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Brief Methodological Report

Psychometric Evaluation of the Arabic Brief Pain Inventory in a Sample of Lebanese Cancer Patients

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Abstract

Context. Pain is a common complaint in oncology patients, and success in its treatment requires accurate assessment. Thus, assessment tools that are practical, culturally sensitive, and psychometrically sound are needed.

Objectives. The purpose of this study was to evaluate the psychometric properties and cultural sensitivity of the Arabic Brief Pain Inventory (BPI) in a Lebanese sample of cancer patients. The BPI measures the location and severity of pain; pain relief from treatment; and the pain's interference with life.

Methods. The BPI was translated into Arabic. Its cultural sensitivity was evaluated by a panel of experts. This instrument and a visual analogue scale for pain were administered to a convenience sample of 75 adult oncology patients receiving pain treatment.

Results. The experts' ratings indicated that the tool was culturally sensitive. The majority of the patient sample (88%) was married, male (78.7%), older than 46 years (56%), and with at least a secondary education (84%). The mean pain intensity rating was 5.3 ± 1.7, with interference ratings of 5.3 ± 2.0 to 7.0 ± 2.5. Most patients (78.4%) reported more than 50% pain relief with treatment. Cronbach alpha coefficients were 0.82 and 0.92 for the severity and interference items, respectively. Factor analysis yielded two factors, replicating the severity and interference dimensions. Correlations between the severity and interference items ranged between 0.25 and 0.57 ($P < 0.05$).

Conclusion. The findings support the validity, reliability, and cultural sensitivity of the Arabic BPI in Lebanese oncology patients. This tool can be used to assess pain and improve its management in this population. J Pain Symptom Manage 2011;42:147–154. © *2011 U.S. Cancer Pain Relief Committee. Published by Elsevier Inc. All rights reserved.*

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Key Words
Brief Pain Inventory, cancer, adults, symptom management, Lebanon

Introduction

Pain is reported to be the most distressing symptom encountered by cancer patients in general, and in advanced cancer and terminally ill patients in particular.[1] The *Cancer Pain Relief* report published by the World Health Organization in 1986 emphasized the right of patients to optimal pain management. Nevertheless, studies in different countries report that 50%–60% of patients do not receive adequate pain management, thus contributing to their poor quality of life.[2–7] Moreover, investigators reported that barriers to pain management include poor assessment of pain, patient reluctance to report pain or to take analgesics, and physician reluctance to prescribe analgesics.[6,8] Consequently, the importance of pain assessment has evolved over the years, until it became recommended as the fifth vital sign.[9] Recent studies did identify inadequate pain assessment to be the primary source of mismanagement of pain, resulting in a 62% incidence of impaired functional status of patients despite treatments received.[2,4,10–13] In addition, the importance of and need for improvement of pain assessment in seriously ill patients was reported by Lasch and Carr.[14]

Pain is a complex, dynamic, and subjective sensation described according to its quality, location, intensity, and emotional impact, with intensity recognized as the primary clinical dimension. Pain intensity is usually measured by self-report.[1] The Brief Pain Inventory (BPI), developed by Cleeland et al., is a 16-item instrument developed to measure cancer pain and has been validated in patients with other diseases associated with chronic pain. The BPI addresses the history of pain, intensity, location, and interference with activities, thus tackling the sensory, affective, cognitive, behavioral, and sociocultural dimensions of pain. The BPI is a short, easy to understand, self-administered, and easily scored tool that has been psychometrically evaluated in many languages and cultures and has been recommended as a comprehensive tool for clinical practice and research.[15–23]

The BPI has been found to be psychometrically sound in inpatient and outpatient cancer groups with different cancer sites and from various cultures. Internal consistency reliability of the BPI has been reported in Greek, Taiwanese, Japanese, Hindi, Norwegian, German, Chinese, French, and Italian samples, with coefficients ranging from 0.78 to 0.92 for the severity and interference scales.[7,16,17,19–23] Moreover, test-retest reliability was evaluated, with correlation coefficients ranging between 0.88 and 0.92 for the interference and severity items, respectively, in one study in Taiwan.[16] The construct validity in all the studies on the BPI was tested using principal component factor analysis with non-orthogonal (oblimin) rotation, and the two dimensions (severity and interference) were replicated.[21]

The BPI also has been translated into Arabic and piloted in Morocco.[24] This version could not be used in the present study, however, because the spoken Arabic dialect varies greatly between countries, notwithstanding a uniform official Arabic language. Moroccan Arabic is quite different from the Lebanese dialect, and some of the terms in that version cannot be understood by the Lebanese. Therefore, the available Moroccan tool may not be sensitive for use in other Arab countries. To date, an Arabic version of the BPI has not been psychometrically evaluated in any other country of the Arab world, which comprises 21 countries in which reside 400 million Arabic-speaking people.[25] Consequently, an Arabic tool needs to be psychometrically tested and evaluated for cultural sensitivity in the different Arab countries.

The aim of the study was to evaluate the psychometric properties of an Arabic version of the BPI in a Lebanese sample of cancer patients. The research questions were as follows:

1. Is the Arabic BPI culturally sensitive to the Lebanese cancer patient population?
2. Is the Arabic BPI internally consistent in a Lebanese cancer patient sample?
3. Can the Arabic BPI be validated with its severity and interference subscales in the Lebanese cancer population?

Methods

Sample and Setting

After securing approval of the institutional review board, hospital administration, and the oncology department, a convenience sample of 75 patients diagnosed with cancer and complaining of cancer pain were recruited from inpatient and outpatient departments of a major tertiary care center in Beirut, Lebanon. The sample inclusion criteria included patients who were 1) 18 years and older; 2) diagnosed with cancer, primary or metastatic; 3) complaining of pain as a result of cancer; and 4) receiving treatment for pain. Patients who underwent surgery or an invasive procedure during the past month were excluded because these patients would be experiencing pain as a result of their invasive procedures, and the aim was to assess cancer pain in this study. Patients were recruited between January 2007 and July 2007.

Instrument

The BPI is a 16-item, self-administered, pain assessment tool that has been tested in many cultural groups and patients with various diseases that precipitate chronic pain. The first question asks about the presence of pain other than everyday pains, such as minor headaches, sprains, and toothaches. The second question asks about the location of pain using a body diagram. The severity of pain is assessed in four items rated on an 11-point scale (0 = no pain to 10 = pain as bad as you can imagine) for pain now, pain on average, and pain at its worst and least during the past 24 hours. An open-ended question asks about pain treatment or medication received by the patient and is followed by a rating of the amount of relief achieved on a 0%−100% scale (no relief to complete relief). Seven items measure the interference of pain with general activity, mood, walking ability, normal work, relations with other people, sleep, and enjoyment of life on an 11-point scale, ranging from does not interfere to completely interferes.[7]

At the end of the tool, a visual analogue scale (VAS) was added to assess convergent validity. In addition, demographic data including age, gender, marital status, level of education, insurance status, medical diagnosis, and medications used for the disease and pain management were obtained from the patient and medical record. Finally, the treating nurse or physician was asked whether the patients knew about their diagnosis.

Procedure

This study was conducted in two phases: the first phase included development of the Arabic version of the BPI, and the second phase involved data collection from the participants. The research team translated the BPI into Arabic, and then a bilingual translator who was not involved in the study back translated the instrument into English. The original and back-translated versions were compared and no difference was found, thus supporting the semantic equivalence of the Arabic version. The cultural sensitivity of the BPI was evaluated by a panel of oncology physicians and nurses, and a pain specialist (two oncology physicians, a physician specialized in pain management, the nurse manager of an oncology unit, and a registered nurse from an oncology unit). The experts were asked to rate the items of the BPI on a 4-point scale (1 = not culturally sensitive to 4 = very culturally sensitive). Cultural sensitivity is the appropriateness of the translated items for the Lebanese culture. Modifications, which included changing the terminologies of certain items, were made based on the recommendations by experts before the main study. Additionally, the Arabic BPI was pilot tested on five patients who met the study's eligibility criteria to evaluate the readability of the tool by the patients. No further modifications were warranted.

For the main study, patients were identified by screening the medical records on the oncology units for eligibility to participate in the study. Once an eligible patient was identified, he/she was approached by the primary investigator and invited to participate in the study. Eighty-two patients were invited to participate. Seven patients declined because they were too ill or fatigued, so the final sample included 75 patients, making a 91% response rate. Those patients who agreed to participate were given the informed consent after a full explanation of the study aim and procedure and then the BPI. The patients were asked to rate their pain that is caused by their "illness." Eleven patients (14.7%) who were unable to read and/or write were assisted by the investigator

through reading the informed consent and the BPI. Patients were informed that if they refused to participate in the study, this would not affect their care. Moreover, the "cancer" diagnosis was not discussed with the patients. Instead, the investigator referred to their diagnosis as the "disease" or "condition" depending on the terminology recommended for use by the treating nurse or physician.

Data Analysis

The sample size was determined through a power analysis. Considering an alpha of 0.05 and a power of 70%, a minimum sample size of 69 was needed for moderately strong bivariate correlations.[26] Moreover, to perform factor analysis on the 11 severity and interference items based on the rule that the number of subjects should be larger than five times the number of variables,[27,28] a minimum of 55 participants was needed. Thus, 75 patients were deemed sufficient for the purposes of this study.

Demographic and clinical characteristics of the sample were analyzed using frequencies, means, and standard deviations (SDs). The mean and SD of the pain severity and interference items were calculated. The mean and SD of the cultural sensitivity ratings by the experts were calculated to answer Research Question 1. Reliability was tested by calculating the Cronbach alpha (α) coefficient to answer Research Question 2. To answer Research Question 3, a principal component exploratory factor analysis with oblimin rotation was done. The criteria used to determine the optimal number of factors included an eigenvalue greater than one and factor loadings of at least 0.40. A scree plot also was used to graphically verify the number of factors for the best solution. Moreover, Student's *t*-tests and analysis of variance were used to compare severity and interference ratings between inpatients and outpatients; patients with metastasis and those without metastasis; patients who knew about their diagnosis and those who did not know; and between patients receiving different types of pain medications.

Convergent validity was tested by correlating the item that asks about how much pain the patient is having now in the Arabic BPI with the VAS rating. Pearson r correlations were calculated between the severity items, interference items, and the item about relief provided by pain treatments or medications. The data were analyzed using the Statistical Package for the Social Sciences (SPSS 16; SPSS, Inc., Chicago, IL), and the level of statistical significance was set at 0.05.

Results

Sample Characteristics

The majority of the sample (62.7%) was recruited from the inpatient department. Most of the patients were married (78.7%), male (56%), and older than 45 years (88%). Almost all patients (93.4%) were insured and 84% had at least a secondary education. In terms of clinical characteristics, the primary cancer sites were the gastrointestinal tract, pancreas, or liver (29.3%); bladder, testicles, or prostate (17.4%); and breast (14.7%). The remaining sites included the lungs (12%), hematologic system (10.7%), retroperitoneum (5.3%), and skin (2.7%). Over half the sample (50.7%) had metastases, where 52% of the secondary sites were the bone, 18.4% the liver, 15.8% the lungs, 7.9% the bladder, and 5.3% the brain. Two-thirds of the patients (66.7%) knew about their cancer diagnosis as reported by the nurse or treating physician.

The majority of the sample (98.7%) reported having pain other than minor everyday pains, occurring most frequently in the abdomen, back, lower extremities, or a combination of areas. Table 1 shows the mean pain severity and interference ratings. There were no missing data on any items of the BPI. Severity ratings ranged between 3.1 for pain at its least and 8.4 for pain at its worst, with only six patients (8%) rating their pain on average as

Table 1
Pain Severity and Interference Ratings ($n = 75$)

Variable	Mean	SD
Severity		
Pain right now	4.2	2.0
Pain on average	5.3	1.7
Pain at its worst during the last 24 hours	8.4	1.3
Pain at its least during the last 24 hours	3.1	1.6
Interference		
Sleep	7.0	2.0
General activity	6.4	2.2
Enjoyment of life	6.3	2.2
Normal work	6.3	2.4
Mood	6.1	2.2
Walking ability	5.9	2.5
Relationship with people	4.4	2.3

severe (8–10). The interference items had ratings ranging between 4.4 for the relationships with people item and 7.0 for the sleep item. All patients reported receiving pain medications, with opioids being the most frequently used (46.6%), either alone or in combination with other drugs, such as acetaminophen (paracetamol), nonsteroidal anti-inflammatory drugs, or tramadol. Most patients (78.4%) reported more than 50% relief with treatments, with a mean percentage relief of 60% (SD 20.2%) and median of 70%.

Cultural Sensitivity

The mean rating for cultural sensitivity was 3.8 for all the items, suggesting that the tool was culturally sensitive. Minor linguistic modifications were recommended by the experts, and these were integrated. Recommendations included changing the terminologies for "diagram," "least pain," "average pain," and "percentage relief," in addition to modifying the sentence structure of the questions on "pain on average" and "pain relief from treatment." These modifications mainly addressed the Arabic grammar of the items to address the patient directly and remove the word "please."

Reliability of the Arabic BPI

The values of the Cronbach α coefficients were 0.82 for the severity items and 0.92 for the interference items. The interitem correlations of the severity items were statistically significant and moderate to strong, their values ranging between 0.37 (pain now and worst pain) and 0.68 (least pain and pain on average). Deletion of any item did not affect the Cronbach α significantly. The interitem correlations of the interference items were also moderate to strong and significant, with values ranging from 0.39 (walking ability and mood) and 0.74 (normal work and walking ability). Deletion of any of the interference items did not affect the Cronbach α significantly.

Validity of the Arabic BPI

Results of the factor analysis are shown in Table 2. The items loaded on two factors, one that included the items that measured severity, explaining 11.3% of the variance and the other that included the items that measured interference, explaining 55.8% of the variance. Correlations between the severity and interference items are shown in Table 3. As expected, these correlations were positive and statistically significant. Pearson r coefficient values ranged between 0.25 for pain now and sleep and 0.57 for normal work, least pain, and pain on average. Furthermore, a severity scale was created by computing the mean of the severity items and an interference scale from the mean of the interference items. The correlation between the two scales was positive and significant ($r = 0.63$).

Inpatients had significantly higher scores for interference with walking ability (mean inpatient $= 6.3 \pm 2.7$ vs. outpatient $= 5.3 \pm 1.8$, $P = 0.045$), relationships with other people (5.0 ± 2.2 vs. 3.4 ± 2.2, $P = 0.04$), and enjoyment of life (6.9 vs. 5.4, $P = 0.05$) compared with outpatients. The severity ratings were not significantly different between inpatients and outpatients. As expected, patients with metastasis had significantly higher ratings of pain on average compared with those with no metastasis (5.7 ± 1.7 vs. 4.9 ± 1.5, $P = 0.02$). There were no significant differences in

Table 2
Factor Loadings Using Principal Component Factor Analysis and Oblimin Rotation

Component	Factor 1 (Severity)	Factor 2 (Interference)
Worst pain	**0.63**	0.10
Least pain	**0.71**	0.19
Pain on average	**0.82**	0.13
Pain now	**0.93**	−0.17
General activity	−0.05	**0.85**
Mood	0.04	**0.76**
Walking ability	0.01	**0.77**
Normal work	0.07	**0.85**
Relationships with people	0.11	**0.68**
Sleep	−0.06	**0.88**
Enjoyment of life	0.01	**0.85**

Bolded numbers indicate factor loadings greater than 0.4.

Table 3
Pearson r Correlations Between Severity and Interference Scores ($n = 75$)

Items	Worst Pain	Least Pain	Pain on Average	Pain Now
General activity	0.28[a]	0.47[b]	0.49[b]	0.33[b]
Mood	0.36[b]	0.43[b]	0.51[b]	0.32[b]
Walking ability	0.29[a]	0.45[b]	0.50[b]	0.33[b]
Normal work	0.35[b]	0.57[b]	0.57[b]	0.42[b]
Relationships with people	0.42[b]	0.47[b]	0.50[b]	0.28[a]
Sleep	0.50[b]	0.51[b]	0.41[b]	0.25[a]
Enjoyment of life	0.45[b]	0.47[a]	0.47[b]	0.34[b]

[a] $P < 0.05$.
[b] $P < 0.01$.

severity or interference scores between those who knew about their diagnosis and those who did not. Comparison of patients who received opioids, those who took opioids in combination with other pain medications, and those who took nonopioid medications did not show any significant difference in the pain on average score between the three groups ($F = 0.91$, $P = 0.50$).

Correlation of the score of the Arabic BPI item asking about pain now with the rating on the VAS was 0.68 ($P < 0.01$). Finally, the correlation between pain on average and relief from treatment was negative as expected but not significant ($r = -0.19$, $P = 0.10$).

Discussion

The importance of adequate pain assessment was recognized, and the focus became the identification of clinically useful psychometrically sound tools to facilitate pain assessment.[18] The present study evaluated the Arabic version of the BPI in a sample of Lebanese cancer patients. The findings overall supported the validity, reliability, and cultural sensitivity of the BPI in this patient population.

The BPI was chosen for this study because it is short, simple, and was found to be psychometrically sound in many languages and cultures. The BPI includes few word descriptors, making it easier during translation. The McGill Pain Questionnaire also has good psychometric properties and has been evaluated in many languages and cultures; however, it includes a section with many word descriptors, which makes it difficult to translate.[18] This difficulty would be encountered especially in the Arabic language because of its special feature of having too many adjectives and word synonyms. Nejmi et al.[24] presented a translated Arabic/Moroccan version of the BPI at the 10th World Congress on Pain of the International Association for the Study of Pain. However, the Moroccan version of the BPI is not culturally sound for the Lebanese population because the Moroccan Arabic dialect is quite different from the Lebanese dialect. Moreover, cultural adaptation and translation issues could not be compared with the Moroccan study.

A culturally sensitive tool for the Lebanese cancer population was obtained and psychometrically evaluated in a Lebanese sample. Many participants had trouble relating to the item asking about the interference of pain with relations with other people; 74.7% of patients rated the interference of their pain with relations with other people as ≤5. This may be because of the close-knit family structure and strong social ties in the Lebanese culture whereby people rely on the presence and support of family and friends in the presence of illness and share their ailments with them, rather than withdrawing when in distress or pain. An alternative explanation is that people may underplay their pain experience and use their social relationships to distract them from pain. Still another explanation may be that the item "relationship with people" was not well understood by the patients; however, this was not reflected in the pilot test of the BPI. Further research is needed to explore this issue.

Reliability of the BPI was supported by the Cronbach α coefficient values, which showed excellent internal consistency. Reliability results for the severity and interference items were comparable and in some cases better than those reported by other investigators.[15–17,19–23] Table 4 provides a comparison of the alpha coefficients of this study to those obtained for other versions of the BPI in other languages.[7,15–17,19–23]

Construct validity of the Arabic BPI was supported by the factor analysis, with the severity items loading on one factor and the interference items on another factor exclusively. No item loaded strongly on both factors. The factor structure obtained in this study is in line with that reported by many investigators,[15,16,19,20,22] replicating the severity and interference dimensions reported in earlier

Table 4
Reliability Coefficients (Cronbach α) of the Pain Severity and Interference Factors of the Various Versions of the BPI

Country	Severity α	Interference α
China	0.86	0.91
France	0.86	0.90
Germany	0.88	0.92
Greece	0.89	0.85
Italy	0.78	0.78
Japan	0.81	0.81
Lebanon	**0.82**	**0.92**
North India	0.88	0.78
Norway	0.87	0.92
Taiwan	0.81	0.89

Bolded numbers are results of the present study in Lebanon.

studies. Only three studies reported three factors, with intensity items loading on one factor, interference items related to physical function or activity (general activity, walking ability, and normal work) loading on another factor, and interference items related to psychological function or affect (mood, relations with other people, and enjoyment of life) loading on a third factor.[17,21,29] Nevertheless, the severity and interference factors remained distinct. Construct validity was further supported by the significantly higher severity scores in patients with metastases compared with those without metastases because the former have more body organs affected and thus are likely to experience more pain.

Correlations of the severity and interference items were significant and comparable to those reported in other countries.[15–17,19–23,30] Results of the analysis at the level of items were corroborated by the correlation between the severity and interference scales, which was strong and significant.

Convergent validity was supported by the positive and significant correlation between the mean rating of pain now and that of the VAS, but the coefficient was less than 0.75. Studies comparing ratings by numeric rating scales (NRSs) and VASs report that patients tend to score higher on the NRS but scores are still well correlated and the results could be reproduced.[31,32] Cork et al.[31] reported a Pearson $r = 0.90$ ($P < 0.01$) between the NRS and VAS. In the present study, the mean pain rating on the NRS item asking about pain now was 4.2 (SD 2.0, range 0–10), and the mean on the VAS was 5.0 (SD 2.3, range 1–10), with a weaker correlation than that reported by Cork et al.[31]

The correlation between pain on average and pain relief was negative as expected but not significant. This may be caused by the fact that participants on average did not have low pain scores, yet they still reported a high percentage of relief through treatment. Pain on average had a mean of 5.3 (SD 1.7) and median of 5.0 (with minimum of 2 and maximum of 10), with 13.3% rating pain between 1 and 3 and 8% rating it between 8 and 10. As for pain relief from treatment, the mean was 60.1% (SD 20.2%), median 70% (minimum 0% and maximum 100%), with 21.3% reporting 0%–40% relief and 29.3% reporting 80%–100% relief. Another possible explanation is that when answering the relief from treatment item, patients may have been influenced by the recency effect, which is judging treatment relief based on the last time they used pain medications, whereas pain on average refers to the overall pain experience. There are not enough data to support this explanation. Further studies are required on this issue in the Lebanese population.

A possible limitation of the study lies in the heterogeneous convenience sample, including inpatients and outpatients, with a limited size. Nevertheless, the variability in pain ratings was not beyond what is expected in such studies. Thus, this study provided baseline information about the pain experience in cancer patients at this hospital. Future studies need to examine the change in BPI scores from baseline till after pain interventions are provided and have taken effect.

Conclusion

In conclusion, the Arabic BPI showed satisfactory psychometric properties in a sample of Lebanese cancer patients that are comparable to those of other versions tested in other countries. The tool also seems to be appropriate for the Lebanese culture and practical for use in clinical practice. The findings suggest that this tool is useful to assess pain and the adequacy of pain management regimens, in an attempt to minimize the undertreatment of cancer pain. This constitutes one of a few studies in Lebanon that provides preliminary baseline information about the pain experience in this population.

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