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ORIGINAL ARTICLE

Validation of the knowledge, attitude and perceived practice of asthma instrument among community pharmacists using Rasch analysis

Waqas Akram [a,*], Maryam S.E. Hussein [a], Sohail Ahmad [a], Mohd N. Mamat [b], Nahlah E. Ismail [a]

[a] *Clinical BioPharmaceutics Research Group (CBRG), Inhalational Delivery Research Unit (IDRU) and Biomedical Analysis Lab (BAL), Faculty of Pharmacy, Universiti Teknologi MARA, Puncak Alam Campus, 42300 Bandar Puncak Alam, Selangor, Malaysia*
[b] *i-Learn Centre, Academic Affairs Division, Universiti Teknologi MARA, 40000 Shah Alam, Selangor, Malaysia*

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Abstract There is no instrument which collectively assesses the knowledge, attitude and perceived practice of asthma among community pharmacists. Therefore, this study aimed to validate the instrument which measured the knowledge, attitude and perceived practice of asthma among community pharmacists by producing empirical evidence of validity and reliability of the items using Rasch model (Bond & Fox software®) for dichotomous and polytomous data. This baseline study recruited 33 community pharmacists from Penang, Malaysia. The results showed that all PTMEA Corr were in positive values, where an item was able to distinguish between the ability of respondents. Based on the MNSQ infit and outfit range (0.60–1.40), out of 55 items, 2 items from the instrument were suggested to be removed. The findings indicated that the instrument fitted with Rasch measurement model and showed the acceptable reliability values of 0.88 and 0.83 and 0.79 for knowledge, attitude and perceived practice respectively.

1. Introduction

Bronchial asthma is regarded as a chronic inflammation of the respiratory tract (Onda et al., 2009). In asthma management, the imperative role of the community pharmacists is to educate patients about asthma medications, instruct patients about proper techniques of inhaled medications and monitor medication use (National Heart and Institute, 1995). Knowledge and attitude are essential for the community pharmacists to effectively deliver better pharmaceutical care practices to asthma patients. To date, there is no instrument which collectively

* Corresponding author. Tel.: +60 162731677; fax: +60 332584602.
E-mail address: elkudssiah77@gmail.com (N.E. Ismail).
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assesses the knowledge, attitude and perceived practice of asthma among community pharmacists. The study of the validity and reliability of the instrument is very important to maintain the accuracy of the questionnaire from defect. Rasch Measurement Model is a measurement model that is formed as a result of the consideration that takes into account the ability of the candidate or respondent who answered questionnaires, tests or instruments and the difficulty of each test item or items (Rasch, 1980). According to Wainer and Braun (2013), consistency when the same item is tested several times on the same subject at different time intervals, the score results or the answers given are approximately the same. In short, the reliability is only possible to provide consistency validity (Wainer and Braun, 2013). The purpose of this study was to determine the item reliability and validity to construct knowledge, attitude and perceived practice (KAPP) of asthma questionnaire tested among community pharmacists using Rasch Measurement Model.

2. Method

This baseline study was conducted in Penang, Malaysia. The survey was conducted by a single investigator, who systematically met with the community pharmacists and explained the objectives of the survey. Apart from the rare cases where the pharmacists responded on the spot, the investigator was often obliged to return at a time suitable for the pharmacists. If the questionnaire was not filled out on the day of the visit, the pharmacist was requested to respond in front of the investigator or to schedule another visit. If after six visits to the same pharmacy without a response, the respondent was excluded from the study. Upon signed consent, 33 community pharmacists were recruited from 1st December until 30th December 2012.

3. Instrument

3.1. Item construct

The questionnaire was adapted and self designed from several publications with approval from the corresponding authors, for knowledge (Kritikos et al., 2005; O'Laughlen et al., 2013; Salama et al., 2010; Vainio et al., 2001) for attitude (Anderson et al., 1998; Chiang et al., 2010), and for perceived practice (Kritikos et al., 2010; McDonald and Gibson, 2006; Weinberger et al., 2002) and aligned with GINA guidelines (Global Initiative for Asthma, 2011). There are four parts of the questionnaire. The first part of the questionnaire consisted of socio-demographic data, the second part of the questionnaire evaluated the knowledge (n = 25 items), the third part evaluated the attitude (n = 10 items) of community pharmacists toward the management of asthma using 5-Likert scale and the fourth part of the questionnaire evaluated the practice of the community pharmacists in the management of asthma (n = 22 items) using 5-Likert scale.

3.2. Face validity

Face validity essentially looks at whether the scale appears to be a good measure of the construct "on its face". A group of senior pharmacists in academia and community pharmacists reviewed this instrument. The questionnaire was endorsed as valid and reliable for the research among health professionals mainly pharmacists to assess the knowledge, attitude and perceived practice of asthma among community pharmacists.

3.3. Construct validity

Rasch measurement was used to pre-validate the construct of the instrument. Layout of the questionnaire was redesigned to guide the respondents to answer the questionnaire. The scale's banner was put on top of every page of the questionnaire, guiding the respondents to refer consistently, the right scale.

4. Results

Table 1 shows socio-demographic data of enrolled community pharmacists from Penang, Malaysia. The mean (±SD) age of the respondents was 31.09 (±4.63). As shown in the table, there were 12 (36.45%) male and 21 (63.62%) female respondents. On the basis of ethnicity, Chinese were more (20

Table 1 Socio-demographic data of respondents (n = 33).

Demographic parameters	Groups	N (%)
Age (years old)	21–30	16 (48.5)
		2(6.0)
	31–40	15 (45.5)
	>40	2(6.0)
Mean = 31.09 ± 4.63, Minimum = 24, Maximum = 41		
Gender	Male	12 (36.45)
	Female	21 (63.62)
Ethnicity	Malay	13 (39.44)
	Chinese	20 (60.67)
Pharmacy education level	Bachelor of Pharmacy	29 (87.92)
	Master of Pharmacy	4 (12.11)
Number of practicing year(s) at community level	1–5 years	22 (67.7)
	6–10 years	9 (27.3)
	10–15 years	2(6.1)
Mean = 4.57 ± 2.53, Minimum = 1, Maximum = 13		

Table 2 Rasch analysis of asthma knowledge among community pharmacists in Penang, Malaysia.

ITEM	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEA
Q01	1.12	0.43	0.91	0.24	0.33
Q02	1.29	0.94	1.34	0.75	0.36
Q03	.96	−0.10	1.31	1.29	0.30
Q04	.67	−1.6	0.62	−1.37	0.64
Q05	1.21	0.65	1.40	0.88	0.42
Q06	1.28	1.04	1.04	1.74	0.41
Q07	0.96	0.03	1.08	0.47	0.36
Q08	1.80	2.10	1.90	2.20	2.22
Q09	0.73	−1.87	0.61	−1.64	0.66
Q10	0.79	−1.46	0.70	−1.36	0.61
Q11	0.73	−0.87	0.65	−1.07	0.59
Q12	0.87	−0.88	0.81	−0.88	0.54
Q13	1.33	1.26	1.37	1.33	0.38
Q14	1.52	−3.56	1.67	−3.0	1.94
Q15	1.09	0.56	0.91	−0.16	0.32
Q16	1.03	0.26	0.85	−0.47	0.42
Q17	1.05	0.38	0.90	−0.37	0.43
Q18	1.00	0.14	0.97	−0.14	0.45
Q19	1.39	1.84	1.37	1.47	0.43
Q20	0.72	−1.66	0.68	−1.44	0.64
Q21	1.39	1.15	1.31	1.96	0.38
Q22	0.64	−1.65	0.65	−1.13	0.63
Q23	1.02	1.90	0.97	0.05	0.43
Q24	0.72	−0.93	0.60	−0.62	0.57
Q25	0.68	−1.19	0.61	−1.95	0.61

Table 3 Rasch analysis of attitude toward asthma among community pharmacists in Penang, Malaysia.

ITEM	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEA
Q01	1.05	0.37	1.30	0.68	0.38
Q02	1.03	0.28	1.32	1.35	0.32
Q03	0.68	−1.59	0.64	−1.65	0.65
Q04	1.31	0.98	1.02	0.37	0.32
Q05	1.08	1.90	1.39	1.24	0.38
Q06	0.55	−1.37	0.54	−1.92	0.70
Q07	1.10	1.90	0.97	0.05	0.38
Q08	0.61	−1.97	0.59	−1.95	0.68
Q09	1.37	1.75	1.30	1.47	0.34
Q10	0.95	0.29	0.99	0.39	0.35

(60.67%)) than Malays (13 (39.44%)). Majority of respondents had bachelor qualification (29 (87.92%)) in comparison with the Master degree holders (4.0 (12.11%)). The mean (±SD) number of practicing years as community pharmacists was 4.57 (±2.53).

Using the Rasch measurement model, the items of the instrument were reviewed and designed to the best reliable and valid to fit the purpose.

The reliability of the questionnaire was determined by the use of Bond and Fox Data File Setup Software® (Raosoft, 2004). The analysis of items for knowledge, attitude and perceived practice with excluded items being highlighted is shown in Tables 2–4, respectively.

5. Discussion

The reliability value of >0.8 was accepted as high value while the value of which less than 0.6 was not acceptable for reliability of items (Bond and Fox, 2001). The results showed that the instrument was good, reliable and valid with the real item reliability (Real RMSE) for knowledge, attitude and perceived practice of (r = 0.88), (r = 0.83) and (r = 0.79) respectively. Table 2–4 showed the value of PTMEA Corr of the instruments as generated by Rasch analysis. According to Rasch Measurement Model, the validity of a questionnaire can be identified by referring to the analysis of the output program. The main output to be referred to is the polarity item so as to find a correlation coefficient of measurement-point which is known as *point-measure correlation Coefficient* (PTMEA Corr). A high PTMEA Corr means that an item is able to distinguish between the ability of respondents. A negative value or zero indicates that the link for the item response or respondent is in conflict with the variable or construct (Linacre, 2006). Tables 2–4 showed that each PTMEA Corr was within the range of 0.30–0.70 (Allen and Yen, 2001). Therefore, it can be concluded that the items will contribute to the measurement

Table 4 Rasch analysis of perceived practice toward asthma among community pharmacists in Penang, Malaysia.

ITEM	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEA
Q01	0.90	−0.27	0.79	−0.45	0.36
Q02	0.59	−1.25	0.54	−1.97	0.54
Q03	0.90	−0.25	0.77	−0.58	0.33
Q04	0.81	−1.06	0.77	−1.15	0.54
Q05	1.23	0.94	1.37	1.37	0.39
Q06	0.97	0.19	1.34	1.28	0.32
Q07	0.94	−1.90	1.26	0.94	0.34
Q08	0.80	0.08	0.54	−0.32	0.34
Q09	1.32	0.85	1.06	0.36	0.35
Q10	0.90	−0.28	0.79	−1.99	0.46
Q11	0.59	−1.27	0.54	−1.15	0.54
Q12	0.90	−0.29	0.77	−0.5	0.33
Q13	0.81	−1.06	0.77	−1.17	0.54
Q14	1.23	0.93	1.37	1.38	0.39
Q15	1.30	1.36	1.24	0.93	0.35
Q16	0.97	0.18	1.34	1.24	0.42
Q17	0.94	−0.24	1.26	0.92	0.34
Q18	0.80	0.06	0.54	−3.30	0.34
Q19	0.66	−1.95	0.63	−1.84	0.55
Q20	1.37	1.73	1.33	0.82	0.43
Q21	1.32	1.58	1.19	0.93	0.47
Q22	1.34	1.36	1.35	1.94	0.41

Table 5 shows the real item reliability of the instrument as generated by Rasch measurement model.

Table 5 Summary of real item reliability.

Reliability tests	Knowledge	Attitude	Perceived practice
Real item reliability (Real RMSE)	0.88	0.83	0.79

of instrument respondents. This can discriminate or differentiate between different types of intelligence held by the respondents.

Tables 2–4 showed the appropriate item fit of instrument as generated by Rasch analysis. Rash model analysis estimates the degree of suitability of items measuring a latent variable. The construct validity of instrument is derived from the study of each item. Infit mean square value and mean square outfit of each item and respondents were calculated. According to Wright and Linacre (2002), the infit/outfit ZSTD should be within ±2 and the infit and outfit mean square of each item and the respondent must be located within 0.6–1.5 (Linacre, 2002), while Bond and Fox claimed that the mean square of two infit and outfit of each item and the respondent must be located within 0.6–1.4. If an individual item does not meet this requirement, then it will be considered for elimination. For the purpose of this research, the researcher used the total mean square infit and the outfit in the range proposed by Bond and Fox (2001).The analysis showed that the mean square infit and outfit items were 0.6–1.4 for all constructs except 2 items under knowledge domain as shown in the Table 2 (Q8 and Q14). It can be concluded that those 2 items were suggested to be removed because all of infit and outfit mean square radius were outside the stipulated range of 0.6–1.4 as proposed by Bond and Fox (2001) (see Table 5).

6. Conclusion

The instrument appears to fit the Rasch measurement model and shows the acceptable reliability values except for 2 items under asthma knowledge part. Further work is needed to determine this fit in general population of community pharmacists. High validity and reliability value of each item in a questionnaire is very imperative. There is a need to ensure the accuracy of the data collection and data entry because they contribute to the validity and reliability of the results. The questionnaire seemed to be a useful tool for research purposes to measure the knowledge, attitude and perceived pr of asthma among community pharmacist.

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