Should the Nottingham Health Profile or the Short Form-36 be given preference in stroke?

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ABSTRACT

الأهداف : مقارنة الفائدة من استعمال ملف نوتنقهام الصحي (NHP) والنموذج القصير 36 (SF–36) كقياسات للنتائج العامة لمرضى الجلطة المزمنة، مع الأخذ بعين الاعتبار معدل الاستجابة، واعتمادية التماسك الداخلي ومشروعية التحليل والاتفاقية في الملكية المشابهة لكلتا الأداتين .

الطريقة : في هذه الدراسة التطلعية، تم تقييم 90 مريضاً من مرضى الجلطة الذين حضروا للعلاج في العيادات الخارجية للأعصاب – مستشفى إيريكايس الجامعي – تركيا، خلال الفترة ما بين مارس 2004م وحتى مارس 2005م. كما شملت الدراسة 70 مريضاً من الذين تعرضوا للجلطة الدماغية قبل ستة أشهر. تم استعمال نقاط SF–36 و NHP كأداة لجمع البيانات .

النتائج : كان التأثير أعلى بالنسبة لنقاط 35.7%-10.0% – NHP من نقاط 37.1%-1.4% – SF–36 . كما كان أدنى تأثير أيضاً مرتفعاً بالنسبة لنقاط 45.7%-1.4% – NHP من نقاط 30.0%-1.4% – SF–36 . أظهر التماسك الداخلي للنقاط الفرعية لكلتا الطريقتين SF–36 و NHP قيم مُرضية. أما بالنسبة إلى شرعية التقارب، تبين وجود صلة بين النقاط الفرعية المقارنة لكلتا الطريقتين. كانت حدود الاتفاقية للملكية المشابهة لكلتا الطريقتين كبيرة جداً. في جميع العينات الخمسة وباستخدام طريقة بلاند ألتمان كان هنالك اتفاق للنقاط في قياس المجالات المشابهة من جودة الحياة QOL .

خاتمة : لدى كلتا الطريقتين SF–36 و NHP درجات مقبولة من الاعتمادية، مشروعية التقارب، ومعدل الاستجابة. كانت حدود الاتفاقية للملكية المشابهة لكلتا الطريقتين كبيرة جداً .

Objectives: To compare the usefulness of the Nottingham Health Profile (NHP) and the Short Form 36 (SF-36) as general outcome measures for chronic stroke patients with respect to the response rate, internal consistency reliability, validity analyses, and agreement in similar domains of the 2 instruments.

Methods: In this prospective study, 90 consecutive stroke patients attending the Neurology outpatient clinic at Erciyes University, Kayseri, Turkey from March 2004 to March 2005 were evaluated for the study. Seventy outpatients who had a stroke 6 months previously were included in the study. As a data-collecting device, SF-36 and NHP scales were used.

Results: The prevalence of patients with highest quality of life score (ceiling effect) was higher for the NHP scale (10-35.7%) than for the SF-36 scale (1.4-37.1%). The prevalence of patients with lowest quality of life score (floor effect) was also higher for the NHP scale (1.4-45.7%) than for the domains of SF-36 (1.4-30%). The internal consistencies of the subscales of both the SF-36 and the NHP showed satisfactory values. Regarding convergent validity, correlations were found between comparable subscales of the 2 instruments. Limits of agreement in similar domains of the 2 instruments were very large. In all 5 demonstrated Bland-Altman plots, there was agreement of the scales in the measurement of the similar fields of quality of life.

Conclusions: Both the SF-36 and the NHP have acceptable degrees of reliability, convergent validity, and response rate. Limits of agreement in similar domains of the 2 instruments were very large.

The recipient of interventions or treatments in medicine or clinical psychology is the patient or the client, whose judgement is given increasing importance in the assessment of any intervention. The recent published literature describes a new category of outcome measures, so-called patient-reported outcomes, which are used as an umbrella term for various measures such as subjective symptom intensity, treatment satisfaction, and also health-related quality of life (HrQoL).[1,2] Quality of life (QOL) instruments can be divided into

generic and disease-specific scales: generic scales address general health concepts not specific to any age, disease, or treatment, enable comparisons of the relative burden of different diseases and the relative benefits of different treatments;[3,4] disease-specific scales do not allow cross-disease comparisons, but may be more sensitive to a specific population.[4] The selection of the QOL measure must be based on its psychometric attributes, which include feasibility, validity, reliability, and sensitivity to change.[5] Particularly in the field of HrQoL, owing to the boom in the nineties of the last century, we now have a plethora of survey instruments that render it difficult, even for the expert in this field of research, to make a decision regarding the most appropriate or optimal instrument. This trend has pervaded the field of generic instruments as well. Generic instruments are disease-unspecific QOL questionnaires that can be administered in the entire spectrum of diseases.[6,7] Given the countless new developments in the field of HrQoL, it has become difficult to select the most appropriate or the best instrument for outcome-oriented studies. We compared the 2 most frequently used questionnaires, namely, the Nottingham Health Profile (NHP) and the Medical Outcomes Study Short-Form-36 Health Survey (SF-36) with regard to their applicability in chronic stroke patients. The SF-36 is increasingly being used to measure subjective health status in stroke clinical trials.[8] In the 20 years since the NHP was published, the test has been investigated in 26 publications in stroke cited in MEDLINE between 1986 to February 2008. However, the SF-36 has been investigated in 120 publications in stroke in MEDLINE between 1994 to February 2008. We were able to retrieve 59 articles that mentioned both survey instruments in various diseases between 1993 and 2008. A relatively small number (13; 22.1%) of these publications were reviews. On the other hand, most of the articles (46; 77.9%) reported the results of clinical trials (such as validation studies, evaluation studies, or even multicenter studies) in which both instruments were used and compared with each other as psychometric instruments. The strengths, weaknesses, and psychometric properties of the NHP and the SF-36 scales are not extensively examined and further research is needed to establish which is a more appropriate QOL instrument for patients with stroke.[9-14] Both questionnaires may differ in their discriminant ability in the stroke patient population. Their scientific value depends on their psychometric properties.[15,16] To date, no study has from the same sample analyzed these 2 instruments to determine which is most appropriate following stroke, and the psychometric properties of the NHP have also not been established in stroke. The aim of this study was to compare 2 generic QOL questionnaires, the NHP and the SF-36 regarding the

internal consistency reliability, response rate, floor-ceiling effects, validity, agreement in similar domains of the 2 instruments, and suitability as outcome measures in chronic stroke patients.

Methods. *Study population and data collection.* In this prospective study, 90 consecutive stroke patients who attended the Neurology outpatient clinic at Erciyes University, Kayseri, Turkey from March 2004 to March 2005 were evaluated for the study. Of the 90 consecutive chronic stroke patients who fulfilled the inclusion criteria during this period, 70 (77%) patients agreed to join the study. There were 27 female (38.6%) and 43 male (61.4%) patients in the study group. The mean ± SD age was 60.16 ± 11.3, and the age range was 23-83. The patients were asked to visit the outpatient clinic at the appointment date. All of the patients gave informed consent. Erciyes University Ethical Committee approved the study. The inclusion criteria were; 1) cerebral infarction or hemorrhage demonstrated by CT or MRI, 2) having a stroke 6 months or more after the onset of stroke, 3) having stroke for the first time, 4) age 20 or above. The patients who had communication problems, psychiatric disorders except depression, other neuromusculoskeletal disorders, and low score (<24) in the Mini Mental State Examination (MMSE) were excluded.

Health-related QOL questionnaires. The SF-36 QOL scale. The SF-36 was designed for use in clinical practice and research, health policy evaluations, and general population surveys.[3] The SF-36 Health Survey contains 36 items that are scored as 8 scales: physical functioning (PF, 10 items), role limitations due to physical health problems (RP, 4 items), bodily pain (BP, 2 items), general health (GH, 5 items), vitality (VT, 4 items), social functioning (SF, 2 items), role limitations due to emotional problems (RE, 3 items) and mental health (MH, 5 items). It also includes a single item that provides an indication of perceived change in health. For each scale, a score ranging from 0 (worst measured health) to 100 (best measured health) was calculated. Additionally, scores were calculated for physical health (PCS) and mental health (MCS) components of HrQoL. A standardized algorithm was used to calculate the scores for 8 domains and 2 dimensions of the SF-36 were transformed to norm-based scores with a mean of 50 and a standard deviation of 10.[17,18] The survey was constructed for self-administration by persons 14 years of age and older, and for administration by a trained interviewer or by telephone. The SF-36 was relatively quick and easy to use and had satisfactory internal consistency after stroke (Cronbach's alpha > 0.7).[19] The reliability and the validity for the Turkish population of the scale was developed by Pinar et al.[20]

The NHP. One of the scales that measures the HrQoL in patients in neurorehabilitation targets to measure self-perceived health status in physical, emotional, and social aspects.[21] The NHP was developed to be used in epidemiological studies of health and disease.[22] The NHP is in 2 parts. Part I measures perceived or subjective functional status by requiring a yes or no answer to 38 statements associated with 6 dimensions: energy (EN, 3 items), pain (PA, 8 items), emotional reaction (EM, 9 items), sleeping (SL, 5 items) social isolation (SO, 5 items), physical mobility (PM, 8 items). Each dimension has a potential score in the range 0-100 where zero indicates good health and 100 indicates poor health. Part II focuses on QOL and asks the individual about the effects of his/her functional health status on 7 areas of daily life: work, looking after the home, social life, home life, sex life, interests, hobbies, and holidays. The 2 parts may be used independently and part II is not analyzed in this study. Part I is scored using weighted values, which give a range of possible scores from zero (no problems at all) to 100 (presence of all problems within a dimension).[21] The NHP is easy to use with stroke patients,[23] and is relatively quick and easy to use. The reliability and the validity for the Turkish population of the NHP was developed by Küçükdeveci et al.[24] The NHP has been used in neurorehabilitation patients (multiple sclerosis, Parkinson, stroke and polio sequel) and determined appropriate for this disorder.[21,25] A third questionnaire was used to obtain clinical and demographic data. The SF-36, NHP, and questionnaire form were administrated face to face by interviewers.

Data were expressed as mean ± standard deviation (mean ± SD) or median with minimum-maximum values. Reliability tests included internal consistency determined by Cronbach's alpha. The prevalence of the lowest (floor effect) and highest (ceiling effect) possible quality of life score in NHP and SF-36 was also calculated. Pearson's correlations were used to determine the level of agreement between 2 comparable subscales of the 2 instruments while R^2 was used to determine the percentage of expressed variance. Agreement of similar domains between the SF-36 and the NHP was analyzed using Bland-Altman plots. The sum of twice the SDs was used to estimate the widest likely 95% confidence interval for SF-36 and NHP comparison. All analyses were performed using SPSS for Windows, version 13.0. $P<0.05$ values were considered significant.

Results. There were 27 female (38.6%) and 43 male (61.4%) patients in the study group. The mean ± SD age was 60.16 ± 11.30, and the age range was 23-83. Of the patients, 85.7% were married, 67.1% were primary school graduates or less educated, 40% were retired, 94.3% had health insurance (**Table 1**). Fifty-one

percent of the patients had comorbid diseases, and the most common diseases were hypertension (45.7%) and diabetes mellitus (14.3%). Eighty percent of the patients fulfilling the inclusion criteria were included in the study. The clinical properties of the patients were homogeneous. The overall response rates to the full 2-part questionnaire were 100%. Patients completed the entire SF-36 and NHP. The analysis of subscales for both test instruments is shown in **Table 2**. The prevalence of patients with best possible scores, referred to as "ceiling effect" was higher for the NHP scale (range, 10-35.7%) than for the SF-36 scale (range, 1.4-37.1%). The prevalence of worst possible scores, "floor effect" was also higher for the NHP scale (range,1.4-45.7%) than for the domains of SF-36 (range, 1.4-30%). The present study SF-36 and NHP scales exhibited acceptable values in respect of internal consistency (>0.70) with the exception of 3 subscales each (SF-36 - GH, VT, and MH; NHP - EN, SL, and SO), however, the values for these subscales are in an acceptable range (**Table 2**). For all but one of the comparable domains, alpha coefficients of the SF-36 were higher than those for the NHP. Emotional reaction on the NHP had a higher alpha coefficient than the SF-36's MH domain. Regarding convergent validity, correlations were found

Table 1 - Distribution of the individuals forming the study group in respect to their socio-demographic characteristics and clinical features.

Variables	n	(%)
Gender		
Male	43	(61.4)
Female	27	(38.6)
Age (mean±SD) (min-max)	60.16±11.30 (23-83)	
Marital status		
Married	60	(85.7)
Divorced-widowed	10	(14.3)
Education		
Primary school graduates or less	47	(67.1)
Middle school and over	23	(32.9)
Occupation		
Retired	28	(40.0)
Housewife	27	(38.6)
Other	15	(21.4)
Health Insurance		
Yes	66	(94.3)
No	4	(5.7)
Side of brain lesion		
Left	34	(48.6)
Right	36	(51.4)
Lesion type		
Infarction	47	(67.1)
Hemorrhagic	23	(32.9)
Duration of illness (day) (mean±SD)	197.44±26.22	

Table 2 - Analysis of subscales of the Short Form 36 (SF-36) and the Nottingham Health Profile (NHP).

Subscale	Number of items	Mean ± SD	Floor n (%)		Ceiling n (%)		Cronbach's alpha
SF-36							
Physical functioning	10	50.6 ± 34.0	0	(12.9)	100	(4.3)	0.95
Physical role limitations	4	54.3 ± 42.6	0	(30.0)	100	(37.1)	0.88
Pain	2	65.0 ± 32.7	0	(1.4)	100	(37.1)	0.85
General health perceptions	5	39.8 ± 17.1	0	(1.4)	80	(4.3)	0.62
Vitality	4	41.0 ± 21.2	0	(2.9)	90	(1.4)	0.64
Social functioning	2	68.9 ± 30.7	0	(5.7)	100	(31.4)	0.88
Emotional role limitations	3	51.4 ± 40.8	0	(1.4)	100	(37.1)	0.74
Mental health	5	50.6 ± 18.7	4	(2.9)	84	(2.9)	0.67
Physical component summary		40.3 ± 9.10	18.2	(1.4)	56.9	(1.4)	
Mental component summary		40.8 ± 10.8	15.5	(1.4)	62.6	(1.4)	
NHP							
Pain	8	4.0 ± 5.7	19.5	(1.4)	0	(28.6)	0.74
Energy	3	19.6 ± 17.1	32.3	(45.7)	0	(10.0)	0.62
Emotional reaction	9	7.2 ± 6.5	19.1	(4.3)	0	(10.0)	0.79
Sleeping	5	8.1 ± 10.3	24.0	(1.4)	0	(32.9)	0.68
Social isolation	5	8.3 ± 10.2	24.0	(5.7)	0	(35.7)	0.68
Physical mobility	8	4.5 ± 5.4	19.5	(4.3)	0	(22.9)	0.85

Table 3 - Correlations between subscales of the Nottingham Health Profile (NHP) and the Short Form 36 (SF-36).

	SF 36 Domain															
NHP	Physical functioning		Physical role limitations		Pain		General health perceptions		Vitality		Social functioning		Emotional role limitations		Mental health	
	r	R^2	R	R^2	r	R^2	r	R^2	r	R^2	r	R^2	r	R^2	r	R^2
PA	-0.130 [ns]	0.02	-0.366**	0.13	**-0.454***	**0.21**	-0.121 [ns]	0.01	-0.297*	0.09	-0.157 [ns]	0.02	-0.225 [ns]	0.06	-0.071 [ns]	0.01
EN	-0.324**	0.10	-0.303*	0.09	-0.323**	0.10	-0.247*	0.06	**-0.609****	**0.38**	-0.344**	0.12	-0.298*	0.09	-0.274*	0.08
EM	-0.339**	0.11	-0.214 [ns]	0.05	-0.267*	0.07	-0.449***	0.20	-0.362**	0.13	-0.401**	0.16	-0.236*	0.06	**-0.247***	**0.06**
SL	-0.181 [ns]	0.03	-0.022 [ns]	0.001	-0.294*	0.09	-0.141 [ns]	0.02	-0.164 [ns]	0.03	-0.098 [ns]	0.01	-0.091 [ns]	0.01	-0.056 [ns]	0.003
SO	-0.190 [ns]	0.04	-0.026 [ns]	0.001	-0.253*	0.06	-0.214 [ns]	0.05	-0.388**	0.16	**-0.245***	**0.06**	-0.130 [ns]	0.02	-0.202 [ns]	0.04
PM	**-0.703***	**0.49**	-0.117 [ns]	0.01	0.127 [ns]	0.02	-0.160 [ns]	0.03	-0.093 [ns]	0.01	-0.188 [ns]	0.04	-0.041 [ns]	0.002	-0.052 [ns]	0.003

[ns]non-significant at $p < 0.05$ level, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ based on Pearson correlation coefficient, numbers are correlation values, PA - pain, EN - energy, EM - emotional reaction, SL - sleeping, SO - social isolation, PM - physical mobility.
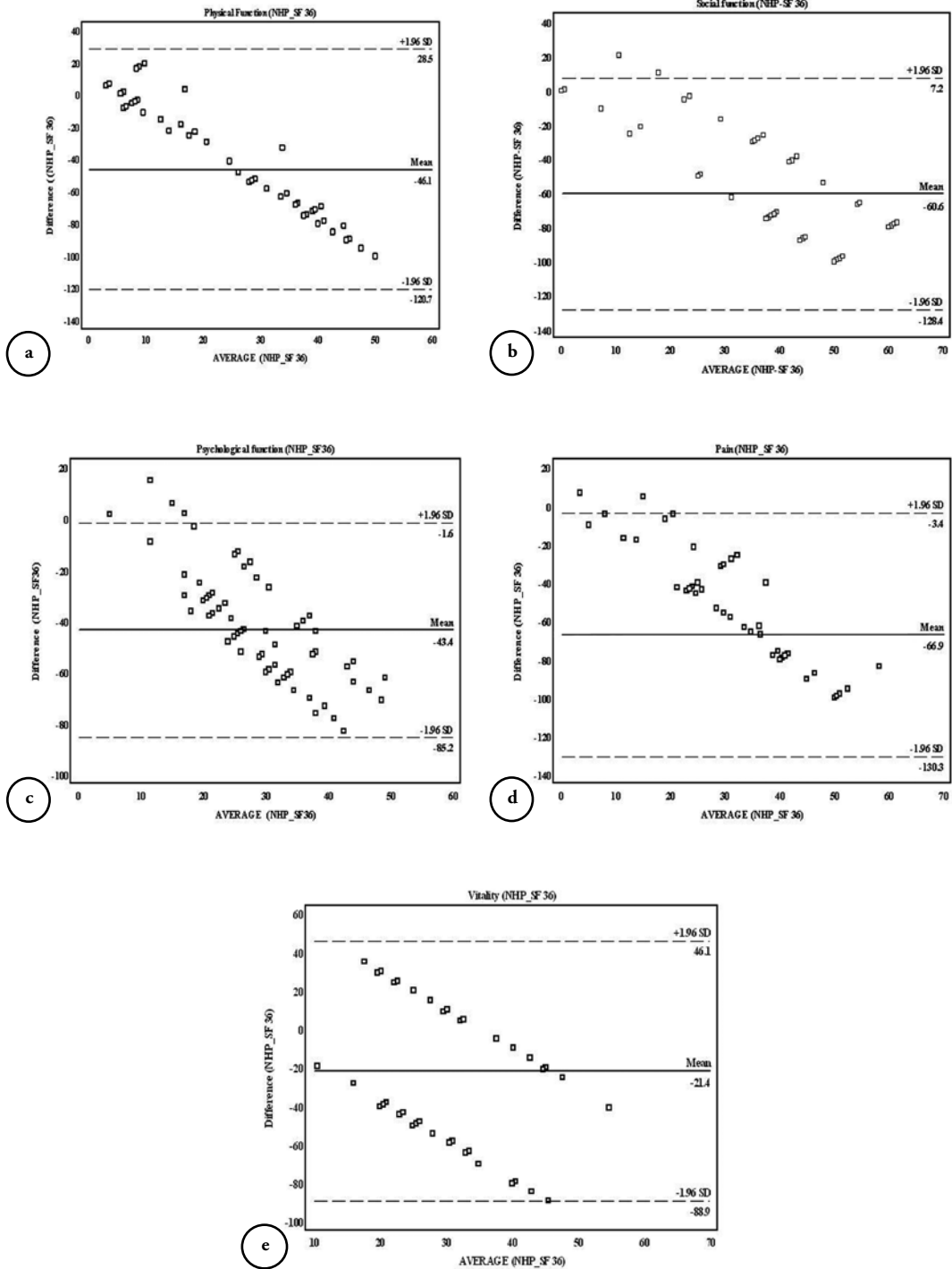Numbers in bold are the correlation coefficients between similar subscales of the 2 scales

Figure 1 - Bland Altman plots for 5 different subgroups according to specific domain: **a**) physical function = physical functioning (SF 36) and physical health (NHP). **b**) Social functioning (SF-36) and social relationships domain (NHP). **c**) mental health (SF 36) and psychological domain (NHP). **d**) pain (SF 36) and pain (NHP). **e**) vitality (SF 36) and vitality (NHP). The differences between the SF-36 and NHP values are drawn, according to the average of the 2 methods (SF 36-NHP)/2. The squares mark the upper and lower limits of the 95% confidence interval (mean ± 2 SD) and the dashed lines indicate the bias. SF-36 - Short Form 36, NHP - Nottingham Health Profile.

between comparable subscales of the 2 instruments (**Table 3**). The problems in PM on the NHP correlated strongly with PF of the SF-36, but did not correlate with the other domains of SF-36. Vitality on the NHP correlated strongly with vitality of the SF-36, but also moderately with the other domains of SF-36. There was a moderate relationship between pain, social, and mental fields that were similar fields of scales. The relationship was found different in each domain. Such as, between SL and BP the relationship was moderately weak, between RP, BP, VT, and PA the relationship was weak and moderate, between GH and EM the relationship was moderately strong, between GH and EN, the relationship was moderately weak, between EN, EM, and RE, the relationship was moderately weak. The different domains of the SF-36 cannot be automatically transferred to several domains in the NHP. However, there may be a few domains that intend to describe the same aspect of HrQoL, for example, PF (SF-36) and PM (NHP), MH (SF-36) and EM (NHP), SF (SF-36) and SO (NHP), pain (SF-36), pain (NHP), VT (SF-36) and EN (NHP). The compliance was evaluated with Bland-Altman plots (**Figure 1**). Limits of agreement in similar domains of the 2 instruments were very large. In all 5 demonstrated Bland-Altman plots, there was agreement of the scales in the measurement of the similar fields of QOL.

Discussion. Health status and QOL assessments are becoming increasingly recognized as being crucial to the evaluation of the benefits of medical interventions. The results of this investigation do not allow an unequivocal statement as to which of the 2 HrQoL instruments should be given preference. In essence, our investigation showed that both questionnaires possess good psychometric properties. The NHP and the SF-36 are both generic instruments for assessing HrQoL.[26] They have been tested extensively and used for different purposes in many populations, including patients with stroke.[9,19,27] For the purpose of assessing the utility of these instruments as general outcome measures in clinical practice to be taken into consideration, first, the questionnaire should be brief and easy to use. The NHP and the SF-36 seemed to meet that criterion, requiring just 10 minutes each to complete. Secondly, the questionnaire should be acceptable for use by older patients. This acceptance was indicated by the high response rate of 80%.[28] In the literature, the response rate was found >75% in stroke patients in SF-36 especially in the PF and RE domains.[29] The present study showed that the response rate was 100%. Brazier et al[30] however, reported a high level of missing data for the SF-36 in persons over 65 years of age. Lastly, the study design might be limited by the fact that the

NHP and the SF-36 questionnaire domains differ in their nature and content. Nevertheless, consistent with the World Health Organization[10] both questionnaires include basic domains of physical, psychological, social, pain, and vitality.[28]

Response rate to questionnaires. In this study, response rates to the 2 questionnaire were high. There was no difference in response rate between the 2 instruments and both seemed to be user-friendly and took around 5-10 minutes to complete. The present study demonstrated that response rates were high for the NHP in stroke patients.

A generic quality of life instrument, designed for a variety of populations and measuring a comprehensive set of health concepts, is likely to have problems with "ceiling" and "floor" effect. It is widely accepted that the more homogeneous the distribution of scores, the lower the floor and ceiling effects, the better the measuring instruments.[3] The study finding was consistent with literature that demonstrated large ceiling and floor effect in the stroke patients of SF-36.[31] The present study determined that ceiling and floor effect in the stroke patients of NHP. Although both questionnaires provided nonpsychometric distributions, in the present study, the NHP showed higher "ceiling-floor" effects than the SF-36 in stroke. Other studies have also reported fewer "ceiling" and "floor" effects in the SF-36 than in the NHP in patients with chronic obstructive pulmonary disease,[32] and after a myocardial infarction.[33] The advantage of the SF-36 may be due to its use of a Likert type response format with a number of possible different scores, and its ability to detect positive as well negative states of health, whereas the NHP items are dichotomous and state more extreme ends of ill health.

Reliability. The internal consistencies of the subscales showed satisfactory values. However, for 3 subscales in each instrument the value fell below 0.70. Among the studies using the SF-36 in people with stroke, several have examined some of its psychometric properties. These studies report adequate internal consistency reliability,[19] and support the convergent and discriminant construct validity,[34] and group differences validity[19] of the SF-36 in stroke patients. However, Jeremy et al,[27] showed that the SF-36 is not reliable in assessing QOL in stroke patients. The test-retest reliability of the NHP is adequate, with correlations ranging from 0.77 and 0.85 in patients with chronic illness.[22] According to Essink-Bot et al,[35] Falcoz et al,[36] and Wann-Hansson et al,[37] the internal consistency of NHP is generally lower. The present study finding was found to be similar to a previous study.[37] In the present study, the mean Cronbach's alpha was a little lower for the NHP than for the SF-36 in stroke. The findings suggest that it is not only the magnitude of

the correlation among items, but also the number of items in the scale that affects the internal consistency. For example, the domains of pain and SF in the NHP contain 8 and 5 items, while BP and SF in the SF-36 contain only 2 items. This is further strengthened by the fact that both the scales were not sensitive enough to identify significance within patients' changes in SO and SF. Both instruments meet the reliability standards for group level application in most respects, although none of them achieved the degree of reliability that be would desirable in individual based assessment.[37]

Validity. In terms of validity, the questionnaires should be sufficiently sensitive to discriminate between levels of disease.[38] As far as convergent validity is concerned, satisfactory values were achieved for the 5 dimensions covered jointly by the 2 instruments. These values were approximately equivalent to the level of correlations registered by Wann-Hansson et al[37] in patients with chronic lower limb ischemia, and lower to the level correlations registered by Meyer-Rosberg et al[39] in patients with chronic neuropathic pain and Jagsch et al[40] in the elderly. The poor validity of the social domains has always been discussed as a serious problem in studies comparing the 2 questionnaires. With correlations of r=-0.24 (R^2 =0.06%), the concurrence between the 2 subscales in the social domain is much lower than that in the remaining domains, yet approximately equivalent to that reported in the published literature (Meyer-Rosberg et al[39]: r= -0.29; Wann-Hansson et al[37]: r= -0.32).

Agreement of specific domains of the SF-36 with NHP. In our study, in addition to correlation analysis, the NHP was compared with SF-36 by using Blant-Altman scales. We demonstrated the agreement of the similar fields at these 2 QOL scales. The Bland-Altman plot has become a popular tool for the presentation of method-comparison studies.[41,42] In the present study, there was agreement between scales in the measurement of the similar fields of QOL, in all 5 demonstrated Bland-Altman plots. Limits of agreement in similar domains of the 2 instruments were very large. Horizontal lines were drawn at the mean difference, and at the mean difference ±1.96 times the SD of the differences. If the differences within mean ± 1.96 SD are not clinically important, the 2 methods may be used interchangeably.

Strengths and limitations of the study. There are only 3 studies in the literature comparing the SF-36 QOL and other QOL scales using Blant-Altman plots.[43-45] In the present study, in addition to correlation analysis, the NHP was compared with the SF-36 by using Blant-Altman scales. The findings of this study have demonstrated the agreement of similar fields of these 2 QOL scales. The number of patients was sufficient to make a comparison between the 2 scales considering the number of patients involved in previous studies. Although there are studies reporting the QOL in stroke patients 3 months or more after the onset of stroke, this study includes patients who had stroke for 6 months or more. This study has several limitations. The first was the exclusion of patients with communication problems, psychiatric disorders except depression, other neuromusculoskeletal disorders, and low score (<24) in the MMSE, which restricts the possibility to generalize the obtained findings. The second was duration of disease. This study included having a stroke 6 months or more after the onset of stroke and, having stroke for the first time.

The findings indicate that both the SF-36 and the NHP have acceptable degrees of reliability, convergent validity, and response rate in chronic stroke patients. In the present study, there was agreement between scales in the measurement of the similar fields of QOL, in all 5 demonstrated Bland-Altman plots. Limits of agreement in similar domains of the 2 instruments were very large. Our study demonstrated that SF-36 and NHP QOL scales are both useful in the practical evaluation of the patients with stroke. The use of the NHP scale may be considered as an alternative instrument for SF-36 in determining the QOL assessment of patients with chronic stroke. Further evaluation is required to replicate these study findings in other stroke populations, to confirm its usefulness in QOL studies.

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