

Psychometric properties of the Urdu version of the Hospital Anxiety and Depression Scale (HADS) among pregnant women in Abbottabad, Pakistan

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ABSTRACT

Background The Hospital Anxiety and Depression Scale (HADS) is a widely used instrument to measure anxiety and depression symptoms.

Aims This study aimed to translate, validate and test the applicability of the Urdu version of the Hospital Anxiety and Depression Scale (HADS/UV) among pregnant women.

Methods The original English version of the HADS was translated into Urdu by three bilingual experts and retranslated to English using the forward–backward approach. The questionnaire was administered to a sample of 200 pregnant women availing obstetrics and gynaecology services for routine prenatal check-ups of Ayub Teaching Hospital, Abbottabad, Pakistan. Psychometric properties of the instrument, including reliability (internal consistency, test–retest analysis and interitems correlation), were tested. Face and content validity were also assessed. Content Validity Index (CVI) was determined using the average approach and Item-Level Content Validity Index (I-CVI) and Scale-Level Content Validity Index (S-CVI) were calculated accordingly. Construct validity was examined through exploratory factor analysis.

Results Cronbach's alpha coefficient has been found to be 0.82 for the anxiety subscale and 0.64 for the depression subscale, while overall alpha of the HADS/UV is 0.84. The Urdu version is content valid, and the S-CVI of anxiety subscale, depression subscale and HADS/UV are 0.947, 0.948 and 0.947, respectively. Test–retest reliability is 0.884 and 0.934 as measured by Pearson correlation and intraclass correlation, respectively. HADS/UV items correlated positively with the whole scale ($p < 0.001$). Factor analysis with varimax rotation revealed that two factors explained 42.75% of the variance. Items' distribution was quite similar to the original HADS.

Conclusion The HADS/UV is a psychometrically sound instrument with satisfactory measurement, including good internal consistency. The instrument shows promise to be a sound tool to assess anxiety and depression in pregnancy.

INTRODUCTION

Screening tools are used in epidemiological and clinical studies, which are often conducted among various population groups.

This requires a culturally understandable and valid translation of the tool.^{1 2} Translating a tool from its original language could pose problems as the translated version may lose the meaning intended in the original version.^{2 3} This issue of translating a questionnaire into other languages has been extensively discussed in psychology literature.^{4 5}

The translated version of the questionnaire is expected to be as close as possible to the original and serves the same purpose.⁶ However, in real life, there is conflict between the two as literal translation often gives a different meaning. In the literature, there is a debate on which of these two is to be followed.^{1 5}

The Hospital Anxiety and Depression Scale (HADS) is a widely used tool to screen anxiety and depression among various patient groups. The HADS is a 14-item scale with two subsets of seven questions developed to measure anxiety and depression. This tool has been found to be reliable and valid for assessment of anxiety and depression among various ethnic groups. A number of researchers across the world have translated and validated HADS in different languages, such as Arabic, Chinese, Dutch, French, German, Persian and Spanish.^{7 8} In South Asia, HADS has been translated into Urdu, Malayalam, Nepali, Punjabi and Pushtoo.^{9–14}

The HADS has been used extensively in the recent past to assess anxiety and depression among pregnant women. However, it focused on women with complicated pregnancies. Little research was conducted among women with normal pregnancies. Recently, only one study from Lahore, Pakistan, among prenatal and perinatal women validated the Urdu version of the Hospital Anxiety and Depression Scale (HADS/UV).¹² Given the high burden of mental disorders among pregnant

women and the scarcity of literature about validity and reliability of screening tool in the local context, we aimed to assess the psychometric properties of the HADS among pregnant women in the Abbottabad province, Pakistan.

MATERIALS AND METHODS

Study design and setting

This was a methodological study to examine the psychometric soundness of HADS/UV. A hospital-based cross-sectional design was conducted among pregnant women attending the gynaecology outpatient departments (OPDs) for their routine antenatal check-ups from April 2019 till August 2019 at Ayub Teaching Hospital, Abbottabad, Khyber Pakhtunkhwa province, Pakistan. Ayub Medical and Teaching Institution Abbottabad is a 1000-bed tertiary care teaching hospital and the largest healthcare facility of Northern Pakistan and provides major healthcare facilities to the general population. The obstetrics and gynaecology department is well equipped with advanced diagnostic and therapeutic facilities, along with trained staff.¹⁵

During the study period, 220 women attending routine antenatal care at Ayub Teaching Hospital were approached and encouraged to participate in the study. Women who consented to participate in the study were interviewed using a structured questionnaire comprising sociodemographic, family structure and relationship variables and maternal characteristics followed by the HADS.

Sample and sampling

A convenience sampling of 200 pregnant women finally completed the interview, while 20 women discontinued the interview and had missing data. Inclusion criteria were pregnancy in any trimester; willingness to participate; and not being diagnosed with psychological disorders before the commencement of the study, including anxiety and depression. A systematic presentation of the study procedure is shown in figure 1.

Study tool

Hospital Anxiety Depression Scale

The HADS is a commonly used instrument in a hospital setting originally developed by Zingmond and Snaith.¹⁶ It is used to determine anxiety and depression levels in different populations with an established validity and reliability.^{16 17} The HADS is a 14-item questionnaire consisting of two subscales, one for depression symptoms (Hospital Anxiety and Depression Scale Depression Subscale [HADS-D]) and one for symptoms of anxiety (Hospital Anxiety and Depression Scale Anxiety Subscale [HADS-A]). Depressive and anxiety symptoms during the previous week are reported on a Likert scale ranging from '0' (not at all) to '3' (most of the time). The standard scoring algorithm was used= sum of items (anxiety) 1*, 3*, 5*, 7, 9, 11*, 13* and depression= sum of items 2, 4, 6*, 8*, 10*, 12, 14, where starred items were reverse record. Total scores on these subscales ranged from 0 to 21. A score

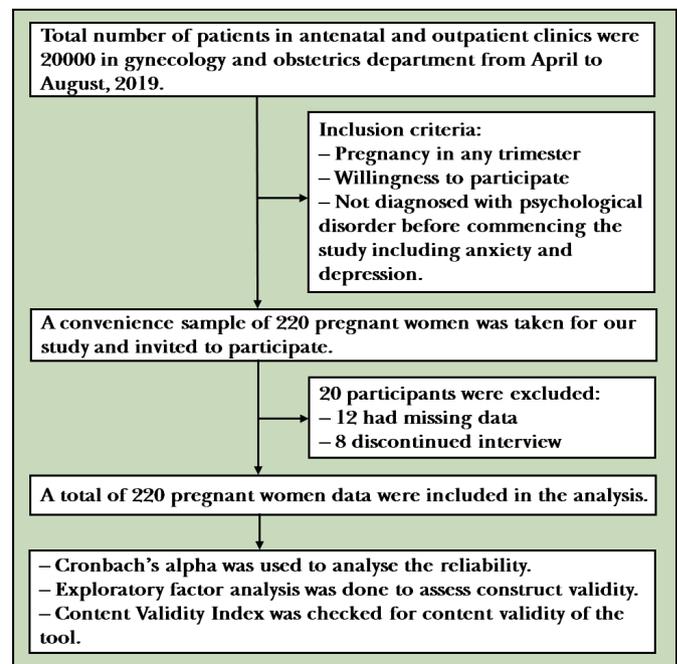


Figure 1 Systematic presentation of study procedure.

of 0–7 is considered as normal, 8–10 as borderline and 11–21 as either anxious or depressed.¹⁷

Forward–backward translation

Translation of the HADS from English to Urdu was independently done by three bilingual experts using the forward–backward method. The resulting translated draft was sent to experts in the health sector with experience in survey development. Arguments were made on many translations. The word 'wound up' in item 1 'A1', 'slowed down' in item 8 'D4', 'butterflies' in item 9 'A5' and 'to be on the move' in item 11 'A6' received extensive discussion because of variations in translations. The research team focused on conceptual rather than linguistic translation, and therefore consistency was reached and the final draft was established. The provisional version was then sent for backward translation and given to two independent experts who had no previous knowledge of the questionnaire.¹⁸ The backward translation is a familiar approach because it gives an indication of semantic equivalence and boosts validity of instruments.

STATISTICAL ANALYSIS

Test–retest reliability

A pilot test was conducted to ensure the items' validity, sequence of questions, complete understanding and average time taken by participants for the interview. We conducted the pilot study before the start of the original survey, the questionnaire was tested–retested on 20 pregnant women attending the gynaecology OPDs for their routine antenatal check-ups, and these data were not included in the final analysis. Participants were requested to complete the translated HADS, along with the social demographic questionnaire, and the same questionnaire

was provided to them again after a time interval of 2 weeks. For analysis, we expected the Cronbach alpha equal or greater than 0.70. Test-retest reliability signifies score stability over a time. Internal consistency was verified by examining the Cronbach coefficient alpha of >0.65 for HADS-A, HADS-D and the total HADS.

Reliability analysis

We conducted a reliability analysis of the HADS total, HADS-A and HADS-D subscales to ensure internal consistency. A Cronbach alpha reliability coefficient was considered satisfactory if the value was equal or greater than 0.65.¹⁹

Construct validity

Exploratory factor analysis (EFA) was examined on the 14 items of the HADS by means of survey among 200 pregnant women who attended routine antenatal care. Suitability of data and sampling adequacy was examined through assessment of Kaiser Meyer Olkin (KMO) > 0.6 and Bartlett test for sphericity. EFA was performed with varimax rotation and items loaded ≥ 0.3 were included.

Content Validity Index

Content validity was checked to ascertain whether the questionnaire's content is appropriate and the relevance of study purpose. A convenient sample of 10 health experts received the HADS/UV and were asked to rate the relevancy of items to its subscale using the 4-point Likert scale: 1 = not relevant, 2 = somewhat relevant, 3 = relevant and 4 = highly relevant. An item that received a score of 1 or 2 was considered 'content invalid', while a rating of 3 or 4 was considered 'content valid'. Eight raters responded and Item-Level Content Validity Index (I-CVI) and Scale-Level Content Validity Index (S-CVI) were calculated accordingly using the average approach. CVI was calculated as the proportion of items that had ratings of 3 or 4 by the rating experts.

Data collection procedure

Informed consent was taken by the researcher before the start of the interview from pregnant women who visited the gynaecological OPDs. Participants were interviewed by gynaecological and obstetrical physicians. Two days of interviewing skills training were given to data collectors due to the sensitive nature of questions asked during the interview. The interview was conducted in a separated room. The average time taken by the each participant was 20–25 min. Written informed consent was provided by each of the 200 participants who agreed to take part.

RESULTS

Characteristics of the study participants

The demographic, obstetric and gynaecological characteristics of participating women are presented in [table 1](#). A total of 200 pregnant women were included, and the mean age was 26.7 (5.0) years. Half of the women (102 (51%)) were residents in urban areas; 115 (57%) had a

Table 1 Sociodemographic and obstetric characteristics of participants (n=200)

Variables	Frequency (n)	Percentage (%)
Respondent age (years), mean (SD)	26.7 (5.0)	
≤30	151	75.5
>30	49	24.5
Type of residence		
Urban	102	51
Rural	98	49
Gravida mean (SD)	2.48 (2.10)	
≤2	115	57
>2	85	43
Parity mean (SD)	1.65 (1.69)	
≤1	121	60.5
>1	79	39.5
Family number in household		
1–5	52	26
6–10	99	44.5
>10	49	29.5
History of abortion		
Yes	31	15.5
No	169	84.5
Diabetes mellitus		
Yes	11	5.5
No	189	94.5
Hypertension		
Yes	28	14.0
No	172	86.0
Education level		
No formal education	55	27.5
Primary (up to grade 5)	38	19.0
Secondary (up to grade 12)	73	36.5
Tertiary (up to grade 16 or above)	34	17.0
Household income in Pakistani rupee		
≤20 000	117	58.5
>20 000	83	41.5
Family system		
Nuclear	40	20
Joint	159	79.5

history of at most two gravida; and 79 (39.5%) had a history of at least two deliveries. History of previous abortions was reported in 31 women (15.5%). One-third completed up to elementary school and 34 (17%) completed university level, while 55 (27.5%) could not have formal education. Twenty-eight (14%) and 11 women (5.5%) were reported to have hypertension and diabetes, respectively. Most of

Table 2 Content Validity Index of Hospital Anxiety and Depression Scale items

	Giving rating of 3 or 4 out of eight experts (n)	I-CVI/average	pc*	K*†	Interpretation‡
I feel tense or 'wound up'.	8	1	0.004	1.00	Excellent
I get a sort of frightened feeling, like 'butterflies' in the stomach.	8	1	0.004	1.00	Excellent
I get a sort of frightened feeling as if something awful is about to happen.	8	1	0.004	1.00	Excellent
I feel restless as I have to be on the move.	6	0.75	0.109	0.72	Good
Worrying thoughts go through my mind.	8	1	0.004	1.00	Excellent
I get sudden feelings of panic.	8	1	0.004	1.00	Excellent
I can sit at ease and feel relaxed.	7	0.88	0.031	0.88	Excellent
Anxiety (S-CVI/average: 0.947)					
I feel as if I am slowed down.	8	1	0.004	1.00	Excellent
I still enjoy the things I used to enjoy.	7	0.88	0.031	0.88	Excellent
I have lost interest in my appearance.	8	1	0.004	1.00	Excellent
I can laugh and see the funny side of things.	7	0.88	0.031	0.88	Excellent
I look forward with enjoyment to things.	7	0.88	0.031	0.88	Excellent
I feel cheerful.	8	1	0.004	1.00	Excellent
I can enjoy a good book or radio or TV programme.	8	1	0.004	1.00	Excellent
Depression (S-CVI/average: 0.948)					

*: pc (probability of a chance occurrence) was computed using the formula: $pc = [N!/A!(N-A)!] \times 0.5N$, where N=number of experts and A=number agreeing on good relevance.

†k*: kappa designating agreement on relevance: $k^* = (I - CVI_{pc}) / (1 - pc)$.

‡: Evaluation criteria for kappa using guidelines described in Cicchetti (1984)³⁵

I-CVI, Item-Level Content Validity Index; S-CVI, Scale-Level Content Validity Index.

the respondents belonged to joint family systems (159 (79.5%)).

Assessment of validity

Regarding face validity, reviewers were satisfied with questionnaire appearance. Moreover, questions were clear and easy to understand; however, we made some changes for questions 3 and 4 after the feedback received from the reviewers and made it simpler. For content validity, the I-CVI and S-CVI scores were calculated accordingly. The I-CVI scores of anxiety and depression items ranged between 0.75 and 1.0 and between 0.88 and 1.0, respectively. The S-CVI scores of anxiety and depression items were 0.947 and 0.948, respectively. For HADS, the CVI was 0.947 (table 2).

Analysis of reliability involved assessment of the Cronbach alpha coefficient. The value was adequate (> 0.7), and after removal of each item, the Cronbach alpha did not reveal any major deviation in the overall internal consistency of the HADS. Majority of the corrected item-total correction analysis was above 0.4; however, the lowest value was in the statement 'I can enjoy a good book or radio or TV programme', and the value was 0.15 (table 3).

Internal consistency reliability analysis

The anxiety and depression subscale had a Cronbach alpha equal to 0.82 and 0.64, respectively. However, the Cronbach alpha value for whole scale was good ($\alpha=0.84$). All anxiety items showed a significant correlation with the anxiety subscale (range 0.56–0.77, $p<0.001$). Similarly, depression items showed a significant correlation with the depression subscale (range 0.39–0.70, $p<0.001$). Furthermore, items of HADS also showed a significant correlation with the full scale (range 0.27–0.75, $p<0.001$) (table 4). The two subscales correlated significantly with each other (Pearson's coefficient $r=0.894$, $p<0.001$). In turn, each subscale showed a significant good correlation with the full scale ($r=0.930$ and $r=0.894$, $p<0.001$) for the anxiety and depression subscales, respectively.

Exploratory factor analysis

Prior to factor extraction, sampling adequacy was checked to ensure suitability for factor analysis. The Kaiser-Meyer-Olkin (KMO) and the Bartlett test of sphericity (BTS) showed adequate sampling. The KMO yielded an index of 0.847 and high significant BTS ($\chi^2=800.327$, $df=91$, $p<0.001$). The number of factors were assessed using eigenvalues greater than 1, which suggested two-factor solution and explained 42.75% of the total response

Table 3 HADS test-retest reliability and scale variance analysis (n=200)

	Scale mean if items deleted	Scale variance if item deleted	Corrected item, total correlation	Cronbach's alpha if item deleted
A: I feel tense or 'wound up'.	16.71	45.96	0.59	0.83
D: I still enjoy the things I used to enjoy.	17.06	49.66	0.39	0.84
A: I get a sort of frightened feeling as if something awful is about to happen.	16.69	45.25	0.62	0.82
D: I can laugh and see the funny side of things.	16.70	46.91	0.56	0.83
A: Worrying thoughts go through my mind.	16.99	47.10	0.57	0.83
D: I feel cheerful.	17.29	46.64	0.60	0.82
A: I can sit at ease and feel relaxed.	16.79	47.94	0.53	0.83
D: I feel as if I am slowed down.	16.84	50.40	0.33	0.84
A: I get a sort of frightened feeling, like 'butterflies' in the stomach.	16.83	49.64	0.46	0.83
D: I have lost interest in my appearance.	17.20	50.81	0.28	0.84
A: I feel restless as I have to be on the move.	16.88	48.46	0.49	0.83
D: I look forward with enjoyment to things.	17.06	47.95	0.50	0.83
A: I get sudden feelings of panic.	16.77	46.91	0.69	0.82
D: I can enjoy a good book or radio or TV programme.	16.63	52.33	0.15	0.85

A, anxiety; D, depression.

variance. The two-factor solution is the most frequently reported one in literature. The first and second factors explained 34.97% and 7.78% of the variability of data, respectively (table 5).

Table 4 Correlations between anxiety and depression subscales and total Hospital Anxiety and Depression Scale (n=200)

Item	Anxiety subscale	Depression subscale	Full scale
A1 (tense)	0.77*	0.43	0.67*
A2 (frightened)	0.74*	0.53	0.49*
A3 (worrying thought)	0.73*	0.42	0.70*
A4 (feel relaxed)	0.63*	0.48	0.64*
A5 ('butterflies' in the stomach)	0.56*	0.42	0.65*
A6 (restless)	0.65*	0.38	0.68*
A7 (panic attack)	0.75*	0.60	0.62*
D1 (enjoy the things I used to)	0.34	0.58*	0.44*
D2 (laugh and see the funny side)	0.50	0.70*	0.54*
D3 (cheerful)	0.58	0.67*	0.30*
D4 (slowed down)	0.33	0.48*	0.58*
D5 (lost interest in appearance)	0.24	0.50*	0.59*
D6 (look forward with enjoyment)	0.49	0.60*	0.75*
D7 (enjoy a good book, radio or TV)	0.14	0.39*	0.27*

*All correlations are significant at the 0.001 level.

DISCUSSION

Main findings

In this study, the HADS was validated on a sample of Pakistani pregnant women living in the district of Abbottabad. Our findings are of clinical importance in terms of validation of a screening tool for anxiety and depression. The HADS/UV proved to be acceptable for pregnant women.

The language of the original English questionnaire was highly metaphorical, and some items had to be carefully translated to adapt to the Urdu language of the Pakistani population. Translation of the HADS items faced some problems, and some items were retranslated at least twice, especially item 8 D4, item 9 A5 and item 11 A6, because of ambiguity of words. Ambiguity was also noticed with the Polish²⁰ and Malayalam versions.¹⁴ In our opinion, the translation was sufficient; however, further scrutiny of the meaning is suggested to match with the Urdu language and local context.

The original research of HADS tested its psychometric soundness on a group of hospitalised patients who suffered from different diseases. The scale is proven to be valid and reliable for other groups of patients as well: for oncology,^{21 22} HIV-infected patients,²³ hospitalised elderly,²⁴ gynaecology patients,^{12 14} patients with coronary artery diseases,²⁵ patients in the emergency department²⁶ and among patients in primary healthcare.²⁷ In turn, our study contributes to the body of knowledge about irregularities of psychometric findings of HADS noticed in the literature²⁸ when it is applied on patients with chronic diseases to others who suffer from physiological changes during pregnancy.

With regard to content validity, the CVI of HADS items revealed high and excellent agreement among experts

Table 5 Exploratory factor analysis of HADS items with varimax rotation matrix (n=200)

HADS items	F1	F2
I feel tense or 'wound up'.	0.686	0.274
I still enjoy the things I used to enjoy.	0.058	0.652
I get a sort of frightened feeling as if something awful is about to happen.	0.675	0.307
I can laugh and see the funny side of things.	0.254	0.698
Worrying thoughts go through my mind.	0.713	0.178
I feel cheerful.	0.583	0.386
I can sit at ease and feel relaxed.	0.363	0.539
I feel as if I am slowed down.	0.225	0.374
I get a sort of frightened feeling like 'butterflies' in the stomach.	0.255	0.550
I have lost interest in my appearance.	0.075	0.431
I feel restless as I have to be on the move.	0.796	0.004
I look forward with enjoyment to things.	0.278	0.592
I get sudden feelings of panic.	0.639	0.451
I can enjoy a good book, radio or TV programme.	0.150	0.110
% of variance: 42.75%	34.97%	7.78%

Bold indicates significant factor loading at level above 0.30. HADS, Hospital Anxiety and Depression Scale.

($k \geq 0.88$), indicating good content validity, except for item 11 A6 ($k=0.72$), which is below the recommended value ($k > 0.75$).²⁹ Therefore, the question should be reconsidered to make it more understandable and culturally suitable. The S-CVI of the HADS subscales, anxiety and depression, was above the recommended value (0.90).³⁰ Similarly, Zimmermann *et al*²⁹ stated that an S-CVI score above 0.83 is sufficient and satisfactory, indicating no ambiguity in understanding the questionnaire. The satisfactory S-CVI indicates cultural relevance.

The HADS/UV of both scales is comparable to previous studies^{12 31} and showed satisfactory internal consistency. The Cronbach alpha of HADS scales was good ($\alpha=0.84$) and above recommended value and met Klines' criteria.²⁰ The Cronbach alpha coefficient of the HADS subscales was good for anxiety ($\alpha=0.82$) but below the recommended value for depression ($\alpha=0.64$). By and large, the HADS-A subscale showed better psychometric properties than the HADS-D.¹³ Our study has reported good reliability scores; hence, we recommend that HADS/UV should be used in the clinical setting for screening of anxiety and depression in Pakistan.

Test-retest reliability was also excellent and intra-class correlation was 0.93, which was similar to that of previous studies³² and better than that of the Hyland *et al* study.²¹ The stability of the test-retest score over 2 weeks and high alpha coefficient support the strength of the HADS for use among pregnant women. Correlation between two factors, HADS-A and HADS-D, was excellent (0.667), similar to the Greek,³³ Iranian,²² Arabic²⁶ and Pashto versions.⁹ The correlation was strong between HADS of both scales and the subscale scores.^{21 22 26}

The EFA showed unequal distribution of items among the two factors, especially for factor 2. It was bidimensionally similar to the original English published by Zigmond and Snaith³⁴ Majority of ex-studies documented the two-factor model,^{9 12 13 22 23 26 33} and some reported three factors.^{20 25} Three exceptions were found, which reported a unidimensional model.²³ In the EFA, most items of the HADS-A were loaded in factor 1 except for item 9 A5. A5 was also an unstable item and problematic in Iranian²² and Arabic²⁶ translations. In contrast, item 14 (D7) was loaded less than 0.3 in factor 2 (depression); item 'D7' load remained < 0.3 in factor 1 (anxiety). Items 'A4', 'D3' and 'A7' shared their loadings between factor 1 and 2. So, we would recommend that it is better to rephrase this item 14 (D7) in future studies as it asks about enjoying a good book, radio or TV programme, and it gave us mixed response due to the different medium of entertainment sources.

In turn, the extracted factors' correlation matrix showed no high correlation, typically between 0.03 and 0.545, in the initial factor analysis, and very few items were highly correlated with others (> 0.50). Items 10 'D5' and item 14 'D7' correlated low (> 0.2) with most items. This irregularity of items' distribution and low correlation were observed in the Karimova and Martin³¹ study and suggests an unsatisfactory model and could be attributed to the impact of biological changes occurring during pregnancy on the perception of emotional components of the HADS. The explained variance of the HADS/UV is 42.75%, which is quite similar to Waqas *et al*¹² and a bit far from the Watrowski and Rohde²⁰ finding in the same population.

Limitation

This study has certain limitations; first, convergent and criterion validity were not done. Perhaps further validation approaches might be useful to test external validity of the HADS/UV. Second, the study sample was not representative of all three pregnancy trimesters.

Implications

The study revealed applicability of the HADS/UV as a screening tool to determine and measure depression and anxiety among pregnant women. Screening and early detection of psychological distresses, including anxiety and depression, will be very useful to overcome the burden associated with anxiety and depression. Healthcare workers can use this tool to predict early

symptoms of anxiety and depression. Further validation studies in specific pregnancy trimesters are required.

CONCLUSION

Our study adds to the body of knowledge a proof about psychometric performance of HADS in obstetrics and gynaecology. The HADS/UV revealed satisfactory psychometric soundness; hence, it may be used as a robust screening tool to measure anxiety and depression in a population of pregnant women as it has shown stability of reliability over a time.

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