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ORIGINAL RESEARCH PERIOPERATIVE MEDICINE

Evaluating the reliability and validity of the Urdu translation of Nijmegen questionnaire for patients with hyperventilation syndrome

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ABSTRACT

Background & Objective: Nijmegen Questionnaire (NQ) was developed in order to screen hyperventilation syndrome (HVS) and for better understanding of its questions and in lieu with the patient-centric model, it has been translated into other languages. This study aimed at translating English version of NQ in to Urdu and for evaluating the reliability and validity of Urdu based NQ (UNQ) in healthy population and in patients with hyperventilation.

Methodology: This study followed cross sectional design with non-probability convenient sampling technique. Study was completed over the period of 6 months w.e.f. 19th June, 2021 and recruited a total of 70 participants (50 with HVS and 20 healthy people) after getting approvals from pulmonary department based in a government hospital and institutional ethical research board committee. Urdu translation of NQ was a four steps process involving two bilingual translators and a backward translation. Intra class correlation coefficient (ICC), Cronbach's alpha, Pearson Correlation and content validity index were utilized for assessing reliability and validity.

Results: ICC was 0.96, representing good test re-test reliability. The reliability and internal validity gave a value of 0.96. Pearson's correlation coefficients were measured at 0.78 for tightness across chest and 0.82 for shortness of breath.

Conclusion: UNQ is a valid assessment tool for the patients with HVS. It represented overall good reliability, content and construct validity.

Abbreviations: ICC - Intra class correlation coefficient; NQ - Nijmegen Questionnaire; UNQ - Urdu based NQ;

Keywords: Hyperventilation, Translation, Questionnaire, Language, Urdu.

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1. INTRODUCTION

Breath has a vibrant purpose in the human body. Due to increase in respiratory level, hyperventilation syndrome (HVS) occurs, which can cause an increase in the rate of air intake instead of fulfilling the oxygen needs of tissues across the body, and ultimately the demand for oxygen will increase with increasing metabolic requirements. Hyperventilation can also increase carbon dioxide emissions, which reduces arterial pressure of carbon dioxide (PaCO2) from the typical worth (35–45mmHg) and makes hypocapnia, which eventually prompts respiratory alkalosis and ameliorates blood pH levels.[1-5]

Clinical symptoms of hyperventilation condition include irregular episodes of breathlessness generally inconsequential to work out, even though can be deteriorated by work out, might be related with manifestations of respiratory alkalosis, range from feelings of deadness, shivering of the limbs, sensations of looming destruction, and dizziness, once in a while to passing out (cerebral vasoconstriction because of the hypocapnia), and the impression of not having the option to take an agreeable breath.[6, 7]

HVS is hard to analyze as a result of the labile nature of its symptoms. It can occur in cardio-pulmonary related issues and respiratory infections. A few analytic instruments have been proposed, including the development of HVS symptoms during deliberate hyperventilation challenge, gas exchange measurement curves during exercise, or a shift from the sitting to the standing position. In any case, these demonstrative devices are not acceptable. Of note, blood vessel hypocapnia very still is a helpful hint to HVS, yet is most likely the sign of more constant as well as more extreme types of the condition,[8, 9]

The Nijmegen Hyperventilation Questionnaire (NQ) is a 16-item list explicit to hyperventilation condition that asks about the recurrence of side effects like windedness, dyspnea, shivering around the mouth or fingers, and feeling of cold on distal points. Scores greater than 23 out of 64 represents significant hyperventilation. It is presumably the best single survey for the reason that the novel mix of indications relates well with clinical symptomatic criteria.[10, 11]

In 1980s NQ was created at Netherlands based university known as Nijmegen University to assess suggestive hyperventilation (SH), and the NQ was accounted for acceptable dependability as well as legitimacy. In the meantime improvement of the NQ, the scientific seriousness of SH assessed by the NQ has been related to a comprehensive diagnosis of infections, comprising asthma, uneasiness issue, and ongoing exhaustion condition. [11, 12]

The NQ was introduced more than thirty years back as a screening apparatus to distinguish patients suffering from hyperventilation who might profit from breathing guidelines through capnograph input. It got approval against the Hyperventilation Provocation Test with the concept in minds that hypo-capnia was associated positively with Nijmegen findings. In later examinations, the connection between carbon dioxide pressures and Nijmegen Questionnaire scores showed up exceptionally. All things considered, the Nijmegen Questionnaire has stayed being used and it has observed a new expansion in investigations in clinical medication. It is highly encouraged to utilize Nijmegen Questionnaire in new examinations related to SH. It has been interpreted, apparently, into Norwegian, Swedish, Spanish, Greek, Persian, Finnish Filipino and Chinese to avoid any language related confusions among patients and health care providers when it comes to defining symptoms relevant to hyperventilation.[13] Urdu language is one of the top 10 most spoken languages and around 231.7 million people communicate in this language on daily basis.[14, 15]

This questionnaire had not been analyzed or translated into Urdu; therefore, the current study's aim is to translate it into Urdu language and explore the properties of psychometry for this Urdu based questionnaire in order to improve diagnosis and management plan for this population group. We evaluated the reliability and validity of UNQ in healthy population and in patients of hyperventilation.

2. METHODOLOGY

Linguistic reliability and validity study using cross sectional study method with convenient non probability sampling technique was used. Institutional ethical research board committee gave permission of conducting this research. Additionally, written consent was taken from all participants.

The participants for this study were taken from Pulmonary Department at a government hospital. Total duration of study was 6 months. Patients of both genders suffering from hyperventilation syndrome, aged between 20 to 60 yr range and who were able to speak and understand Urdu were recruited in the study. Patients with the history of any traumatic and surgical condition, and any lung surgery were excluded. Total sample size of the study was 70 and that was calculated online by using Raosoft,[16] using prevalence rate from a previous study.[17] This sample was divided into 50 participants suffering from hyperventilation (Group HV) and 20 healthy people of Group A.

The original Nijmegen Questionnaire was selected for translation and linguistic validation to facilitate the use of NQ for Urdu speaking patients of Group HV.

2.1. TRANSLATION IN URDU

Translation was performed without noticeable issues except in case of few words' synonyms in Urdu such as shortness of breath, tingling sensation and cramps. These words on re-translation of their Urdu version in to English were changed by independent translator so; these words were modified while preparing for final Urdu version.

This study has 4 major steps. All steps are mentioned below:

2.1.1. Step 1

Study used knowledge and expertise of two language experts to formulate Urdu version of Nijmegen Questionnaire from its English version.

2.1.2. Step 2

The two independent translations of Urdu version of NQ were compared to create the first draft. The experts in the first step were asked to check for any mistakes and gaps in the first draft of UNQ by the use of committee method.

2.1.3. Step 3

An independent language expert translated the first draft Urdu version of NQ backward to English version of NQ without knowing the original scale. Then the focused group of three physiotherapists with cardiopulmonary based background compared the original and back translations of NQ.

2.1.4. Step 4

In step 4 the final version of UNQ was formed and tested it for content validity by using committee method. Hence 3 physiotherapists tested the Urdu version of NQ and rated its 15 items for content validity by using Content Validity Index (CVI). Four elements were checked in each item of questionnaire: relevance, clarity, ambiguity and simplicity. They rated these elements for items on the following four-point ordinal scales.

- 1 - point is not there,
- 2 - needs a lot of revision,
- 3 - needs some revision and;
- 4 - element is present.

For test and re test reliability and construct validity, two values were recorded from participants 1st in week 1 and 2nd in week 2.

Kaiser Meyer Oklin (KMO) factor analysis for measuring of sampling adequacy were run on the data of 50 patients with HVS. To measure internal consistency reliability, Cronhbach's Alpha was used and to determine the test-retest reliability, intra class correlation co-efficient (ICC) was used as yardstick. In order to measure construct validity, Pearson Correlation test and independent t-test was used by keeping value of significance at 5%. IBM SPSS version 25 was utilized for analyzing and recording data.

3. RESULTS

We enrolled a total of 70 participants from both genders; out of which 31 (44.29%) were females and 39 (55.71%) were males. Mean age was 45.07 ± 10.13 y for 70 participants. ICC showed average measurement of 0.96 which indicated good test re test reliability of UNQ. Crohn Bach Alpha was 0.96 for Urdu based questionnaire meaning good internal consistency in hyperventilating patients. Pearson correlation test showed correlation between week 1 and week 2 in the following manner: for tightness across chest subscale of UNQ r = 0.79; for shortness of breath subscale of UNQ r = 0.82. Hence, it represented good validity overall. Independent t- test reported P = 0.01 for drawing comparisons about validity of UNQ between both groups. KMO-factor analysis test showed KMO value = 0.90 and P < 0.05 meaning that patients from Group HV have adequate sample for running statistical tests in order to identify adequate factors present in questionnaire. Independent T test was used

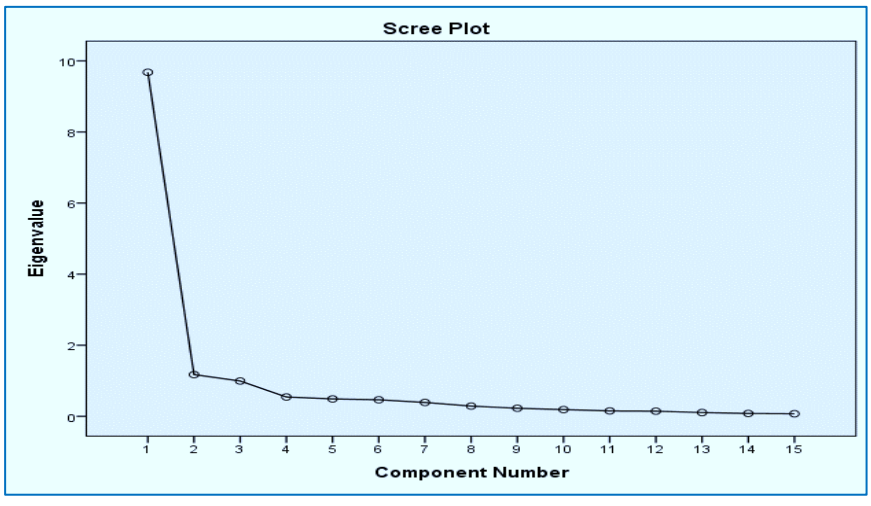

Figure 1: Scree plot showing number of components from translated questionnaire having eigen value greater than 1

Table 1: Descriptive and clinical statistics of study sample

Variables	Frequency (%)/ week	Mean ± SD*
Average age (y)	Males: 39 (55.79%)	45.07 ± 10.13
	Females: 31 (44.29%)	
Chest tightness (HVS group; n = 50)	Week 1	2.02 ± 1.16
	Week 2	1.94 ± 1.20
Shortness of breath (HVS group; n = 50)	Week 1	2.38 ± 1.06
	Week 2	2.30 ± 1.01
Palpitations (HVS group; n = 50)	Week 1	1.96 ± 1.14
	Week 2	1.96 ± 1.14
Independent T test for validity		
Question	**Group A**	**Group HV**
1	0.45 ± 0.68	1.58 ± 1.05
2	0.25 ± 0.55	1.88 ± 1.099
3	0.55 ± 0.82	1.78 ± 1.18
4	0.40 ± 0.50	1.48 ± 1.23
5	0.40 ± 0.82	1.98 ± 0.82
6	0.40 ± 0.68	2.30 ± 1.06
7	0.30 ± 0.57	2.02 ± 1.16
8	0.10 ± 0.30	1.70 ± 1.28
9	0.30 ± 0.57	1.98 ± 1.16
10	0.15 ± 0.48	2.12 ± 1.02
11	0.35 ± 0.58	2.00 ± 0.96
12	0.05 ± 0.22	1.70 ± 1.18
13	0.20 ± 0.52	1.32 ± 1.09
14	0.20 ± 0.52	1.96 ± 1.14
15	0.10 ± 0.45	2.04 ± 1.26

Data presented as Mean ± SD:

to measure mean between all items of UNQ, and all items were statistically significant as P value was less than 0.05 between both groups (Table 1).

Content validity index for each item was greater than 0.80 means better validity (Table 2).

Additionally, according to scree plot, component 1 & 2 represents greater than 1 eigen values, meaning all the variations in the other components is because of the presence or absence of these two items i.e. chest pain (سینے کا درد) and blurry vision (دھند لی نظر) in patients with hyperventilation (Figure 1).

Table 2: Content validity index question wise

Question	Relevance	Clarity	Simplicity	Ambiguity	Content validity index
1	4	4	4	1	0.93
2	4	4	3	1	0.93
3	4	3	4	1	0.87
4	4	3	3	1	0.81
5	4	4	3	1	0.87
6	4	4	4	1	0.93
7	4	3	4	1	0.87
8	4	3	3	3	0.81
9	4	4	4	1	0.93
10	3	4	4	4	0.93
11	4	3	4	1	0.87
12	4	3	4	1	0.87
13	4	4	4	1	0.93
14	4	4	3	1	0.95
15	4	3	3	1	0.85

1 represents element is absent and 4 represents element is present completely.

Table 3 represents translated questionnaire's items.

4. DISCUSSION

The purpose of study was to translate Nijmegen Questionnaire in Urdu language and assess its psychometric properties in the patients of Group HV. The study assessed construct validity by Pearson's correlation coefficient and recorded values of coefficient as 0.78 for tightness across chest and 0.82 for shortness of breath. The reliability and internal consistency were represented by Cronbach's alpha as 0.96 which showed that UNQ is highly reliable tool. The intra class correlation co-efficient was calculated to measure test re test reliability, the value of ICC for total score was 0.96 which indicates that UNQ has good test re test reliability. The NQ has been translated into various other languages and have very high value of Cronbach's alpha such as Korean language has 0.87.[12] 0.7 was recorded for Persian,[1] as well as for Chinese language.[18] The highest value of Cronbach's alpha was recorded in Arabic language as 0.92.[19]

The Arabic based NQ was developed to diagnose hyper-ventilation and to conclude the prevalence of this issue

Table 3: Nijmegen Urdu Questionnaire

علامت۔	کبھی نہیں	شاذونادرہی	کچھ اوقات	اکثر	بہت کثرت سے
سینے کا درد	0	1	2	3	4
دھندلی نظر	0	1	2	3	4
چکر آنا	0	1	2	3	4
الجھن، کا شکار ہونا یا وہم	0	1	2	3	4
تیز یا گہری سانس لینا	0	1	2	3	4
سانسوں میں دشواری	0	1	2	3	4
سینے میں جکڑن	0	1	2	3	4
پیٹ کے پھولنے کا احساس	0	1	2	3	4
ہاتھوں اور انگلیوں میں سنسناہٹ	0	1	2	3	4
سانس لینے میں دشواری یا تیز سانس لینا	0	1	2	3	4
ہاتھوں اور انگلیوں کا سخت ہو جانا اور کھنچاؤ	0	1	2	3	4
منہ کے گرد جکڑن	0	1	2	3	4
ہاتھوں اور پاؤں کا ٹھنڈا ہونا	0	1	2	3	4
دھڑکن تیز ہونے کا احساس	0	1	2	3	4
بے چینی ہونا	0	1	2	3	4

in patients with dizziness. The modified Arabic based NQ recorded data in one-hundred participants belonging to control group and in 50 participants presenting with hyper-ventilation syndrome and dizziness. The Arabic NQ showed good internal consistency for both groups with its 0.819 value for control group's volunteers and its 0.920 value for participants with dizziness and hyper-ventilation problems. The correlation test frequency was highest (r = 0.987 between controls, and r = 0.927 between conditions). Validity in terms of construct of questionnaire represented a greater negative correlation between the total number of questionnaires and the partial compression of the carbon dioxide effect with r = –0.916 and P < 0.001. The Arabic version of NQ demonstrated excellent psychometric properties.[19]

As compared to all linguistic studies on NQ carried out till now, the present study showed good reliability and validity of UNQ with the slightly higher value of Cronbach's alpha as 0.96 second only to the Arabic NQ making it a valid and reliable tool for assessing population with hyperventilation syndrome. NQ needs to be translated into other regional and national languages so that population with hyperventilation syndrome can report their symptoms appropriately and consequently timely management of symptoms can be planned and operated. This study was only conducted in one center, so diversity of this population needs to be considered for prospective studies.

5. CONCLUSION

This study developed Urdu version of Nijmegen Questionnaire (UNQ); and found it valid and reliable. UNQ has good validity and reliability in patients with hyperventilation.

6. Disclaimer

Paper was not presented or submitted to any other journal before.

7. Conflict of interest

The authors declare no conflict of interest.

8. Funding disclosure

None to declare

9. Authors contribution

SI: Concept and design, Collection and assembly of data

Q: Analysis and interpretation of the data, Critical review of manuscript, Final approval and guarantor of the article

RM: Data collection and assembly, literature search, drafting of manuscript

YS: Drafting of Article, final approval of the article, data analysis and interpretation, critical appraisal of manuscript

AH: Data collection, drafting and critical revision of manuscript

SSZ: Study design and drafting of article, data collection and statistical analysis

10. REFERENCES

1. Ravanbakhsh M, Nargesi M, Raji H, Shoushtari MH. Reliability and validity of the Iranian version of Nijmegen Questionnaire in Iranians with asthma. Tanaffos. 2015;14(2):121.

2. Watson M, Ionescu MF, Sylvester K, Fuld JJERR. Minute ventilation/carbon dioxide production in patients with dysfunctional breathing. 2021;30(160).

3. Bennett AJI. Hyperventilation syndrome. 2021;14(4):246-9.

4. Taverne J, Salvator H, Leboulch C, Barizien N, Ballester M, Imhaus E, et al. High incidence of hyperventilation syndrome after COVID-19. 2021;13(6):3918.

5. Urushidani S, Kuriyama A, Matsumura MJC. Clinical utility of venous blood gas analysis for the evaluation of psychogenic hyperventilation in the emergency department. 2020;12(12).

6. Chapman S, Robinson G, Stradling J, West S, Wrightson J. Oxford handbook of respiratory medicine: OUP Oxford; 2014.

7. Tavel MEJTAJoM. Hyperventilation syndrome: why is it regularly overlooked? 2021;134(1):13-5.

8. Chenivesse C, Similowski T, Bautin N, Fournier C, Robin S, Wallaert B, et al. Severely impaired health-related quality of life in chronic hyperventilation patients: exploratory data. Respiratory medicine. 2014;108(3):517-23.

9. Tiotiu A, Ioan I, Poussel M, Schweitzer C, Kafi SAJRM. Comparative analysis between available challenge tests in the hyperventilation syndrome. 2021;179:106329.

10. Gilbert C. Better Chemistry Through Breathing: The Story of Carbon Dioxide and How It Can Go Wrong. Biofeedback. 2005;33(3).

11. Williams CY, Williams RW, Knight R, Hashmi S, Donnelly N, Bance MJO, et al. Hyperventilation Syndrome: Investigating the Relationship Between Nijmegen Questionnaire, Vestibular Function Tests, and Patient Symptoms. 2020;41(3):e349-e56.

12. Ok J-M, Park Y-B, Park Y-J. Association of dysfunctional breathing with health-related quality of life: a cross-sectional study in a young population. PLoS One. 2018;13(10):e0205634.

13. Van Dixhoorn J, Folgering H. The Nijmegen Questionnaire and dysfunctional breathing. Eur Respiratory Soc; 2015.

14. What are the top 200 most spoken languages? [Available from: https://www.ethnologue.com/language/urd/.

15. Mirzayeva MJAAIMRJ. History of Urdu language and its status in India and Pakistan. 2021;11(2):584-91.

16. Raosoft [Available from: http://www.raosoft.com/samplesize.html.

17. Spinhoven P, Onstein E, Sterk P, Le Haen-Versteijnen D. Hyperventilation and panic attacks in general hospital patients. General hospital psychiatry. 1993;15(3):148-54.

18. Qiu C, Chen S, Yao Y, Zhao Y, Xin Y, Zang X. Adaption and validation of Nijmegen continuity questionnaire to recognize the influencing factors of continuity of care for hypertensive patients in China. BMC health services research. 2019;19:1-9.

19. Talaat HS, Moaty AS, Elsayed MA. Arabization of Nijmegen questionnaire and study of the prevalence of hyperventilation in dizzy patients. Hearing, Balance and Communication. 2019;17(2):182-8.

