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ORIGINAL RESEARCH

# The Creation of the Arabic Version of the Hyperhidrosis Quality of Life Index (HidroQoL©) with Validation and Cross-Cultural Adaptation

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**Purpose:** Hyperhidrosis (HH) is characterized by excessive sweating, which can significantly affect quality of life. The Hyperhidrosis Quality of Life Index (HidroQoL©) is the latest tool that has been developed and validated for assessing the quality of life of patients with HH. Because of the absence of an Arabic version of the HidroQoL©, this research aimed to create, validate, and adapt the HidroQoL© into Arabic.

**Patients and Methods:** A quantitative, analytical, cross-sectional study was conducted with HH patients followed up in dermatology or thoracic surgery clinics. We assessed the results reliability through internal consistency and reproducibility by assessing test–retest reliability. For validity, we conducted an exploratory factor analysis with an interitem correlation matrix and a rotated component matrix.

**Results:** A total of 167 participants were enrolled in this study; 61.1% were males, and 92.8% were Saudi. All 18 items of the HidroQoL©, including the daily life activities domain, psychosocial life domain, and whole HidroQoL©, had Cronbach's alpha values above 0.7. The test–retest reliability assessment demonstrated strong reproducibility. The correlations between each item and the other 17 items of the scale were positive, ranging between 0.2 and 0.6, and the results of the components analysis suggested that the questionnaire has three domains. The correlation between the test–retest results of the HidroQoL© revealed a significant strong positive correlation ($r=0.9$, $P<0.001$).

**Conclusion:** Our findings revealed excellent psychometric properties of the Arabic HidroQoL© in terms of structural and construct validity, internal consistency, and reproducibility. Proper utilization of the Arabic HidroQoL© adequately assesses the quality of life of those affected by HH.

**Keywords:** perspiration, excessive sweating, validation, Arabic, Saudi Arabia

## Introduction

Hyperhidrosis (HH) is a disorder characterized by increased sweating due to the overstimulation of cholinergic receptors on eccrine glands, which may significantly affect quality of life.[1,2] It is classified as primary or secondary.[1] Primary HH typically presents earlier in life, with more localized symptoms.[1] In contrast, secondary HH typically presents as adverse effects of medications or systemic disorders, in particular neurologic disorders.[1] Disproportionate perspiration is sometimes the cause of patients' significant emotional distress and reluctance to inform physicians about their symptoms.[3] For this reason, researchers emphasize that the prevalence of HH is highly underreported.[3] Various epidemiological studies have been conducted to estimate the prevalence of primary HH, with results ranging from 2.9% to 18.3%.[3–10]

Various tools are available for measuring quality of life in hyperhidrosis research.[11] The Hyperhidrosis Quality of Life Index (HidroQoL©) is the most recent tool designed and validated for measuring HH's impact on quality of life.[11] It is a short and comprehensive measure with two main domains and 18 items in total.[12] The first domain includes six items and evaluates the impact of HH on daily life activities, whereas the second domain has twelve items and assesses the

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psychosocial impact of HH.[13] The initial validation of the HidroQoL© revealed excellent measurement properties (structural validity, internal consistency, test–retest reliability, construct validity, and responsiveness).[12] We conducted an extensive search, and to our knowledge the HidroQoL© has not been translated or validated for Arabic speakers. Therefore, our study aimed to create, validate, and culturally adapt the HidroQoL© into Arabic.

# Materials and Methods

## Study Design, Participants, and Setting

A quantitative, analytical, cross-sectional study was carried out at the Dermatology and Thoracic Surgery clinics of King Saud University Medical Center in Riyadh, Saudi Arabia, from May 2024 to June 2024. This study focused on fluent Arabic-speaking patients of all age groups (adults and children) diagnosed with primary hyperhidrosis. The exclusion criteria included nonnative Arabic speakers, individuals younger than 12 years, and those with hyperhidrosis from a secondary treatable cause.

## Questionnaire

The participants completed an electronic survey consisting of three sections:

1. Demographic information
2. Medical history related to hyperhidrosis (HH)
3. Hyperhidrosis Quality of Life Index (HidroQoL©)

The demographic section gathered data on age, sex, education level, and monthly income. The medical history section covered the age at diagnosis, affected areas, treatments used, and history of chronic illnesses. The final section included the Arabic-translated version of the HidroQoL©.

### Hyperhidrosis Quality of Life Index

The HidroQoL©, developed by P. Kamudoni in 2015, is a self-administered, patient-reported outcome tool designed to assess the quality of life of individuals with hyperhidrosis (HH) through various Likert-scale questions. It consists of 18 items divided into two main domains: Domain 1 evaluates daily life activities, and Domain 2 evaluates psychosocial aspects. Each item offers three choices (very much [2 points]; a little [1 point]; and no, not at all [0 points]). The total score ranges from 0 to 36, with the following interpretations: a total score of 0–1 indicates no effect, 2–11 indicates a small effect, 12–22 indicates a moderate effect, 23–32 indicates a large effect, and 33–36 indicates a very large effect. Recent validations by Donhauser et al and Gabes et al in Germany have demonstrated the excellent internal consistency (Cronbach's $\alpha$ 0.81–0.90) and strong test–retest reliability (Intraclass correlation coefficients 0.89–0.93) of the HidroQoL©, along with satisfactory construct validity.

### Instrument Translation Process

A rigorous translation process was implemented. Three independent professional translators performed forward translations, resulting in the TL-1, TL-2, and TL-3 versions. Another translator, unfamiliar with the tool, compared and combined these versions to produce one preliminary version (PI-TL). Three different independent professional translators subsequently conducted backward translations, creating the B-TL 1, B-TL 2, and B-TL 3 versions. These three versions were then reviewed and merged to produce the final translated version (FTL). The final Arabic-translated version is copywritten and available upon request.

### Psychometric Analysis for Validity and Reliability

To evaluate the reliability of the Arabic HidroQoL©, we conducted a test–retest reliability assessment to determine the stability of the items over time. The assessments were spaced one week apart, and data were compiled for each participant. Internal consistency was not assessed because it is statistically infeasible to calculate Cronbach's alpha for single items, as is the case with the HidroQoL©. Instead, we assessed reliability using structural validity via component analysis. A construct validity test was not performed because of the lack of a validated Arabic tool that measures the same construct.

## Ethical Considerations

Ethical approval (No. E-24-86, Ref. No. 24/1143/IRB) was obtained from the Institutional Review Board at the College of Medicine, King Saud University, in February 2024. The study was conducted in accordance with the Declaration of Helsinki. The participants provided electronic consent after being informed about the study's purpose, expected completion time, principal investigator's contact information, and their right to withdraw at any time without obligation. A parent or legal guardian of participants under 18 years of age provided informed consent. Anonymity was maintained by not collecting any identifying information, and no incentives were offered.

## Statistical Analysis

The data were rigorously analyzed via SPSS (Statistical Package for the Social Sciences, Version 27), a reliable statistical tool. Descriptive statistics were used to calculate the numbers and percentages for qualitative variables and the mean, standard deviation, and range for quantitative variables. The reliability and validity of the questionnaire were evaluated using Cronbach's alpha, which measures internal consistency. A Cronbach's alpha value above 0.7 was considered acceptable, indicating that the items within each construct are sufficiently correlated to form a reliable scale. Spearman correlations were computed between HidroQoL© scores and other variables to assess validity and test–retest reliability (sample size 25). We performed both an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA) to explore the questionnaire's construct validity further. The EFA was conducted to identify the data's underlying structure and determine the number of factors that adequately represent the data. We used a principal components analysis (PCA) with Varimax rotation to simplify the interpretation of the factors. Factors with eigenvalues greater than 1, and items with factor loadings above 0.5, were retained for further analysis. A Bland–Altman graph, a valuable tool for assessing the agreement between two different measurement methods, was created. This graph plots the differences between the two methods against their average, clearly visualizing any systematic bias or discrepancies.

# Results

## Sociodemographic Characteristics of the Participants

A total of 167 participants were included in the study, with males comprising 102 (61.1%) of the sample. The age of the participants ranged from 13 to 63 years, with a mean age of 29 years (SD = 9.02). The majority of the participants were Saudi nationals (n = 155, 92.8%), and most had attained a bachelor's degree (n = 126, 75.4%). A substantial proportion of participants reported a monthly income of less than 5000 SAR (n = 75, 44.9%). Only a small percentage reported having a chronic illness (n = 26, 15.7%) (Table 1).

Table 2 presents the participants' medical history, revealing that the sites most frequently affected by hyperhidrosis (HH) were the palms (n = 133, 79.6%) and the soles (n = 125, 74.9%). The median number of affected sites was 2, with the most common being two sites (n = 68, 40.7%). The most common management strategy for HH was the use of topical antiperspirants (n = 78, 46.7%), whereas oral antiperspirants were the least common (n = 9, 5.4%). Thirty-one participants (18.6%) reported not using any management approach.

The Hyperhidrosis Quality of Life Index (HidroQoL©), comprising 18 items with three possible response options, was used to assess the participants' experiences. The specific questions and corresponding responses are detailed in Table 3. The primary concerns expressed by participants included anxiety about engaging in additional activities to manage their condition, concern about visible sweat marks on objects, and feelings of embarrassment. These issues were rated as "very much" by 138 (82.6%), 136 (81.4%), and 135 (80.8%) participants, respectively.

## Reliability

Each item of the HidroQoL© was analyzed (Table 4), and all 18 items demonstrated a Cronbach's alpha value above 0.7, which is considered acceptable This indicates that the items within each construct were sufficiently correlated to form a reliable scale. The mean ± SD scores for the domains were as follows: daily life activities, 8.35 ± 3.28; psychosocial life, 16.67 ± 5.93; and the overall scale score, 25.03 ± 8.2. The Cronbach's alpha values for the daily life activities

**Table 1** Demographic Characteristics

| | | n (%) |
|---|---|---|
| **Sex** | Male | 102 (61.1%) |
| | Female | 65 (38.9%) |
| **Age** | Mean ± SD | 29 ± 9.02 |
| | Range | 13–63 |
| **Nationality** | Saudi | 155 (92.8%) |
| | Non-Saudi | 12 (7.2%) |
| **Level of education** | High school and below | 27 (16.2%) |
| | Bachelor's degree | 126 (75.4%) |
| | Postgraduate studies | 14 (8.4%) |
| **Monthly income** | Less than 5000 SAR | 75 (44.9%) |
| | From 5000 SAR to less than 15,000 SAR | 59 (35.3%) |
| | From 15,000 SAR to less than 30,000 SAR | 29 (17.4%) |
| | More than 30,000 SAR | 4 (2.4%) |
| **Chronic medical illness** | Yes | 26 (15.7%) |
| | No | 140 (84.3%) |

**Table 2** Medical History

| **Affected regions** | **n (%)** |
|---|---|
| Axilla | 97 (58.1%) |
| Palms | 133 (79.6%) |
| Soles | 125 (74.9%) |
| Body trunk | 34 (20.4%) |
| Face and scalp | 41 (24.6%) |
| Genitalia | 25 (15.0%) |
| **Scores computed for the number of sites affected** | |
| One site only | 20 (12.0%) |
| Two sites | 68 (40.7%) |
| Three sites | 42 (25.1%) |
| Four sites | 21 (12.6%) |
| Five sites | 8 (4.8%) |
| Six sites | 8 (4.8%) |
| Median (IQR) | 2 (2–3) |

(*Continued*)

**Table 2** (Continued).

| **Affected regions** | **n (%)** |
|---|---|
| **Management used for HH** | |
| None | 31 (18.6%) |
| Topical antiperspirants (like aluminum chloride) | 78 (46.7%) |
| Oral antiperspirants (like glycopyrrolate or oxybutynin) | 9 (5.4%) |
| Botulinum toxin injection | 56 (33.5%) |
| Anti-hyperhidrosis machine (like iontophoresis, radiofrequency, etc). | 16 (9.6%) |
| Surgical intervention (like thoracic sympathectomy) | 72 (43.1%) |

**Abbreviations**: IQR, interquartile range; HH, hyperhidrosis.

**Table 3** Hyperhidrosis Quality of Life Index (HidroQoL©)

| | **No, not at all** | | **A little** | | **Very much** | |
|---|---|---|---|---|---|---|
| | **n** | **%** | **n** | **%** | **n** | **%** |
| **Item 1** | 30 | 18.0% | 40 | 24.0% | 97 | 58.1% |
| **Item 2** | 43 | 25.7% | 45 | 26.9% | 79 | 47.3% |
| **Item 3** | 33 | 19.8% | 47 | 28.1% | 87 | 52.1% |
| **Item 4** | 12 | 7.2% | 57 | 34.1% | 98 | 58.7% |
| **Item 5** | 6 | 3.6% | 23 | 13.8% | 138 | 82.6% |
| **Item 6** | 47 | 28.1% | 54 | 32.3% | 66 | 39.5% |
| **Item 7** | 9 | 5.4% | 42 | 25.1% | 116 | 69.5% |
| **Item 8** | 5 | 3.0% | 27 | 16.2% | 135 | 80.8% |
| **Item 9** | 24 | 14.4% | 43 | 25.7% | 100 | 59.9% |
| **Item 10** | 36 | 21.6% | 37 | 22.2% | 94 | 56.3% |
| **Item 11** | 12 | 7.2% | 33 | 19.8% | 122 | 73.1% |
| **Item 12** | 44 | 26.3% | 52 | 31.1% | 71 | 42.5% |
| **Item 13** | 9 | 5.4% | 36 | 21.6% | 122 | 73.1% |
| **Item 14** | 10 | 6.0% | 21 | 12.6% | 136 | 81.4% |
| **Item 15** | 48 | 28.7% | 55 | 32.9% | 64 | 38.3% |
| **Item 16** | 36 | 21.6% | 50 | 29.9% | 81 | 48.5% |
| **Item 17** | 43 | 25.7% | 51 | 30.5% | 73 | 43.7% |
| **Item 18** | 95 | 56.9% | 35 | 21.0% | 37 | 22.2% |

**Table 4** Item Analysis of the HidroQoL©

| | Scale Mean if Item Deleted | Corrected Item–Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|
| **Item 1** | 23.63 | 0.414 | 0.437 | 0.924 |
| **Item 2** | 23.81 | 0.596 | 0.576 | 0.919 |
| **Item 3** | 23.71 | 0.697 | 0.681 | 0.916 |
| **Item 4** | 23.51 | 0.601 | 0.499 | 0.919 |
| **Item 5** | 23.24 | 0.606 | 0.531 | 0.920 |
| **Item 6** | 23.92 | 0.685 | 0.670 | 0.917 |
| **Item 7** | 23.39 | 0.605 | 0.581 | 0.919 |
| **Item 8** | 23.25 | 0.636 | 0.686 | 0.919 |
| **Item 9** | 23.57 | 0.681 | 0.585 | 0.917 |
| **Item 10** | 23.68 | 0.618 | 0.502 | 0.919 |
| **Item 11** | 23.37 | 0.705 | 0.643 | 0.917 |
| **Item 12** | 23.87 | 0.551 | 0.442 | 0.921 |
| **Item 13** | 23.35 | 0.640 | 0.610 | 0.919 |
| **Item 14** | 23.28 | 0.581 | 0.483 | 0.920 |
| **Item 15** | 23.93 | 0.642 | 0.555 | 0.918 |
| **Item 16** | 23.76 | 0.632 | 0.521 | 0.918 |
| **Item 17** | 23.85 | 0.692 | 0.610 | 0.917 |
| **Item 18** | 24.38 | 0.536 | 0.378 | 0.921 |

domain, psychosocial life domain, and overall HidroQoL© scale were high, further indicating that each domain and the overall HidroQoL© scale were sufficiently correlated to establish a reliable measure (Table 5).

Table 6 presents the results of the test–retest reliability assessment, which demonstrated strong reproducibility of the HidroQoL© scores. The intraclass correlation coefficients (ICCs) and 95% confidence intervals (CIs) were as follows: overall scale, ICC = −0.43, $p < 0.001$; daily life activities, ICC = 1.21, $p < 0.001$; and psychosocial impact, ICC = −1.6, $p < 0.001$. In addition, there was a strong positive correlation between the test and retest scores of the HidroQoL© ($r = 0.9$, $p < 0.001$) (Figure 1).

## Validity

The correlation between each item and the remaining 17 items of the HidroQoL© scale was examined (Table 7). Positive correlations were observed among all 18 items, with correlation coefficients ranging from 0.2 to 0.6. A correlation

**Table 5** Descriptive Statistics for HidroQoL© Scores

| | Range | Mean | Cronbach's Alpha |
|---|---|---|---|
| **Daily life activities** | 0.00–12 | 8.359±3.288 | 0.846 |
| **Psychosocial life** | 1.0–24 | 16.67±5.93 | 0.902 |
| **HidroQoL** | 1.0–36 | 25.03±8.5 | 0.923 |

**Table 6** HidroQoL© Score Test–Retest Correlations

| | | Mean | SD | Mean Difference | r(P value) |
|---|---|---|---|---|---|
| **Daily life activities** | **(test)** | 8.6087 | 3.11505 | 1.21739 | 0.846*(<0.001) |
| | **(retest)** | 7.3913 | 3.01118 | | |
| **Psychosocial life** | **(test)** | 14.4348 | 4.35709 | −1.65217 | 0.908*(<0.001) |
| | **(retest)** | 16.0870 | 6.10449 | | |
| **HidroQoL©** | **Test** | 23.0435 | 6.95752 | −0.43478 | 0.926*(<0.001) |
| | **(retest)** | 23.4783 | 8.66482 | | |

**Note**: *Intraclass correlation.

coefficient above 0.5 was considered indicative of a strong correlation. The results of the components analysis (Table 8 and Figure 2) suggested the presence of three distinct components or domains within the questionnaire. The first domain included Items 1–4 and 6; the second domain included Items 5, 7–9, 11, and 13–14; and the third domain included Items 10, 12, and 15–18.

## Correlations Between HidroQoL© and Qualitative and Quantitative Variables

Table 9 presents the correlations between the mean HidroQoL© score and the qualitative variables. No significant correlations were found between the mean HidroQoL© score and sex (P = 0.5), nationality (P = 0.3), education level (P = 0.2), monthly income (P = 0.05), or presence of a chronic medical illness (P = 0.6). Table 10 displays the correlations between the mean HidroQoL© score and the quantitative variables. Significant positive correlations were observed between the daily life activities domain and the number of sweating sites (P = 0.04, r = 0.158), as well as with the HDSS

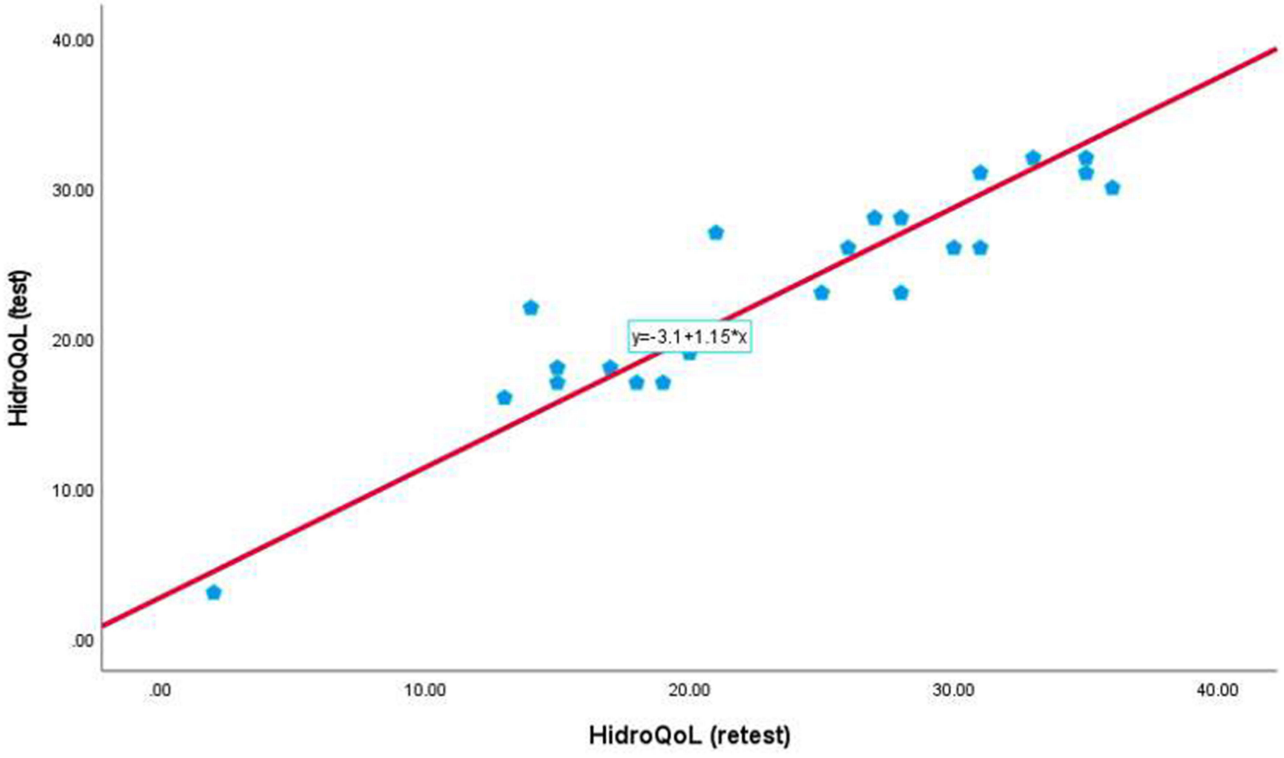


**Figure 1** The correlation between the HidroQoL© test and retest.


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**Table 7** Interitem Correlation Matrix

| | Item 1 | Item 2 | Item 3 | Item 4 | Item 5 | Item 6 | Item 7 | Item 8 | Item 9 | Item 10 | Item 11 | Item 12 | Item 13 | Item 14 | Item 15 | Item 16 | Item 17 | Item 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Item 1** | 1.00 | 0.529 | 0.477 | 0.240 | 0.286 | 0.355 | 0.307 | 0.190 | 0.217 | 0.341 | 0.279 | 0.116 | 0.171 | 0.356 | 0.110 | 0.234 | 0.351 | 0.192 |
| **Item 2** | 0.529 | 1.00 | 0.678 | 0.432 | 0.350 | 0.586 | 0.323 | 0.270 | 0.333 | 0.397 | 0.337 | 0.322 | 0.274 | 0.299 | 0.361 | 0.322 | 0.458 | 0.358 |
| **Item 3** | 0.477 | 0.678 | 1.00 | 0.563 | 0.444 | 0.665 | 0.400 | 0.396 | 0.401 | 0.455 | 0.484 | 0.275 | 0.381 | 0.474 | 0.421 | 0.496 | 0.435 | 0.381 |
| **Item 4** | 0.240 | 0.432 | 0.563 | 1.00 | 0.529 | 0.542 | 0.343 | 0.476 | 0.377 | 0.390 | 0.477 | 0.259 | 0.364 | 0.417 | 0.396 | 0.395 | 0.452 | 0.267 |
| **Item 5** | 0.286 | 0.350 | 0.444 | 0.529 | 1.00 | 0.482 | 0.495 | 0.567 | 0.486 | 0.320 | 0.588 | 0.327 | 0.423 | 0.499 | 0.398 | 0.301 | 0.336 | 0.268 |
| **Item 6** | 0.355 | 0.586 | 0.665 | 0.542 | 0.482 | 1.00 | 0.289 | 0.339 | 0.506 | 0.411 | 0.502 | 0.379 | 0.298 | 0.302 | 0.508 | 0.435 | 0.574 | 0.427 |
| **Item 7** | 0.307 | 0.323 | 0.400 | 0.343 | 0.495 | 0.289 | 1.00 | 0.699 | 0.497 | 0.341 | 0.535 | 0.389 | 0.588 | 0.471 | 0.402 | 0.379 | 0.402 | 0.291 |
| **Item 8** | 0.190 | 0.270 | 0.396 | 0.476 | 0.567 | 0.339 | 0.699 | 1.00 | 0.591 | 0.304 | 0.662 | 0.336 | 0.631 | 0.538 | 0.421 | 0.438 | 0.391 | 0.291 |
| **Item 9** | 0.217 | 0.333 | 0.401 | 0.377 | 0.486 | 0.506 | 0.497 | 0.591 | 1.00 | 0.400 | 0.606 | 0.510 | 0.624 | 0.454 | 0.480 | 0.491 | 0.506 | 0.374 |
| **Item 10** | 0.341 | 0.397 | 0.455 | 0.390 | 0.320 | 0.411 | 0.341 | 0.304 | 0.400 | 1.00 | 0.460 | 0.405 | 0.462 | 0.351 | 0.431 | 0.395 | 0.577 | 0.488 |
| **Item 11** | 0.279 | 0.337 | 0.484 | 0.477 | 0.588 | 0.502 | 0.535 | 0.662 | 0.606 | 0.460 | 1.00 | 0.415 | 0.631 | 0.536 | 0.479 | 0.465 | 0.403 | 0.340 |
| **Item 12** | 0.116 | 0.322 | 0.275 | 0.259 | 0.327 | 0.379 | 0.389 | 0.336 | 0.510 | 0.405 | 0.415 | 1.00 | 0.473 | 0.275 | 0.456 | 0.387 | 0.517 | 0.426 |
| **Item 13** | 0.171 | 0.274 | 0.381 | 0.364 | 0.423 | 0.298 | 0.588 | 0.631 | 0.624 | 0.462 | 0.631 | 0.473 | 1.00 | 0.488 | 0.427 | 0.470 | 0.434 | 0.323 |
| **Item 14** | 0.356 | 0.299 | 0.474 | 0.417 | 0.499 | 0.302 | 0.471 | 0.538 | 0.454 | 0.351 | 0.536 | 0.275 | 0.488 | 1.00 | 0.306 | 0.452 | 0.351 | 0.275 |
| **Item 15** | 0.110 | 0.361 | 0.421 | 0.396 | 0.398 | 0.508 | 0.402 | 0.421 | 0.480 | 0.431 | 0.479 | 0.456 | 0.427 | 0.306 | 1.00 | 0.601 | 0.562 | 0.464 |
| **Item 16** | 0.234 | 0.322 | 0.496 | 0.395 | 0.301 | 0.435 | 0.379 | 0.438 | 0.491 | 0.395 | 0.465 | 0.387 | 0.470 | 0.452 | 0.601 | 1.00 | 0.491 | 0.403 |
| **Item 17** | 0.351 | 0.458 | 0.435 | 0.452 | 0.336 | 0.574 | 0.402 | 0.391 | 0.506 | 0.577 | 0.403 | 0.517 | 0.434 | 0.351 | 0.562 | 0.491 | 1.00 | 0.426 |
| **Item 18** | 0.192 | 0.358 | 0.381 | 0.267 | 0.268 | 0.427 | 0.291 | 0.291 | 0.374 | 0.488 | 0.340 | 0.426 | 0.323 | 0.275 | 0.464 | 0.403 | 0.426 | 1.00 |


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**Table 8** RotateDed Component Matrix

| Item | | Domain | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| 1. | My choice of clothing is affected | | | 0.750 |
| 2. | My physical activities are affected | | | 0.772 |
| 3. | My hobbies are affected. | | | 0.754 |
| 4. | My work is affected | | | 0.515 |
| 5. | I worry about the additional activities in dealing with my condition | 0.659 | | |
| 6. | My holidays are affected (eg planning, and activities) | | | 0.623 |
| 7. | I feel nervous | 0.737 | | |
| 8. | I feel embarrassed | 0.851 | | |
| 9. | I feel frustrated | 0.603 | | |
| 10. | I feel uncomfortable physically expressing affection (eg hugging) | | 0.595 | |
| 11. | I think about sweating | 0.721 | | |
| 12. | I worry about my future health | | 0.706 | |
| 13. | I worry about people's reactions | 0.714 | | |
| 14. | I worry about leaving sweat marks on things | 0.668 | | |
| 15. | I avoid meeting new people | | 0.719 | |
| 16. | I avoid public speaking (eg presentations) | | 0.576 | |
| 17. | My appearance is affected | | 0.688 | |
| 18. | My sex life is affected | | 0.690 | |

**Notes**: Extraction Method: Principal-Components Analysis. Rotation Method: Varimax with Kaiser Normalization. Adapted from Kamudoni P, Mueller B, Salek MS. The development and validation of a disease-specific quality of life measure in hyperhidrosis: the Hyperhidrosis Quality of Life Index (HidroQOL©). *Qual Life Res Int J Qual Life Asp Treat Care Rehabil*. 2015;24(4):1017–1027. Creative Commons.[14]

tool (P = 0.0001, r = 0.456). The psychosocial life domain also showed a significant positive correlation with the HDSS tool (P = 0.0001, r = 0.376). In addition, there was a significant positive correlation between the total HidroQoL© score and the HDSS score (P = 0.0001, r = 0.439).

## Discussion

A total of 167 participants were enrolled in this study; 61.1% were males, 92.8% were Saudi, and 75.4% had a bachelor's degree. Palms (79.6%) and soles (74.9%) were the locations most affected by HH, and topical antiperspirant use (46.7%) was the major management method used for HH. This study aimed to create, validate, and adapt the HidroQoL© into Arabic.

Several tools are available for assessing the quality of life of hyperhidrosis patients. It is unclear which tool is the most reliable, although a small group of patient advisors preferred the HidroQoL© tool.[11] Compared with the Hyperhidrosis Questionnaire (HQ), the HidroQoL© appears more convincing on the basis of a higher quality of evidence with respect to content validity and internal consistency and a more extensive study population.[15] Moreover, the HidroQoL© lacks evaluations of only three measurement properties: measurement error, criterion validity, and cross-cultural validity.[15]

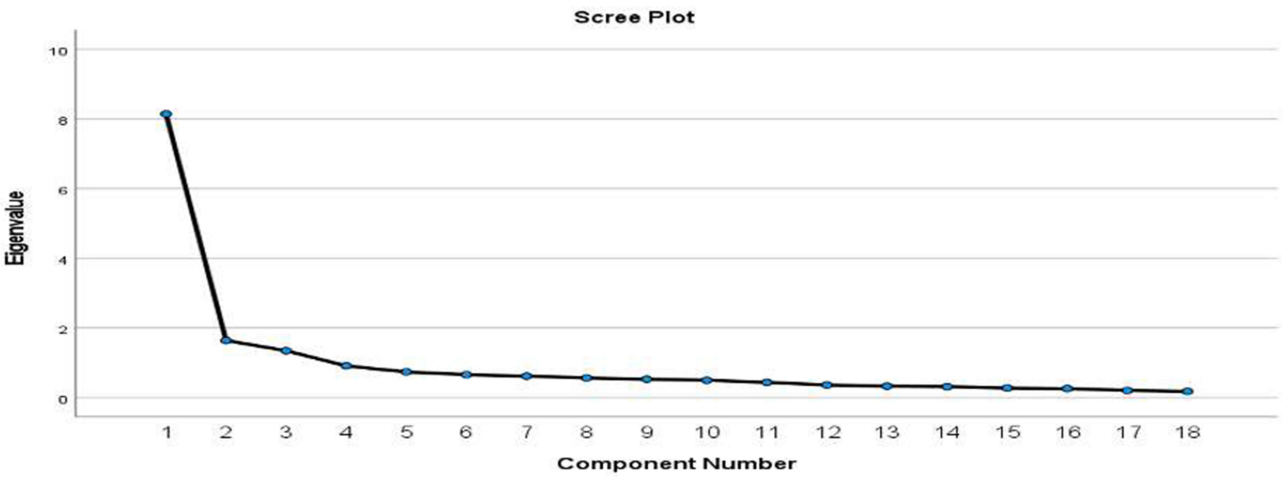


**Figure 2** Scree plot showing the three principal components.

The initial development of the scale started in 2012, when Kamudoni et al recruited an online cohort of 71 patients through social networking sites to participate in initial interviews. This led to the development of a pilot tool containing 47 questions answered using a 6-point scale.[16] Further validation was performed in 2015, when a cross-sectional cohort of 595 patients completed several questionnaires for comparison (HDSS, DLQI and Skindex-17).[14] The findings revealed a strong correlation of the HidroQoL© with the DLQI ($r=0.6$, $p<0.001$) and the Skindex-17 scale, but to a lesser extent.[14] An online longitudinal study subsequently assessed the revised measure's construct validity, reliability and responsiveness ($n = 260$).[14] The findings showed strong reproducibility (internal consistency, Cronbach's α overall scale = 0.89; test–retest reliability, intraclass correlation = 0.93, $p<0.001$).[14] The results demonstrated that the HidroQoL© was responsive in recognizing slight changes or small responses to treatment over time.[14] Moreover, Gabes et al reported

**Table 9** Correlations Between the HidroQoL© and Qualitative Variables

| | | HidroQoL© | | P value |
|---|---|---|---|---|
| | | Mean | SD | |
| **Sex** | Male | 24.73 | 8.48 | 0.56 |
| | Female | 25.51 | 8.61 | |
| **Nationality** | Saudi | 24.87 | 8.39 | 0.39 |
| | Non Saudi | 27.08 | 10.17 | |
| **Level of education** | High school and below | 27.11 | 8.96 | 0.25 |
| | Bachelor's degree | 24.85 | 8.47 | |
| | Advanced studies (MSc/PhD) | 22.64 | 7.67 | |
| **Monthly income** | Less than 5000 SAR | 25.24 | 9.18 | 0.056 |
| | From 5000 SAR to less than 15,000 SAR | 24.63 | 8.26 | |
| | From 15,000 SAR to less than 30,000 SAR | 26.76 | 6.31 | |
| | More than 30,000 SAR | 14.50 | 7.77 | |
| **Chronic medical illness** | yes | 24.38 | 8.15 | 0.69 |
| | no | 25.10 | 8.61 | |

**Table 10** Correlations Between the HidroQoL© and Quantitative Variables

| | | Daily Life Activities | Psychosocial Life | Total HidroQoL© |
|---|---|---|---|---|
| **Age** | **r** | 0.005 | −0.005 | −0.015 |
| | **P value** | 0.946 | 0.947 | 0.851 |
| **Age since hyperhidrosis started** | **r** | 0.012 | −0.029 | −0.014 |
| | **P value** | 0.876 | 0.711 | 0.855 |
| **Sites** | **r** | 0.158* | 0.048 | 0.104 |
| | **P value** | 0.042 | 0.537 | 0.180 |

**Note**: *Spearman's rho.

strong internal consistency of the scale, with a Cronbach's alpha score above 0.7 in all the domains.[12] In addition, Wade et al reported strong internal consistency of the overall scale, with a Cronbach's α score of 0.89.[11] Similarly, in our study, each item of the HidroQoL© was analyzed (Table 4); all 18 items had a Cronbach's alpha value above 0.7, which was considered acceptable, indicating that the items within each construct were sufficiently correlated to form a reliable scale. The Cronbach's alpha values of the daily life activities domain, psychosocial life domain, and whole HidroQoL© were high, indicating that each domain and the HidroQoL© scale were sufficiently correlated to form a reliable scale. The reliability of the HidroQoL© scale, which was observed in our findings, is consistent with the findings of other studies. These findings suggest that the HidroQoL© can be reliably used for individual-level quality of life assessment in routine clinical practice.

Test–retest reliability was assessed by measuring the level of agreement between the baseline and first follow-up scores using intraclass correlations. Table 6 shows the results of the test–retest reliability assessment, which demonstrated strong reproducibility of the HidroQoL© scores [intraclass correlation (95% CI): overall scale, ICC = −0.43, $p < 0.001$; daily life activities, ICC = 1.21, $p < 0.001$; psychosocial impact, ICC = −1.6, $p < 0.001$]. Similar findings of strong test–retest reliability have been reported in other studies. For example, Kamudoni et al demonstrated strong reproducibility of HidroQoL© scores [intraclass correlation (95% CI): overall scale, ICC = 0.93 (0.89, 0.95), $p < 0.001$; daily life activities, ICC = 0.88 (0.83, 0.92), $p < 0.001$; psychosocial impact, ICC = 0.914 (0.87, 0.94), $p < 0.001$].[14] Moreover, findings from Gabes et al and Wades et al revealed strong test–retest reliability, with ICCs ranging from 0.89 to −0.93 and 0.93, respectively.[11,12]

EFA was used to assess the construct and structural validity of the Arabic version of the HidroQoL©. EFA was first applied in 1904 by Spearman and soon after was rapidly adopted by many researchers to evaluate theories and validate measurement instruments.[17] EFA measures the factors that clarify the structure and order of a measurement instrument.[17] The Arabic HidroQoL© scale was not previously subjected to EFA; hence, its construct validity was not established. In our study, we assessed validity using EFA, as highlighted in Tables 6 and 7. Our findings revealed positive correlations between the 18 items, with correlation strengths ranging between 0.2 and 0.6, where a correlation above 0.5 was considered strong. With respect to component analysis, Table 8 shows three domains of the questionnaire. The first domain included Items 1–4 and 6. The second domain included Items 5, 7–9, 11, 13, and 14. The third domain included Items 10, 12, and 15–18.

In contrast to the original HidroQoL© scale, which consists of two domains (daily life activities and psychosocial life), our analysis suggests the presence of three distinct domains (Table 11). The proposed domains are Domain 1 (Daily Life Impact), which focuses on how hyperhidrosis affects various daily activities, such as clothing choices, physical activities, hobbies, work, and holiday planning; Domain 2 (Emotional and Social Impact), which addresses the emotional responses and social concerns related to hyperhidrosis, including feelings of embarrassment, nervousness, and worries about others' reactions; and Domain 3 (Quality of Life and Well-being), which encompasses the broader impact on overall quality of life, including social interactions, psychological well-being, personal relationships, and concerns about

**Table 11** Suggested HidroQoL© Domains

| Domain 1 (Daily Life Impact) | Domain 2 (Emotional and Social Impact) | Domain 3 (Quality of Life and Well-being) |
|---|---|---|
| 1: My choice of clothing is affected | 5: I worry about the additional activities in dealing with my condition | 10: I feel uncomfortable physically expressing affection (eg hugging) |
| 2: My physical activities are affected | 7: I feel nervous | 12: I worry about my future health |
| 3: My hobbies are affected | 8: I feel embarrassed | 15: I avoid meeting new people |
| 4: My work is affected | 9: I feel frustrated | 16: I avoid public speaking (eg presentations) |
| 6: My holidays are affected (eg planning, and activities) | 11: I think about sweating | 17: My appearance is affected |
| | 13: I worry about people's reactions | 18: My sex life is affected |
| | 14: I worry about leaving sweat marks on things | |

**Notes**: Adapted from Kamudoni P, Mueller B, Salek MS. The development and validation of a disease-specific quality of life measure in hyperhidrosis: the Hyperhidrosis Quality of Life Index (HidroQOL©). *Qual Life Res Int J Qual Life Asp Treat Care Rehabil*. 2015;24(4):1017–1027. Creative Commons.[14]

future health and appearance. In addition, our analysis suggests that Item 5, originally in the first domain, may be better categorized in Domain 2 because it reflects the emotional and psychological burden of managing the condition.

This revised structure reveals that the psychosocial life domain is more complex than previously thought. Domain 2 specifically addresses the immediate emotional and social impacts directly linked to hyperhidrosis, whereas Domain 3 captures a wider range of social, emotional, and personal impacts. Thus, although both domains assess the condition's impact on life, Domain 2 focuses on specific concerns related to hyperhidrosis, and Domain 3 covers a broader spectrum of life impacts. By reassigning Item 5 to Domain 2, each domain maintains consistency in the types of concerns it addresses.

## Conclusion

Our findings indicate that the Arabic HidroQoL© is a valid and reliable tool that can be used to assess the quality of life of patients affected by HH and may aid in tailoring management plans. Local and regional studies of HH are warranted to better capture the prevalence of HH and address its debilitating effect for better management.

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## Disclosure

The authors report no conflicts of interest in this work.

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