Reliability and Validity of Gujarati Pittsburgh Sleep Quality Index: A Cross-sectional Study

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ABSTRACT

Introduction: Poor quality of sleep is a common symptom of many sleep disorders. Pittsburgh Sleep Quality Index (PSQI) is self-administered questionnaire that measures quality of sleep of an individual. It includes subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications and day time sleepiness.

Aim: To translate English PSQI into Gujarati Language and to find reliability and validity of Gujarati version of PSQI.

Materials and Methods: This cross-sectional study was conducted from August 2020 to February 2021. Permission was taken to translate original English PSQI to Gujarati language from the Mapi Research Trust. This study was carried out in four phases: 1) Cultural adaptation and translation of PSQI into Gujarati language; 2) Face and content validation by expert clinical review; 3) Cognitive interviews; 4) Test retest reliability. Forward-backward-forward method was used to translate PSQI. The consensus method was used to find face and content validity of Gujarati PSQI. The group of experts having mean experience of 10.5 years in different fields examined each item of Gujarati PSQI. Total 120 participants aged between 18-60 years were included in this study. To find reliability of Gujarati PSQI, internal consistency and test retest reliability was determined. Statistical Package for the Social Sciences (SPSS) vesrsion 24.0 was used to analyse the data. Test retest reliability was determined by Intraclass Correlation Coefficient (ICC) and internal consistency was calculated by chronbach's alpha.

Results: Gujarati version of PSQI showed excellent test retest reliability as evidenced by high ICC (ICC=0.87) and high internal consistency (α=0.93).

Conclusion: Gujarati version of the PSQI has excellent reliability and good face and content validity. It is adequate and useful for evaluation of quality of sleep in Gujarati speaking population.

INTRODUCTION

Poor quality of sleep is the most common symptom of many sleep disorders including sleep disordered breathing, obstructive sleep apnea, narcolepsy, and habitual snoring. It is a leading symptom in patients visiting sleep clinic which interfere with daily living activities [1]. Poor quality of sleep, side effects of certain medications, or any other underlying medical condition can be the reason for Excessive Daytime Sleepiness (EDS) also [2]. EDS can lead to serious consequences as risk of motor vehicle accidents is associated with daytime sleepiness [3]. Productivity of work is also impaired by poor quality of sleep [4]. Sleep disturbances are associated with cardiovascular risk in healthy adolescents [5]. Reduced duration of sleep and poor quality of sleep are associated with obesity [6]. The original English version of PSQI scale was developed by reasearchers of University of Pittsburgh in 1989. PSQI is self-administered questionnaire which evaluates quality of sleep over period of one month. It includes components like quality of sleep, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleep medicines, daytime dysfuction. PSQI global score ranges from 0-21. Score ≥5 indicates poor quality of sleep [7]. The present study is part of large research project to assess effectiveness of aerobic interval training on quality of sleep and daytime sleepiness in Gujarat and quality of sleep is one of the important outcome measure in that study. As PSQI is self-administered questionnaire, it is important to measure quality of sleep with relaible and valid questionnaire in Gujarati speaking population.

So, aim and objective of present study was to translate PSQI into Gujarati language and to find reliability and validity of Gujarati PSQI.

MATERIALS AND METHODS

Present cross-sectional study was conducted from August 2020 to February 2021. Participants were recruited from Outpatient Department (OPD) of various physiotherapy clinics in Surat region after taking ethical approval (EC/SPB/025) from Institutional Ethical Committee (IEC).

Inclusion criteria: Both male and female participants older than 18 years who were able to read, write and understand Gujarati language were included in this study.

Exclusion criteria: Participants having night work during study period, pregnant or breastfeeding participant and participants who were on steroids, hypnotics, antidepressants or antipsychotics were excluded from the study.

A total of 120 (sample size calculated on basis of 1:10 ratio with 20% drop out [8]) participants were included for this study. After taking permission to translate original PSQI into Gujarati language from Mapi Research Trust, study was conducted in four phases.

Study Procedure

Phase 1: Cultural adaptation and translation

Original English PSQI was translated into Gujarati language by two independent translators, one familiar with healthcare and its terminology and other not familiar with healthcare and its terminology. After that both the forward translated versions were combined by two initial translators and target language version 1 was given. This version was back translated by independent back translator to verify its consistency with original version and target language version 2 was formed.

Phase 2: Face and content validation

After that target language version 2 was given to team of eight clinical subject experts having mean experience of 10.5 years in the medical field and consensus method was used to find face and content validity of the tanslated version. Each item of questionnaire

was examined by experts for the content, format, wording, meaning, scoring and ease of administration. Each item was scored as either rejected, accepted or accepted with modification by each expert. After the analysis and discussion target language version 3 was formed.

For content validation, all the experts were requested to score each item of the questionnaire from 1-3 where 1 indicate "rejected", 2 indicate "accepted with modification and 3 indicate "accepted".

Content Validation Ratio (CVR) was calculated using below formula [9]:

$$CVR = \frac{\{Ne-(N/2)\}}{N/2}$$

Where,

Ne=number of expert indicating "accepted"

N=total number of expert

CVR value more than 0.62 was approved [9]

Item level Content Validation Index (I-CVI) was calculated using bleow formula [10]:

$$I\text{-}CVI = \frac{Number\ of\ experts\ offering\ rating\ 3}{Number\ of\ total\ experts}$$

Interpretation of I-CVIs [10]:

>79%-appropriate; 70-79%-needs revision; <70%- eliminated

Modified Kappa (K) for chance Agreement was calculated using below formula [9,11]:

$$K = \frac{(I\text{-}CVI)-Pc}{(1-Pc)}$$

Where,

Probability of chance agreement (Pc) was calculated using below formula

Pc={N/A (N-A)}* 0.5N

Here,

N=number of experts in a pannel

A=number of experts who agree that the item is relevant

Interpretation of the K values [12]:

>0.74: excellent; 0.60-0.74: good; 0.40-0.59: fair

Proportion of agreement was calculated using below formula [9,10]

Proportion of agreement=Number of experts who have identified questionnaire comprehensiveness favourable/Total number of experts.

Phase 3: Cognitive interviews

Cognitive interviews were conducted by independent interviewer. After taking written informed consent, target language version 3 was given to the convenient sample of n=10 (18-60 years). Interview was conducted to determine whether the translation was understood properly by the participants and whether the target language is simple and appropriate. After the analysis and discussion target language version 4 was formed which was further analysed for proof reading and final translated version was formed.

Phase 4: Reliability

Total 120 participants were recruited to find reliability of Gujarati PSQI. After taking written informed consent, final translated version of PSQI was administered to same participant for two times with the gap of one week by one administrator. ICC was calculated to find test retest reliability. Internal consistency was calculated by chronbach's alpha. ICC of <0.40 identified as a fair, 0.40-0.59 identified as a moderate, 0.60-0.79 identified as substantial, ≥0.80 identified as excellent [13]. ICC >0.70 is considered as minimum acceptable level of reliability [14].

STATISTICAL ANALYSIS

The SPSS version 24.0 was used to analyse the data. Descriptive data was presented as mean and Standard Deviation (SD). Test retest reliability was determined by ICC and internal consistency

was calculated by chronbach's alpha. Level of significance was set as p<0.05.

RESULTS

Total number participants were 120, of which 49 were males and 71 were females. Mean age, BMI and mean score of Gujarati PSQI is shown in [Table/Fig-1]. Numbers of participants having normal BMI were 12, numbers of participants who were overweight were 26, and numbers of participants with obesity were 82.

Variables	Mean±SD
Age (years)	40.88±15.58
BMI (kg/m^2)	28.8±4.78
Mean score of Gujarati PSQI	6±2.18

[Table/Fig-1]: Demographic details of participants.

Content and face validity: All the experts (n=8) accepted (A) each item of Gujarati PSQI. So, CVR values for each item of Gujarati PSQI was 1, which was more than 0.62 suggested an approval for the each item [Table/Fig-2].

Experts opinion about acceptability of items in Gujarati PSQI									Number of experts indicated "accepted" (Ne)	CVR
Items	E1	E2	E3	E4	E5	E6	E7	E8		
1	A	A	A	A	A	A	A	A	8	1
2	A	A	A	A	A	A	A	A	8	1
3	A	A	A	A	A	A	A	A	8	1
4	A	A	A	A	A	A	A	A	8	1
5	A	A	A	A	A	A	A	A	8	1
6	A	A	A	A	A	A	A	A	8	1
7	A	A	A	A	A	A	A	A	8	1
8	A	A	A	A	A	A	A	A	8	1
9	A	A	A	A	A	A	A	A	8	1
10	A	A	A	A	A	A	A	A	8	1
11	A	A	A	A	A	A	A	A	8	1
12	A	A	A	A	A	A	A	A	8	1
13	A	A	A	A	A	A	A	A	8	1
14	A	A	A	A	A	A	A	A	8	1
15	A	A	A	A	A	A	A	A	8	1
16	A	A	A	A	A	A	A	A	8	1
17	A	A	A	A	A	A	A	A	8	1
18	A	A	A	A	A	A	A	A	8	1
19	A	A	A	A	A	A	A	A	8	1

[Table/Fig-2]: Values of CVR for each item of Gujarati PSQI.
E1, E2, E3, E4, etc suggest the number of expert member; A: Accepted; CVR: Content validation ratio

The I-CVI values for each item of Gujarati PSQI were 1 suggested that each item of Gujarati PSQI was appropriate. K values for each item of Gujarati PSQI was 1. Proportion of agreement for each item of Gujarati PSQI was 1 [Table/Fig-3]. For the face validation, 10 participants were requested to judge on the understandibility and simplicity of the items during expert review procedure. According to their opinion Gujarati PSQI was simple and easy to understand. All the items of Gujarati PSQI were accepted for appropriate wording, meaning, format and ease of administration by experts during review process. The content of translated items was understandable and they were related to quality of sleep and can be used for the evaluation of the quality of sleep.

Reliability: Mean and SD of total score of Gujarati PSQI at baseline and after one week is shown in [Table/Fig-4]. The Gujarati PSQI showed excellent test retest reliability as evidenced by high ICC (ICC=0.87) (p=0.001) and high internal consistency (α=0.93).

Item No.	I-CVI	K	Interpretation	No. of experts agreed to the comprehensiveness	Proportion of agreement
1	1	1	Excellent	8	1
2	1	1	Excellent	8	1
3	1	1	Excellent	8	1
4	1	1	Excellent	8	1
5	1	1	Excellent	8	1
6	1	1	Excellent	8	1
7	1	1	Excellent	8	1
8	1	1	Excellent	8	1
9	1	1	Excellent	8	1
10	1	1	Excellent	8	1
11	1	1	Excellent	8	1
12	1	1	Excellent	8	1
13	1	1	Excellent	8	1
14	1	1	Excellent	8	1
15	1	1	Excellent	8	1
16	1	1	Excellent	8	1
17	1	1	Excellent	8	1
18	1	1	Excellent	8	1
19	1	1	Excellent	8	1

[Table/Fig-3]: Values of I-CVI, Modified kappa (K) and proportion of agreement for Items in Gujarati PSQI.
I-CVI: Item level content validity index

Mean total score of PSQI at baseline	Mean total score of PSQI after one week
6.00±2.18	5.87±2.00

[Table/Fig-4]: Comparison between Gujarati PSQI score at baseline and after one week.

Various translations of PSQI	Study	Place of study	Publication year	Internal consistency (α)	ICC	Interpretation
Gujarati	Nariya DM and Khatri S (Present study)	Surat	2021	0.93	0.87	Excellent
Hindi	Kumar A, et al., [16]	New Delhi	2021	0.77	0.97	Excellent
Chinese	Tsai PS, et al., [17]	Taipei Medical University, Taiwan	2005	0.82	0.85	Excellent
Breazillian portuguese	Bertolazi AN, et al., [18]	Hospital de Clínicas de Porto Alegre (HCPA), Brazil	2011	0.82	Not given	-
Korean	Sohn SI, et al., [19]	Keimyung University School of Medicine, South Korea	2012	0.84	0.65	-
Kurdish	Seidi PA, et al., [20]	Kermanshah University of Medical Science, Iran	2019	0.70	0.83	Excellent
Arabic	Suleiman KH, et al., [21]	United States	2010	0.65	0.82	Excellent
Persian	Moghaddam JF, et al., [22]	Kerman University of Medical Science, Iran	2012	0.77	Not given	-
Urdu	Hashmi AM, et al., [23]	Mayo Hospital, Lahore	2014	0.56	Not given	-

[Table/Fig-5]: Values of ICC and Cronbach's alpha for various translations of PSQI [16-23].
ICC: Intraclass correlation coefficient

DISCUSSION

As per this date, total more than 89 translations of PSQI are available and it is freely provided by Mapi Trust for the research purpose. The original English version has excellent reliability (α=0.85) and validity (r=0.81) [7,15]. In India validation of Hindi version of PSQI was done by Kumar A et al., found high level of internal consistency (α=0.77) and test retest reliability (r=0.97) [16]. PSQI is a self-administered scale [7]. As this study is a part of large research project to evaluate effect of aerobic interval training on quality of sleep and daytime sleepiness in Gujarat region, there was a need to make use of reliable and valid scale to evaluate quality of sleep in Gujarati speaking population. Gujarati PSQI was validated by team of experienced experts in various fields. During procedure of validation it was found that Gujarati PSQI is valid tool to measure quality of sleep in Gujarati speaking population.

Gujarati PSQI has excellent reliability as evidenced by high test retest reliability (ICC=0.87) and high internal consistancy (α=0.93). Test retest reliability and internal consistency of Gujarati PSQI was similar to other translations [Table/Fig-5] [16-23]. Content validation ratio, I-CVI, modified kappa and proportion of agreement for each item of questionnaire were not calculated in other translation studies of PSQI. In the present study, the CVR was calculated, which was more than its cut-off value (0.62) for the approval of items in the questionnaire. Authors also calculated I-CVI, modified kappa and proportion of agreement for each item of questionnaire and found acceptable values on I-CVI for each item, excellent values of K for each item and 100% agreement of each item for comprehensiveness. It is impossible to establish reliability if there is lacking of content validation for any instrument. As content validity is prerequisite for the other types of validity, higher CVR provide a good base for the measurements of other types of validity [24].

Limitation(s)

Multiple Sleep Latency Test (MSLT) and Polysomnography (PSG) are gold standard procedures to check quality of sleep but it is very costly procedures so comparison of Gujarati PSQI with MSLT and PSG was not done to check concurrent validity of Gujarati PSQI. So it can be conducted in future.

CONCLUSION(S)

Results indicated that Gujarati PSQI is reliable and valid scale to measure and evaluate quality of sleep in Gujarati speaking population. Poor quality of sleep is one of the important factors to be evaluated in many clinical conditons like obesity, hypertension, and diabetes and sleep disorders. Nowadays problem in a sleep is new challenge for the health system also. So Gujarati translation can contribute for better understanding of quality of sleep in Gujarati speaking population and thereby it can be helpful to provide better health outcomes.

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