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Cross-Culture Adaptation of International Physical Activity Questionnaire Short form in Urdu Version

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ABSTRACT

Translation and cross-cultural adaptation of the International Physical Activity Questionnaire Short Form (IPAQ-SF) to the Urdu language and evaluation of the validity and reliability of the translated version are the 2 objectives of the study. The IPAQ-SF English was forward-translated into Urdu, back-translated, subjected to expert panel review, and pilot-tested on 10 subjects. Face and content validity were established. The final IPAQ-SF Urdu was tested for reliability, construct, and concurrent validity (with the English version) on two groups: 30 healthy vs 50 diseased cardiac patients. Six-minute walk test and rate pressure product (RPP) were performed to assess the cardiorespiratory fitness of all participants. Pre and post-test vitals were checked. The concurrent validity of the translated version was good with Pearson correlation coefficients ranging from moderate ($r=0.78$) to high ($r = 0.92$). The construct validity indicated a significant correlation with RPP in total time spent in sitting (minutes/week) from the Urdu IPAQ-SF ($r = 0.81, p < 0.05$). The overall result of the test-retest reliability was (ICC = 0.84, CI = 95%), showing excellent reliability. IPAQ-SF Urdu has good face and content validity with significant concurrent validity and test-retest reliability for strenuous, moderate-intensity, sitting, and total physical activity per week. Moderate-intensity activity exhibited almost ideal concurrent validity but only excellent test-retest reliability.

INTRODUCTION

Physical activity plays an important role in the prevention of chronic diseases and also has various benefits, such as enhanced psychological and cognitive well-being^[1]. Since the COVID-19 pandemic, people are more and more attracted to sedentary lifestyle habits in the name of “home-based work opportunities”. Moreover, lack of motivation for exercise and excessive use of facilities (or technology) are also limiting physical activity among the majority. This subsequent lack of PA is associated with lower or diminished cardiorespiratory endurance, weak muscles, obesity, poor bone health, increased risk of cardiovascular and metabolic diseases, and a decline in cognitive function^[1-3]. Lack of exercise may also have intense consequences on the overall population’s well-being. Low levels of physical activity cause around 2,000,000 deaths every year^[4]. WHO reported that around sixty to eighty percent of people are living sedentary lifestyles, making themselves vulnerable to several health problems^[5]. Hence, it is necessary to evaluate the level of physical activity to prevent declining health statuses and the prevalence of chronic conditions like cancer, cerebrovascular accident (CVA), insulin-resistant diabetes, and heart- and blood vessel-related diseases^[4].

The importance of PA has been widely acknowledged; researchers and clinicians worked tirelessly in the late 1990s to develop a questionnaire that encompassed all major aspects of physical activity. Thus, the IPAQ long and short forms were designed with the aim of merging the indirect measures that could help in making the policies emphasizing the physical activity related to the health of an individual^[6,7]. Multiple studies from the past have recommended the IPAQ-SF because it is reliable, valid, can be filled in a shorter time, and is more feasible than the longer version^[8-11].

Physical activity questionnaire scores are typically presented in two ways: categorically and continuously. Categorically, respondents are classified into low, moderate, or high physical activity levels based on their reported activity patterns. Scores are continuously expressed as MET-minutes per week, a unit that estimates energy expenditure by multiplying the metabolic equivalent task (MET) value of an activity by its duration and frequency, providing a standardized measure of physical activity intensity and volume^[12].

This questionnaire has been widely adapted for various populations through translation and cross-cultural validation, such as Nigerian^[13], Danish^[14], Korean^[15], Lithuanian^[16], Malaysian^[10], Turkish^[17], Hindi^[18], and Gujarati^[18] etc. These adaptations

involved rigorous processes to maintain reliability and validity, enabling consistent use in international research and public health settings. Thus, the dual scoring system coupled with broad cultural adaptation enhances the questionnaire’s applicability for comparing physical activity across individuals and populations worldwide.

The IPAQ helps with producing the required PA data for determining a person’s health status and in order to make international comparisons. The global diversity among populations indicates a significant need for the translation of intercultural research tools or measures^[19]. The practitioner owns the right to use consistent and relevant measurements of cultural concepts alongside language to use intercultural clinical tools for delivering exceptional patient care^[20,21]. Therefore, this study aimed to carry out translation and cross-cultural adaptation of the IPAQ-SF questionnaire in the Urdu language and measure the reliability and validity of the translated version.

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted over a duration of 6 months, after approval from BASAR. The study was conducted at the Railway General Hospital, Rawalpindi. A non-probability convenience sampling technique was used to recruit the sample, which was 80 at the end of the study. A sample size of 60 was calculated by using Bonett’s formula^[22]. Data was collected from 50 diseased and 30 healthy participants. Participants aged 20-65 years who had chronic diseases such as cardiovascular diseases or had risk factors of coronary artery disease (CAD) and were able to speak, write, and comprehend both Urdu and English were included in the study. According to the American College of Sports Medicine (ACSM) risk stratification guidelines, patients with chronic diseases were considered at high risk, participants who had more than two risk factors of CAD were considered at mild risk, and those who had less than two risk factors were considered at low risk. Participants who were diagnosed with dementia, Parkinsonism, or any cerebrovascular problem, or were not able to read properly due to insufficient academic status, were excluded from the study.

All interested participants signed the informed consent paper. The study proceeded in 2 phases. The first phase focused on the translation of the tool under study. Two independent translators, both of whom had command of both English and Urdu, one being the Urdu professional in the language section from NUML University and the second one being a cardiopulmonary expert physiotherapist, worked on

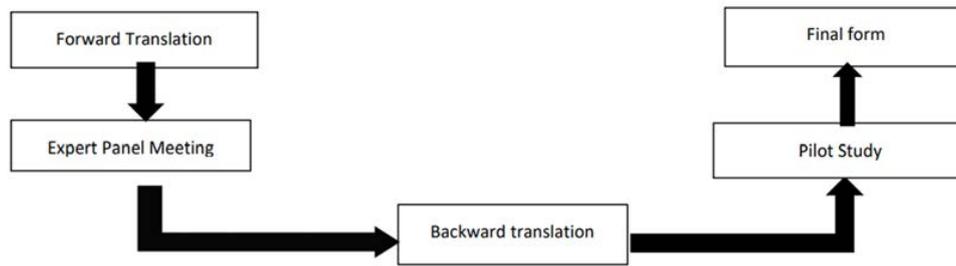


Fig. 1: Phase-1

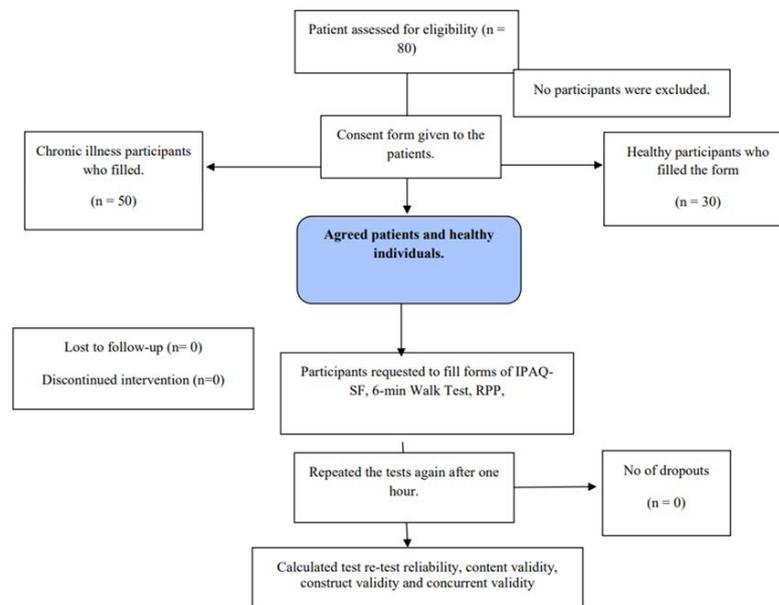


Fig. 2: Phase-2

the forward translation of the IPAQ-SF from English to Urdu and formulated IPAQ-SF (T1) and IPAQ-SF (T2).

A thorough review was done by the expert panel, which consisted of 10 experts who had at least 10 years of clinical experience, and a final IPAQ-SF Urdu version was proposed (IPAQ-SF T3). This final Urdu version was forwarded to two expert translators for backward translation while maintaining the blinding, and the translators had not seen the IPAQ-SF English version. The backwards-translated version was again re-evaluated by the experts for any inconsistencies that might have existed. A small pilot study was done on 10 healthy individuals.

The final Phase-II focused on cross-cultural adaptation and the establishment of reliability and validity of the IPAQ-SF Urdu version. Demographic data was obtained, including the weight and height of the participants as well. The participants were requested to fill out the IPAQ-SF Urdu Version, and the test was repeated after one hour. Moreover, the

six-minute walk test was performed to assess the aerobic capacity and endurance of the patient and to correlate with the PA of the past seven days. Also, pre- and post-vitals, including blood pressure, oxygen saturation (SpO2), and heart rate, were recorded.

The data was analyzed using SPSS-21 software. Pearson’s correlation coefficient “r” was used to assess validity. ICC was applied to analyze retest reliability.

RESULTS AND DISCUSSIONS

10 healthy subjects, 6 females and 4 males, with a mean age of 27.90±2.4 years, were recruited in the pilot study. The BMI was calculated from the height (cm) and weight (kg) reported in the IPAQ. The mean height in feet and weight in kilograms for the pilot study participants were 5.3 ± 0.28 and 63.5 ± 10.9, respectively. Furthermore, 80 participants were recruited in phase II, which included 50 diseased individuals (30 males and 20 females) and 30 healthy individuals (12 males and 18 females). The mean age

Table 1: IPAQ-SF Urdu Version Pilot Testing on Healthy and Diseased Populations (Concurrent Validity)

Urdu IPAQ-SF V/S English IPAQ-SF	Healthy population total (n=30) r	Disease population total (n=50) r
Total PA (MET-Minweek-1)	0.8**	0.73**
Average Physical Activity (minutes/wk.)	0.88**	0.70**
Walking Physical Activity (minute/wk.)	0.7**	0.78**

r – Pearson correlation in times consumed doing PA from the Urdu & English versions

**p-value < 0.001

Table 2: IPAQ-SF Urdu Version Pilot Testing on Healthy and Diseased Populations (Concurrent Validity)

Urdu IPAQ-SF	Construct measure	Healthy population r	Disease population r
Time spent sitting (minutes/week)	Cardiorespiratory fitness	0.81*	0.51*
Walking (minutes/week)	Cardiorespiratory fitness	0.57**	0.67*

Pearson correlation (12) in times expended doing PA from the Urdu version and cardiorespiratory endurance

* p-value < 0.05

** p-value < 0.01

Table 3: Reliability of test-retest of interclass correlation for IPAQ-SF Urdu Version pilot testing on healthy and diseased populations

Urdu IPAQ-SF	Healthy population total (n=30) ICC (95% CI)	Disease population total (n=50) ICC (95% CI)
Vigorous PA (min week 1)	0.74	0.54
Moderate PA (min week 1)	0.74	0.54

ICC: 1 time measurement of inter-class correlation coefficient

for diseased and healthy populations was 43.9±15.5 and 39.5±11.5, respectively. The mean weight for diseased and healthy populations was 70.5 ± 12.5 and 65.5 ± 13.9, respectively. The mean height for the diseased and healthy populations was 5.7 ± 0.23 and 5.4 ± 0.3, respectively.

Validity: The team of experts reviewed both the forward and back translated versions for face and content validity. Face validity was checked through a dichotomous scale of YES or NO. All the participants stated that all the questionnaire items were simple, clear, and related to the objectives. Content validity was calculated using the symbol plate and Likert scale. I-CVI was calculated for each item while considering it to be 1.0 with 3 to 5 experts and a minimum I-CVI of 0.78 for 6 to 10 experts. S-CVI was found to be 0.6.

The concurrent validity, construct validity, and reliability were tested at three levels: pilot study, healthy population, and diseased population. The translated tool was found to be concurrently valid at all three levels. For healthy individuals, Pearson's correlation was found to be concurrently valid. For the diseased population, it showed good concurrent validity.

From IPAQ-SF Urdu (r value: 0.81, p-value < 0.05) RPP was substantially related to overall time expended doing no activity. For a healthy population, an average relationship existed between time expended during moderate activity levels and doing low PA (r value: 0.57, p-value < 0.03), and no substantial relationship was found in RPP and vigorous physical activity of Urdu IPAQ-SF. Final testing was done in a diseased population, where there was also a moderate positive correlation found between time spent (minutes per week) doing moderate physical activity and little activity (r = 0.67, p < 0.03) in the Urdu version of the short form questionnaire and Rate Pressure Product, and no substantial relationship was found between RPP and vigorous physical activity in the Urdu IPAQ-SF.

Reliability: For a healthy population, reliability coefficients for vigorous and moderate activity were good. For the diseased population, reliability coefficients for vigorous and moderate activity were fair (Table 3).

This study aimed to translate the International Physical Activity Questionnaire-Short Form (IPAQ-SF) into Urdu and to evaluate its psychometric properties within the target population. The translation process was undertaken to ensure that the questionnaire is linguistically and culturally appropriate for Urdu-speaking individuals, thereby facilitating accurate assessment of physical activity in this demographic. To verify the clarity and relevance of the translated instrument, a panel of experts was convened to assess its face validity. This panel evaluated the questionnaire for its simplicity, clarity, and comprehensibility, ultimately confirming that the Urdu version was easy to understand and appropriately conveyed the intended questions and concepts. This step was critical in ensuring that respondents could accurately interpret and respond to the questionnaire items, thereby enhancing the validity and reliability of the data collected through this Urdu adaptation.

In the current research, the concurrent validity of healthy population TPA (total physical activity) from the Urdu version was evidently correlated with the original English version (r=0.8, P value < 0.05). A highly significant and positive correlation (r=0.88, p value<0.05) was found for moderate activities, while a significant weak correlation (r=0.2, p value<0.05) was found for walking. In contrast, a recent study exhibited a strong positive correlation (r=0.9) of all components except for moderate physical activity (r=0.79)^[19]. There was no misunderstanding reported in the reading and understanding of the translated questions, which led to better concurrent validity. Importantly, previous studies in other languages, such as the Hausa version, have shown high concurrent validity values (r=0.92 for total PA and r=0.78 for

vigorous PA), recognizing that language adaptations of IPAQ preserve the integrity of the original questionnaire's PA measurement in different cultures^[13].

The current study used Rate Pressure Product for measuring the construct validity. RPP was taken as a cardiac and respiratory marker of fitness and included resting blood pressure and heart rate of the participants. Measuring cardiac output (related to heart function) during submaximal exercise provides a more accurate assessment of an individual's cardiorespiratory fitness (VO₂max) compared to using resting heart rate alone. The RPP was compared with the duration of physical activity from the IPAQ-SF Urdu. Some of the previous studies have also used the RPP values in the analysis of construct validity^[13,14,22,23].

In a healthy population, RPP had a strong, significant relationship ($r=0.81$, P value < 0.05) with sitting, but a moderate association was seen with average physical activity level and walking activities. In contrast, the Hausa IPAQ-SF had shown a poor construct validity with a weak correlation between RPP and sitting time^[13]. In the current study, RPP as the index of cardiorespiratory fitness integrated resting HR and BP, unlike other studies that used submaximal HR derived from response to workload as the index of cardiorespiratory fitness^[21,24-26].

Evidence suggested a weak relationship between the RPP and TPA, thus stating that there is a weak association between TPA and cardiorespiratory functioning, strenuous movement, average movement, and walking^[25,27]. In contrast, the current study reported a weak but important correlation between the functioning of cardiorespiratory and TPA, as several measures were used to assess the cardiopulmonary functioning of the patient.

The reproducibility of the IPAQ-SF Urdu, evidenced by substantial agreement for vigorous and moderate activity (ICC = 0.74, CI = 95%) and fair agreement for walking (ICC = 0.63, CI = 95%), is similar to that of past studies (25, 27). Most reliability studies on IPAQ-SF across populations and points reported moderate or lower reliability for walking and moderate activities, but coefficients above 0.70 for test-retest reliability in vigorous activities (28). In Chile and other foreign cohorts, recent validation studies have consistently found low to moderate reliability for walking and strenuous activities and moderate reliability for sitting time (ICC ranges commonly between 0.40 and 0.74)^[29].

Overall, the IPAQ-SF Urdu showed good reliability for all the parameters with good internal consistency. Although due to the COVID-19 situation, the generalizability of the study was limited, and a multicenter study with a larger population size could not be conducted. Also, only cardiac patients were

recruited in the study, and the criterion validity of the tool could not be analyzed. Future researchers are encouraged to conduct comparison studies with a larger sample size and include other diseased groups as well.

CONCLUSION

The IPAQ-SF Urdu demonstrated consistent test-retest reliability for vigorous, moderate, and overall weekly physical activity, as well as strong concurrent validity. The average strength movement demonstrated nearly optimal concurrent validity and average test-retest reliability. However, its construct validity demonstrated a substantial correlation with the RPP, along with total sitting time (minutes per week). The overall results indicated that the reliability coefficients for vigorous and moderate activities were satisfactory, while the reliability coefficient for walking activities was moderate. Hence, the IPAQ-SF Urdu was found to be a reliable and valid tool.

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