlation coefficient ($r=0.51$ to 0.76). One factor structure was created for ODI-U explaining 52.5% variance. There was no floor and ceiling effect of total ODI-U score showing good content validity. The discriminative validity was assessed by independent sample t-test which indicated significant difference in ODI-U total score between healthy and patients ($P<0.001$). The convergent validity was evaluated through Pearson's correlation showing moderate correlation between ODI-U and VAS pain ($r=0.49$) as well as VAS disability ($r=0.51$).

Conclusion:

ODI-U showed adequate psychometric properties. ODI-U was found to be a reliable and a valid tool to measure the level of disability in Urdu-speaking patients with lumbar radiculopathy.

Background

Musculoskeletal disorders are leading medical problem over the globe and are one of the most frequent reasons of disability.(1, 2) Among these musculoskeletal disorders low back pain (LBP) is the 5th leading cause of patient's visit to the clinics or hospitals. (1, 3) In western countries, the disability associated with LBP is (Vincent, 2014 #45)of great concern these days as in the US, about 6.5 million of general population is bed ridden due to LBP. (1, 2) Sometimes LBP may lead to Lumbar radiculopathy.(4) Due to irritation of lumbar nerve roots, pain radiates in lower limbs which is defined as lumbar radiculopathy.(5)

There are numerous outcome measures for assessing LBP including Roland Morris Disability scale (RMDQ) (6), Oswestry disability index (ODI) (7), Quebec back pain disability scale (8), Waddell disability index (9) and SF-36 (10). Among all these scales ODI is considered here to be studied which is one of the most frequently used, reliable and valid tool to measure disability and pain in patients with LBP and lumber radiculopathy.

ODI is considered to be a gold standard self-reported outcome measure tool to evaluate quality of life and disability level after lumber radiculopathy.(11-14) It was designed by Fairbank JC in 1980s with various adaptations over the years and the final Version 2.1 was then created. (15, 16)

According to ODI website information, this questionnaire is available in 29 languages (17, 18) but the Urdu Version of original ODI is not yet available or published. Therefore, the aim of this study was to translate original ODI into the native Urdu Language, to interpret its psychometric properties and to assess the reliability and validity of translated version.

Methodology

This cross-sectional study was conducted over a period of almost 2 years and data was collected from October 2018 to October 2019. The study was divided into 2 stages: 1) Translation and cultural adaptation 2) Psychometric testing of ODI Urdu version.

Stage I: Translation and cultural adaptation:

Permission for translation of original ODI version 2.1a into Urdu Language was taken from the developers of original ODI (appendix I) through Mapi Research Trust by signing an addendum. The guidelines of Guillemin and Beaton (1993) (19, 20) and COSMIN guidelines (21) were used for the translation and cultural adaptation of original ODI. This process involves five steps:

Step 1: Forward Translation

Two independent native linguistic translators who were experts of both English and Urdu language have independently translated ODI from English to Urdu. The first translator was qualified in English linguistic while other translator was senior physical therapist. These two translators were blinded from each other and were requested to conceptually translate ODI instead of emphasizing on word to word translation.

Step 2: Synthesis of Translation

The discrepancies between two translations i.e translation 1 (T1) and translation 2 (T2) were discussed by a four person committee. This committee involved an independent physical therapist, main author and both of the translators. They have created a new Urdu version (T12) from T1 and T2.

Step 3: Reverse Translation

The reverse translation of T12 was performed by two independent native translators. These translators have produced as reverse translation 1 (RT1) and reverse translation 2 (RT2). Both of the translators were blinded to the original ODI version.

Step 4: Review of the expert committee

The expert review committee of authors including all of the translators and an expert senior physical therapist highlighted, removed and edited the conflicts and errors in translated versions of ODI. After teamwork of review committee a pre-final Urdu version of ODI was produced.

Step 5: Testing of pre-final version

In order to check face validity, the pre-final version of ODI was randomly distributed among 32 patients of lumbar radiculopathy and they were asked to highlights any understanding difficulties in wording and layout of the questionnaire. Patients were also encouraged to identify the ambiguous words. Final version of ODI was formulated after considering the patient's feedback and expert committee opinion. Figure 1 is showing the flow chart of whole translation process.

Stage II: Psychometric Testing:

The psychometric testing of Urdu version of-ODI (ODI-U) was done according to COSMIN guidelines. (21) The total sample size was 108, out of which 54 were healthy participants and 54 were diagnosed patients of lumbar radiculopathy. The data was collected after Institutional review board (IRB) approval from The University of Lahore teaching hospital, department of physical therapy. **All methods were performed in accordance with the relevant guidelines and regulations.** Before data collection the informed written consent was also taken from all the participants. The inclusion criteria was married male and female of age range between 25-55 years, those who were able to read and speak the native Urdu language, pre-diagnosed patients of lumbar radiculopathy by physician or neuro-surgeon and fifty four healthy subjects (based on their BMI) were also age and sex matched with patients of lumbar radiculopathy. All of the healthy subjects were recruited from the faculty of University of Lahore. Patients or subjects who were excluded from the study were pregnant females, having any surgery of lumber region, recent fracture or dislocation, spinal tumors, inflammatory diseases, infections in the intervertebral disc and subjects with psychological disorders.

The Reliability of final ODI-U version was measured by test re-test method across two repeated measures (1st measurement and 2nd measurement), internal consistency and measurement errors. Meanwhile the

content and construct validity were also assessed. Two types of construct validity were studied i.e discriminative validity and convergent validity.

Data Analysis:

The data analysis was carried out on IBM SPSS 21 software. P-value less than 0.05 (typically <0.05) was considered to be statistically significant. The values of psychometric properties were verified through a priori hypothesis. Descriptive statistics was used to study the participant's characteristics.

Reliability

The reliability of ODI-U version was tested among 54 patients of lumbar radiculopathy. The sample size for reliability testing was calculated by using power calculation method which is a previously developed method to determine the sample size of reliability studies.(22) The patients were asked to complete ODI-U, VAS pain and VAS disability, during their first visit. Other demographic details were also documented. After 3 days, the same patients were re-tested in the same way by completing ODI-U, VAS pain and VAS disability. Any type of treatment was not given to the patients during this period.

The test-retest reliability was assessed by calculating intra-class correlation coefficient (ICC) at 95% confidence interval. (21) ICC values are between 0 and 1. For estimating ICC, based on 95% confidence interval the reliability could be poor, moderate, good and excellent with values < 0.5, between 0.5-0.75, between 0.75-0.9 and > 0.90 respectively. (23), (24), (25) The internal consistency of ODI-U was measured through cronbach's alpha values and item total correlation. Internal consistency is considered acceptable when alpha value exceeds 0.70. (26) or is between 0.70-0.95. (27) The item-total correlation was calculated through Spearman's correlation coefficient which shows the relationship strength between each item and total score of ODI-U minus the score of the item being investigated. (28) The strong relationship between two variables is considered when r value is greater than 0.7. (29) The greater the value of the coefficient, the stronger is the correlation between the item and the total score which ensure that the scale is internally consistent. (30) Spearman rank correlation coefficient values were interpreted as little or no relationship, fair, moderate and excellent relationship with values <0.25, 0.25–0.50, 0.50–0.75 and ≥ 0.75 , respectively. (31, 32)

Measurement error was calculated through Standard error of measurement (SEM) and smallest detectable change (SDC). The formulas used to calculate SEM and SDC are $SEM = SD \times \sqrt{1 - ICC}$ (31) and $SDC = 1.96 \times \sqrt{2} \times SEM$, (33) respectively. The instrument is considered more reliable if the value of SEM is less. (32) SEM values ≤ 2.15 -6.5 (32, 34-39) and SDC values between ≤ 6 -13.7 (32, 40-42) are considered to be acceptable.

Factor Analysis

Factor analysis is used to decide that either the items of an instrument form one or more than one dimensions. (43, 44) Factor analysis was executed through varimax rotation by means of principal component factor analysis. Using eigenvalues >1, clusters of items were recognised. (42) Factor loading

value ≥ 0.4 was assumed to be acceptable. (43) KeiserMeyer-Olkin test and Bartlett's test of sphericity were performed for analysing that either correlation was adequately large for implementing factor analysis. (45) Previous translation studies of ODI into different languages have shown one or two factor structure of ODI.(3, 35, 42). Priori hypothesis was also not established about the ODI-U principal factor structure in the previous studies.

Validity

For validity of ODI-U, one hundred and eight participants were recruited. Out of which 54 were healthy subjects and 54 were patients of lumber radiculopathy. The sample size for validity study was estimated through rule of thumb i.e a ratio of minimum 10 participants per item. (46)

The **content validity** was measured through assessing completeness of question response as well as the extent of floor and ceiling effect. It was predicted that there would be < 5% missing questions from total answers of all participants and no floor and ceiling effects will be observed. (32) Floor and ceiling effects were considered if > 15% participants have attained the minimum or maximum possible total score. (32), (47), (27, 48) Floor and ceiling effects were measured by calculating the number of respondents who have recorded the lowest and highest score on ODI-U, respectively. (32) , (40)

Two types of **construct validity** were studied i.e discriminative validity and convergent validity. The discriminative validity was measured by calculating the difference in ODI-U total score between healthy participants and lumber radiculopathy patients by applying independent sample t-test. It was assumed that a significant difference in total score of ODI-U would be found between two groups. The convergent validity was measured through Pearson's correlation (r) by correlating the new translation with two other scales (VAS disability and VAS pain). Pearson correlation coefficient was interpreted as very weak correlation, weak correlation, moderate correlation, strong correlation and very strong correlation with values of 0.00 to 0.19, 0.20 to 0.39, 0.40 to 0.69, 0.70 to 0.89 and 0.90 to 1, respectively. (49, 50) It was hypothesised that there would be a moderate positive correlation between ODI-U and VAS. (14, 51, 52) If 75% of results matched with hypothesis the validity was considered to be good. (48)

Results

Translation and cultural adaptation:

Out of thirty-two patients of lumbar radiculopathy, considered for testing face validity of ODI pre final version, there were nine participants who did not answer to item 8, stating that the question was not linked to them as it was associated to sex life. To remain closer to original version of ODI, any kind of changes were avoided while translating it. The general impression of patients to ODI-U was that it was easy to understand and complete the given instructions and questionnaire items. All the items were related to underlying condition of the patient. Therefore, after performing pre-test of ODI-U, no major changes were made in it.

Psychometric testing:

In order to assess the psychometric properties of translated ODI, fifty-four male and female patients of lumbar radiculopathy were enrolled in the study. Meanwhile, fifty-four healthy subjects were also recruited who were age and sex-matched to the enrolled patients. The patients were followed up after three days without receiving any treatment for reliability analysis but the healthy subjects were not followed up. The demographic characteristics of the participants are presented in Table-1.

Reliability

The reliability properties as well as the mean and standard deviation of all questions and total score of ODI-U are summarized in Table-2. With 54 respondents, the Urdu-ODI showed excellent test-retest reliability of each item (ICC= 0.72–0.98; CI=95%) and total ODI-U score (ICC =0.95; CI=95%). Excellent internal consistency of ODI-U was obtained as Cronbach's alpha value was 0.89 ($\alpha = 0.89$). (2) Item total correlation values ranged between 0.51-0.76 which is also confirming that ODI-U is internally consistent. SEM and SDC of all items ranged between 0.24-0.98 and 0.65-2.0 respectively. However, for ODI-U total scores SEM and SDC were 2.14 and 5.93 respectively.

Factor Analysis

The factor structure of ODI-U was evaluated through factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy showed that the KMO value was adequately high (0.89) and the Bartlett's test of sphericity was found to be significant ($P < 0.001$). A one factor structure of ODI-U was established based on eigenvalues > 1 . The eigenvalue of first factor was 5.25 explaining 52.5% variance. Table-3 is showing the factor loading of all items.

Validity

The content validity is represented in Table-4 which is assessed through completeness of item response and floor and ceiling effect. Descriptive statistics showed that mean score of items ranged from 1.12-1.65. There were 5 (4.6%) participants with 1 missing response to item 8 which was about sex life. Missing answers of questions presented $< 5\%$ of total 760 ODI-U items. Out of 108 participants no one has attained the highest or lowest expected total score. For ODI-U total score, the percentage of respondents scoring highest score (ceiling effect) and the percentage of respondents scoring lowest score (floor effect) is zero. However, for the individual items the ceiling effect ranged between 0.9-6.5 and the floor effect ranged from 19.4 to 39.8. No floor and ceiling effect of ODI-U total score were observed, showing good content validity which is also indicating appropriate reliability. (27, 32)

As shown in Table-5, there was a significant difference in ODI-U total scores between healthy participants and patients ($P < 0.001$) demonstrating significant construct (discriminative) validity. However, the construct (convergent) validity between ODI-U and other scales was moderate when calculated through Pearson's correlation coefficient. A moderate positive correlation was observed between ODI-U and VAS

pain (Pearson's correlation coefficient=0.49, $P<0.001$), as well as a moderate positive correlation was found between ODI-U and VAS disability (Pearson's correlation coefficient=0.51, $P<0.001$).

Discussion

To the author's knowledge, it was the first research study that not only translated and cross culturally adapted original version of ODI in Urdu language according to recommended guidelines but also observed the validity and reliability of ODI-U. In 2014, Ibrahim et. Al (53) translated ODI into Urdu language and applied it in an interventional study in which caudal epidural injections were given to patients with lumbar prolapsed disc. Although assessment was made through ODI-U but permission of translation from developers was not taken as well as reliability and validity of translated version was not assessed through pre-established guidelines. However, in the present study first of all the permission for translation was taken from the developers of ODI and the process of translation was carried out according to the recommended guidelines.

In 2019, Muhammad Baber Ikram and Rana Bilal Naeem(54) cross culturally adapted the Modified form of Oswestry Disability Questionnaire (MODI) and assessed only the test-retest reliability (ICC=0.91) of MODI. On the contrary, the present study had translated the original ODI instead of MODI and assessed all types of reliability including the test-retest reliability; internal consistency and measurement errors. Exploratory factor analysis was also performed as well as convergent, discriminative and content validity was also measured. By pre-defined hypothesis the psychometric properties of ODI-U were proven. The results of this study showed that ODI-U has excellent reliability and fair to moderate validity.

Adaptation process revealed that ODI-U was effectively translated according to pre-established guidelines. By the use of careful language and taking the consensus decisions of expert review committee, all the hurdles faced during the adaptation process were efficiently handled. In the clinical settings, ODI-U was observed to be an easy and simple to use.

The current study has recruited more males 61 (56.45%) than females 47 (44%) which is comparable to the previous studies (54-80%) (32, 52, 55). However many studies have recruited more females (52-66%) than males. (1, 14, 17, 35, 42). In present study, mean age of patients was 39.7 years, that is quite similar (36-40 years) to the previous research studies (1, 14, 32, 55) but in contrast few studies have enrolled patients with slightly higher mean age (40-52 years) (17, 35, 42, 52)

In the present study, internal consistency was found to be excellent with 0.89 Cronbach's alpha value, which is also in the range of results of previous studies (0.75-0.99) (3, 36, 47, 56-61) The item total correlation between single item and total score of ODI-U ranged between 0.51-0.76 which is quite similar to the findings of German version of ODI (0.58-0.72). (62) However, in the study of Liu et al (Chinese ODI version) the item total correlation was reported as slightly high (0.59-0.83). (63) Excellent test re-test reliability (ICC=0.95) was found in this study which is comparable to the previous translation studies with excellent test retest results (14, 36, 37, 42, 47, 58, 63-66) and the original ODI English version (ICC=0.91). (67) However, the ICC value was found to be less in Russian (0.7), Norwegian (0.88) and Marathi (0.88)

ODI versions. (17, 51, 57) Baradaran et al (68) showed low ICC value i.e 0.68. Test re-test values may vary due to interval variation used to find out the test retest reliability. To ensure the minimum changes in patient's condition, the present study used three-day interval similar to the previous studies which also used less test retest interval. (47, 69, 70) Dawson et al. recommended 2-3 days interval to avoid patient's condition changes. (71) On the contrary, 1-2 week interval was recommended by Deyo et al. (72) and Terwee et al. (48) to minimize the memory effects.

Previous studies evaluated factor analysis of ODI in different languages. Many studies have found two factor structures (3, 35, 62, 64, 70) while Monticone et al have found one factor structure of ODI (42) explaining 45% of variance which is comparable to present study having one factor structure with slightly high variance i.e 52.5%. The percentage of variance is comparable to Finnish (3) Spanish (64) and Arabic (70) version, where two factor structure explained 51%, 55.6% and 58.1% of variance, respectively. However, the Croatian version found two factor structures explaining higher variance of 82.7%. (35) Compared to the previous studies, there are few differences in factor structure of present study which may be influenced by cultural differences.

It was observed that the 'sex question' is being omitted in some studies (7) as it is unacceptable for some cultures. In order to compensate question eight which is about sex life, the present study had enrolled only the married individuals. Still there were 5 (4.6%) participants who did not complete question about sex life; the remaining questions were answered by 100% of the participants. The appropriate reason for not answering the item eight was not mentioned by those participants. It was assumed that question 8 was not missed due to any problem in translation so; modification of this section was not needed. In contrast, the previous studies did not specify the married individuals. Therefore previous studies have reported more participants (12.9%, 14.7%, 19%, 23%, 29%) who did not complete item 8. (3, 35, 37, 62, 64)

The only noticeable difficulty in the translation process was about the description of walking distance in item 4. In the original version of ODI the British Imperial System was used and the distances were described as 1 mile, ½ mile and 100 yards. In general, it is difficult for a patient to understand the exact distances and answer it correctly. Therefore, the description of distance should be simple and not be divergent enough. The British Imperial System is also understandable in Pakistan therefore the description of distance was kept in "miles" but to avoid divergence and keeping the scale in homogenous pattern the "100 yard" was converted to "a quarter of a mile".

In the present study, no floor and ceiling effect was found for the total score of ODI-U which is comparable to Croatian version of ODI. (35) On the contrary, the Chinese version of ODI have reported minor floor effect (0.6%) but no ceiling effect (0%).(38) However for individual items some floor and ceiling effects were observed in the present study. The floor effects of personal care, walking, sex life and social life was found to be higher i.e 36%, 35%, 39%, 34% which is comparable to finnish version of ODI with 43%, 43%, 35% and 25% floor effect, respectively. Along with the above mentioned items, the floor effect of sitting (37%) was also higher in the present study.

To the best of author's knowledge, the previous studies have not assessed the construct (discriminative) validity of ODI by comparing the healthy participants and patients. However, in the present study the significant difference between ODI total score of patients and healthy subjects was detected which is showing good construct validity of ODI-U. Moreover, similar to the previous studies ODI-U revealed positive correlation between ODI-U total score and VAS disability (2) as well as VAS pain (57, 60, 69). Effect size of correlation (r) was moderate between ODI-U and VAS pain ($r=0.49$) and VAS disability ($r=0.51$). The effect size of correlation between ODI-U and VAS pain ($r=0.49$) was found similar to some previous studies (47, 57, 59, 60, 64). On the contrary, Pearson's correlation coefficient was lower ($r=0.370$) in Turkish and Polish versions (36, 73) but higher ($r=0.54-0.78$) in other ODI versions. (17, 37, 42, 56, 65) Furthermore, the Pearson's correlation between ODI-U and VAS disability ($r=0.51$) was lower than the Tamil version ($r=0.81$). (2) These findings suggest that ODI-U shows positive moderate correlation with both VAS disability and pain.

Limitations

- The first limitation was responsiveness; to detect change over time was not measured as no treatment was given to the patients.
- In order to evaluate test-re-test reliability, a short interval of 3 days was used to ensure patient's condition remain same. Therefore, memory effects in this study could not be ruled out completely.
- Criterion and concurrent validity of ODI-U was not examined because of absence of gold standard for health-related questionnaires.
- Data was collected from outpatient physiotherapy clinics only. The reliability and validity of ODI-U was not tested in other populations such as lumbar canal stenosis, Lumbar fusion, surgical stabilization, decompression surgeries, etc. Therefore the results may not be generalized to patients suffering from back pain as well as to inpatients.

Strengths

- The primary strength of study was that, by using pre-defined hypotheses the psychometric properties of the ODI-U were analyzed.
- Up to the authors' knowledge, it was the only research study who has measured the item-total correlation for confirming the internal consistency of the scale.

Conclusion

It is concluded that ODI-U is psychometrically reliable and valid questionnaire to assess level of disability in patients with lumbar radiculopathy. It has simple and easy language that can be understood easily by the Urdu-speaking patients. Therefore, the clinicians and researchers may use ODI-U to evaluate the back disability in Urdu-speaking patients having lumbar radiculopathy.

Abbreviations

LBP: low back pain, COSMIN: COnsensus-based Standards for the selection of health status Measurement Instruments, ICC: Intra-class correlation coefficient, RMQD: Roland Morris Disability scale, ODI: Oswestry disability index, ODI-U: Urdu version of the Oswestry disability index, SD: Standard deviation, KMO: Kaiser-Meyer-Olkin, SDC: Smallest detectable change, SEM: Standard error of measurement, VASdisability: Visual analogue scale for disability, VASpain: Visual analogue scale for pain.

Declarations

- **Ethics approval and consent to participate:** The study was approved by the Institutional Review Board of the University of Lahore, Lahore, Pakistan. All the participants provided informed written consent.
- **Consent for publication:** “Not applicable”
- **Availability of data and materials:** All data generated or analysed during this study are included in this published article [and its supplementary information files].
- **Competing interests:** The authors declare that they have no competing interests.
- **Funding:** No funding source.
- **Authors' contributions:**

FA, MAMB and SAG: Substantial contribution to study conception and design.

FA, AA and MW: Acquisition of data.

AH, FA: Analysis and interpretation of data.

FA, MAMB and MW: Drafting of the manuscript.

MAMB, AA and SAG: Critical revision of the manuscript for important intellectual content.

FA and AH: Statistical analysis.

All authors: Final approval of the manuscript.

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Tables

TABLE 1- Participant Characteristics

<i>Variables</i>	<i>Patients (n=54)</i>	<i>Healthy (n=54)</i>
<i>Age (Years)</i>	41.24±14.80	38.22±11.45
<i>Gender (Male/Female)</i>	30/24 [55.6%/44.4%]	31/23 [57.4%/42.6%]
<i>VAS Pain (1st measurement)</i>	5.75±1.98	N/A
<i>VAS Pain (2nd measurement)</i>	4.96±2.12	
<i>VAS Disability(1st measurement)</i>	4.12±1.79	N/A
<i>VAS Disability(2nd measurement)</i>	3.22±1.74	

TABLE 2- Test Retest Reliability, Measurement Errors, Internal Consistency and Item Total Correlation Values for ODI-U (n=54 Patients)

<i>ODI</i>	<i>First Measurement</i>	<i>Second Measurement</i>			<i>ICC (95% CI)</i>	<i>Cronbach's Alpha</i>	<i>Item Total correlation</i>
	<i>Mean±SD (n=54)</i>	<i>Mean±SD (n=54)</i>	<i>SEM</i>	<i>SDC</i>			
Question-1	2.09±1.08	2.04±1.06	0.28	0.77	0.93(0.88-0.96)	-	0.68
Question-2	1.76±1.50	1.78±1.55	0.26	0.73	0.97(0.95-0.98)	-	0.75
Question-3	1.89±1.49	1.91±1.26	0.73	2.02	0.72(0.56-0.83)	-	0.74
Question-4	1.70±1.57	1.70±1.54	0.34	0.96	0.95(0.92-0.97)	-	0.76
Question-5	2.02±1.73	1.76±1.54	0.76	2.10	0.79(0.67-0.87)	-	0.58
Question-6	2.16±1.68	2.02±1.62	0.66	1.83	0.84(0.75-0.91)	-	0.65
Question-7	1.29±1.17	1.24±1.26	0.32	0.88	0.93(0.88-0.96)	-	0.52
Question-8	1.51±1.55	1.37±1.36	0.48	1.34	0.89(0.81-0.93)	-	0.51
Question-9	1.81±1.44	1.72±1.34	0.66	1.84	0.77(0.64-0.86)	-	0.62
Question-10	2.11±1.69	2.05±1.68	0.24	0.65	0.98(0.96-0.99)	-	0.62
Total Score	18.37±10.18	17.59±8.93	2.14	5.93	0.95(0.92-0.97)	0.89	NA

TABLE 3- Factor Loading Values

<i>ODI-U Items</i>	<i>Factor 1</i>
<i>Walking</i>	0.83
<i>Personal Care</i>	0.82
<i>Lifting</i>	0.81
<i>Pain Intensity</i>	0.76
<i>Standing</i>	0.72
<i>Traveling</i>	0.70
<i>Social Life</i>	0.69
<i>Sitting</i>	0.66
<i>Sleeping</i>	0.61
<i>Sex Life</i>	0.59

TABLE 4- Descriptive Data, Distribution of Responses and Floor and Ceiling Effect (n=108)

<i>ODI-U</i>	<i>Mean</i>	<i>S.D</i>	<i>Lowest Score</i>	<i>Highest Score</i>	<i>Missing responses to an item</i>	<i>Floor (%)</i>	<i>Ceiling (%)</i>
<i>Pain Intensity</i>	1.56	1.16	0	4	0	19.4	6.5
<i>Personal Care</i>	1.28	1.31	0	5	0	36.1	1.8
<i>Lifting</i>	1.37	1.31	0	5	0	30.5	2.7
<i>Walking</i>	1.25	1.34	0	5	0	35.2	4.6
<i>Sitting</i>	1.41	1.52	0	5	0	37	4.6
<i>Standing</i>	1.65	1.46	0	5	0	25	3.7
<i>Sleeping</i>	1.12	1.05	0	5	0	28.7	0.9
<i>Sex Life</i>	1.16	1.33	0	5	5	39.8	0.9
<i>Social Life</i>	1.32	1.30	0	5	0	34.3	0.9
<i>Traveling</i>	1.53	1.44	0	5	0	25	6.5
<i>Total Score (0-50)</i>	13.89	9.57	1	41	NA	0	0

Table 5- Testing ODI Construct Validity

<i>ODI-U Total Score Difference</i>	<i>Mean ± SD</i>	<i>P-Value</i>
Patients	18.37±10.18	<0.001
Healthy	8.95±5.74	
Difference (SE)	9.41±1.65	
Pearson's Correlation Coefficient	<i>r</i>	<i>P-Value</i>
Between ODI_U and VAS _{pain}	0.49	<0.001
Between ODI_U and VAS _{disability}	0.51	<0.001

Figures

Figure 1

Flow Chart of Translation and cultural adaptation

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Flow Chart of Translation and cultural adaptation

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