Reliability and Validity of the Spielberger State-Trait Anxiety Inventory (STAI) Among Urological Patients: A Malaysian Study

K F Quek, M.Phil*, W Y Low, PhD, A H Razack, FRCS**, C S Loh, FRCS***, C B Chua, FRCSUrol**

Health Research Development Unit, Faculty of Medicine, University of Malaya, 50603 Kuala Lumpur, **Department of Surgery, University Hospital, 50603 Kuala Lumpur, ***Urological Surgeon, Sunway Medical Centre, Petaling Jaya,

Summary

To validate the English version of the Spielberger State-Trait Anxiety Inventory (STAI) in a sample of Malaysian patients with and without urinary symptoms. Validity and reliability were studied in patients with lower urinary tract symptoms (LUTS) and patients without LUTS. Reliability was evaluated using the test-retest method and internal consistency was assessed using Cronbach's alpha. Sensitivity to change was expressed as the effect size in the pre-intervention versus post-intervention score in additional patients with LUTS who underwent transurethral resection of the prostate (TURP). Internal consistency was excellent. A high degree of internal consistency was observed for each of the 40 items with Cronbach's alpha value = 0.38 to 0.89 while the Cronbach's alpha for the total scores was 0.86. Test-retest correlation coefficients for the 40 items score were highly significant. Intraclass correlation coefficient was high (ICC=0.39 to 0.89). A high degree of sensitivity and specificity to the effects of treatment was observed. A high degree of significant level between baseline and post-treatment scores was observed across nearly half of the items in surgical group but not in the non-LUTS group (control subjects). The STAI is reliable, valid and sensitive to clinical change in a sample of Malaysian patients with and without urinary symptoms.

Key Words: Spielberger State-Trait Anxiety Inventory, Cronbach's alpha, Intraclass correlation coefficient, Internal consistency, Test-retest reliability and Validity.

Introduction

Benign prostatic hyperplasia (BPH) is a common disease, which is rarely life threatening but those who suffers has a high degree of anxiety[1]. Spielberger State-Trait Anxiety Inventory (STAI) has become a commonly used instrument in multicentre, international clinical trials to assess this psychiatric disorder. It is well known that lower urinary tract symptoms (LUTS) can be very bothersome for patients in that they interfere with their daily activities. Symptoms such as frequency of urination, nocturia, urgency of urinating, urge of urination, nocturia, urgency of urinating, urge

incontinence and dribbling can psychologically affect the patients' quality of life, which can contribute to the high level of anxiety[1,2].

The STAI consists of separate self-report scales for measuring two distinct anxiety concepts: state anxiety and trait anxiety. State anxiety is conceptualized as a transitory emotional state or condition that is characterized by subjective, consciously perceived feelings of tension and apprehension and heightened autonomic nervous system activity. Trait anxiety refers to relatively stable individual differences in anxiety

proneness that is due to differences between people in the tendency to respond to situations perceived as threatening with elevations in state anxiety intensity [3].

The state anxiety scale consists of 20 statements to indicate how the respondents feel at a particular moment in time. The trait anxiety scale consists of 20 statements that ask the respondents to describe how they generally feel [3].

Existing self-report measures of anxiety such as the STAI have been widely used in Western countries and therefore need to be validated for the local population. The STAI developed by Spielberger is a multidimensional tool that has been widely used in the study of anxiety in many countries, both in community-based studies as well as clinical studies. The 40-item STAI is easy to administer, simple, short and only requires less than 10 minutes to be filled by the respondents [3].

The present study was conducted at University Malaya Medical Centre, Kuala Lumpur and was designed to assess the reliability and validity of the Spielberger State-Trait Anxiety Inventory (STAI) in a sample of Malaysian patients with and without lower urinary tract symptoms.

Materials and Methods

The study was carried out by the Health Research Development Unit and Department of Surgery, University Malaya Medical Centre, Kuala Lumpur. All patients were recruited consecutively for a period of one year as they come and seek treatment for LUTS and renal stones. The patients were selected based on the inclusion and exclusion criteria. For patients with LUTS, the inclusion criteria were patients who were stable and literate and able to give informed consent, whereas the exclusion criteria were patients who were treated with surgical and medical treatment for lower urinary tract symptoms prior to this study. Patients who were unable to read, write or understand were excluded in the study, as were patients with any major medical history and physically disabled. For the control group of patients, the inclusion criteria included patients who were free from all major chronic and acute diseases, and those with renal stones with no or minimal severity who did not seek treatment for LUTS, while the exclusion criteria were those with urological problems which included BPH and urinary tract infections (UTI). The study protocol was approved by the Ethics Committee of University Malaya Medical Centre, Kuala Lumpur.

Study Sample

The psychometric properties of the STAI were assessed in three different samples. Validity and reliability were studied in a group of patients with LUTS (N=108), control group of patients (N=50) and a group of patients admitted for transurethral resection of the prostate (TURP) (N=79). 108 patients in the medical group were chosen for the test retest while the surgical and control groups were chosen for the sensitivity to changes (responsiveness), sensitivity and specificity and discriminant analysis in order to see the effects distribution of the anxiety changes between these three groups. Therefore, this why the medical group was selected instead of the control group for the test retest and also the earlier pilot study showed there were no significant changes in the anxiety level among the patients seeking medical treatment for LUTS. Management decisions were entirely done by the Urologist (A.H.R) in all cases based on clinical criteria such as medical history, physical and rectal examinations.

Data Collection

All patients in the surgical group (TURP), medical group and control group of patients gave their written informed consent to participate in the study after being explained of the nature of the study. Following this, the patients were required to complete the STAI. All questionnaires were self-administered, although assisted guidance was available by one of the authors (K.F.Q) of this study. 108 patients were re-tested at twelve weeks after the first administration of the STAI. To assess the sensitivity to change, patients completed the questionnaires 1-week before the surgical treatment and were re-tested three months after TURP.

Data Analysis

The internal consistency of the STAI was assessed by calculating the Cronbach's alpha coefficient [4]. Test-retest reliability was assessed using the intraclass correlation coefficient (ICC) which is derived from analysis of variance (ANOVA) model. Values of ICC vary from 1 (perfectly reliable) to 0 (totally unreliable)[5]. Mean differences in STAI scores before and after TURP were also calculated for each individual item. Sensitivity to change was analyzed by calculating the

mean difference between STAI before and after TURP and dividing it by the standard deviation of the scores before TURP (effect size index) [6].

Sensitivity of the STAI was assessed by comparing the means of pre-treatment and post-treatment item scores of patients who undergone TURP, whereas specificity was assessed by comparing the pre-treatment and post-treatment item scores in control subjects.

Results

A total of 237 respondents participated in the study. The mean age of the patients in the medical group was 63.67 (SD=8.37) years, surgical group 70.01 (SD=8.17) and control group 50.04 (SD=12.29). With respect to ethnicity, the Chinese formed the largest proportion in all three groups (medical, 66.70%; surgical 75.90% and control 58.00%), followed by Indians (28.70%, 22.80% and 42.00%) and others (4.60%, 1.30, 0%). Of the 237 respondents at baseline, 108 patients with LUTS (medical group) had the total mean STAI score of 74.11 (SD=12.53) while 79 patients undergoing TURP had the total mean STAI score of 82.43 (SD=11.55) respectively. Higher STAI scores reflect higher levels of anxiety.

A high level of homogeneity was observed for most of the individual items, state and trait sub-scales and overall anxiety scale. The internal consistency of the STAI was thus high. For the individual items, only items 1, 2 and 40 showed significant changes. Test-retest reliability which was assessed in 108 patients after 12 weeks interval showed items of the state, trait and overall anxiety scaler had an ICC of 0.86 ($p \leq 0.001$) , 0.83 ($p \leq 0.001$) and 0.86 ($p \leq 0.001$) and a Pearson's product moment correlation of 0.78 ($p < 0.01$), 0.71 ($p \leq 0.01$) and 0.76 ($p \leq 0.01$) respectively (Table I).

Sensitivity to change of the STAI was assessed in patients undergoing TURP. Table II showed pre and post scores, mean differences and effect size index for individual items, sub-scales and for global scores. The mean pre-intervention scores for the state, trait and overall anxiety were 41.11 (SD=6.91), 41.72 (SD=5.42) and 82.83 (SD=11.55) while the mean post-intervention scores were 35.61 (SD=5.65), 38.53 (SD=4.93) and 74.01 (SD=9.87) ($p \leq 0.0001$), giving an average improvement of 5.5, 3.19 and 8.82 respectively on the anxiety levels after TURP. The high effect size index and sensitivity to change indicating TURP-induced urinary symptom improvement in these patients and reduce their anxiety level. The difference in anxiety level before and after treatment contribute to the increment of the effect size index and the sensitivity of change as well.

In treatment responsiveness, the sensitivity and specificity of instrument were evaluated by comparing the change between baseline and end point scores following treatment. All individual items, state and trait sub-scales and overall anxiety scale demonstrated a high degree of sensitivity and specificity to the effects of treatment (Table III). Significant changes were observed in nearly half of the individual items in the surgical group. The lowest magnitude of change was noted in item 13. In contrast, except for item 22 ($p \leq 0.001$), none of the comparisons in the control subjects approached significance ($p \leq 0.086$ to 1.0). Significant changes were also noted in the state, trait and overall anxiety ($p \leq 0.0001$) in the TURP group but not in those of the control subjects.

Discriminant analysis showed that STAI could discriminate between the LUTS and control subjects (Table IV). Significant changes were noted in almost three quarters of the individual items. Similarly, the state, trait and overall anxiety scores exhibited significant changes. Its ability to discriminate showed that STAI is sensitive and reliable in detecting anxiety changes. A summary of all the mean scores of the state, trait and overall anxiety in all groups is shown in Table V.

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Table I: Validity and Reliability: Mean Test-Retest score, intraclass correlation coefficient and internal consistency for individual STSTI items (medical group)

STAI Items	Intraclass Correlation Coefficient (ICC)	Pearson's moment product correlation coefficient *	Internal Consistency**	Mean Test Score	SD	Mean Retest Score	SD	Mean Difference	SD	95% Confidence Interval Lower	Upper
1	0.51	0.41	0.51	1.99	0.73	1.73	0.68	0.26***	0.77	0.11	0.4
2	0.64	0.49	0.63	2.15	0.73	1.97	0.77	0.18***	0.76	0.031	0.32
3	0.62	0.38	0.63	1.21	0.49	1.34	0.7	0.13	0.68	-0.26	0.001
4	0.61	0.41	0.6	1.4	0.67	1.51	0.78	0.11	0.79	-0.26	0.04
5	0.68	0.37	0.67	2.12	0.75	1.97	0.72	0.15	0.81	-0.008	0.3
6	0.83	0.53	0.83	1.45	0.68	1.44	0.69	0.0093	0.66	-0.12	0.14
7	0.75	0.49	0.74	1.55	0.73	1.61	0.84	0.065	0.8	-0.22	0.09
8	0.66	0.63	0.66	2.21	0.71	2.22	0.79	0.0093	0.65	-0.13	0.11
9	0.71	0.5	0.71	1.6	0.74	1.66	0.82	0.056	0.78	-0.2	0.09
10	0.54	0.61	0.53	2.06	0.65	2.05	0.77	0.0093	0.63	-0.11	0.13
11	0.88	0.72	0.87	2.09	0.7	2.07	0.72	0.019	0.53	-0.082	0.12
12	0.87	0.44	0.87	1.2	0.51	1.2	0.49	0	0.53	-0.1	0.1
13	0.39	0.44	0.38	1.13	0.49	1.15	0.43	0.019	0.49	-0.11	0.07
14	0.9	0.45	0.89	1.17	0.46	1.2	0.51	0.037	0.51	-0.13	0.06
15	0.69	0.52	0.7	2.17	0.68	1.99	0.76	0.018	0.71	-0.04	0.31
16	0.67	0.62	0.67	2.31	0.83	2.09	0.8	0.21	0.71	-0.08	0.35
17	0.78	0.48	0.77	1.78	0.78	1.81	0.81	0.028	0.81	-0.18	0.13
18	0.83	0.36	0.83	1.16	0.49	1.18	0.47	0.019	0.55	-0.12	0.08
19	0.68	0.58	0.69	2.57	0.81	2.51	0.83	0.056	0.75	-0.09	0.2
20	0.63	0.49	0.65	2.35	0.66	2.23	0.78	0.12	0.73	-0.02	0.26
21	0.64	0.47	0.64	2.11	0.49	2.16	0.57	0.046	0.55	-0.15	0.06
22	0.72	0.65	0.74	2.02	0.64	2.07	0.61	0.056	0.53	-0.16	0.04
23	0.74	0.68	0.74	1.29	0.56	1.21	0.47	0.074	0.43	-0.007	0.15
24	0.78	0.49	0.78	2.12	0.79	2.17	0.79	0.046	0.8	-0.2	0.11
25	0.77	0.64	0.76	1.8	0.59	1.81	0.57	0.019	0.49	-0.11	0.07
26	0.49	0.54	0.48	2.33	0.66	2.25	0.69	0.083	0.64	-0.04	0.21
27	0.83	0.64	0.83	2.22	0.63	2.16	0.69	0.065	0.57	-0.04	0.17
28	0.72	0.58	0.73	1.65	0.54	1.69	0.59	0.046	0.52	-0.14	0.05
29	0.77	0.62	0.76	1.88	0.67	1.95	0.65	0.074	0.58	-0.18	0.03
30	0.89	0.73	0.89	2.03	0.5	2.14	0.6	0.11	0.42	-0.19	0.03
31	0.81	0.62	0.81	2.09	0.66	2.17	0.69	0.074	0.59	-0.19	0.04
32	0.81	0.48	0.81	1.61	0.65	1.64	0.62	0.028	0.65	-0.15	0.09
33	0.8	0.52	0.79	2.1	0.61	2.14	0.66	0.037	0.62	-0.16	0.08
34	0.73	0.5	0.74	2.01	0.77	2.11	0.73	0.1	0.75	-0.24	0.04
35	0.8	0.67	0.8	1.81	0.42	1.83	0.48	0.028	0.37	-0.1	0.04
36	0.74	0.59	0.73	2.1	0.56	2.11	0.65	0.0093	0.56	-0.22	0.11
37	0.65	0.72	0.66	2	0.53	2.01	0.59	0.0093	0.42	-0.09	0.07
38	0.68	0.38	0.69	1.76	0.69	1.85	0.75	0.093	0.8	-0.25	0.06
39	0.84	0.57	0.83	2.05	0.59	2.03	0.66	0.019	0.58	-0.09	0.13
40	0.63	0.53	0.63	1.51	0.62	1.67	0.72	0.16***	0.66	-0.28	0.23
State anxiety	0.86	0.78	0.87	38.5	5.88	39.18	7.32	0.68	4.56	-1.54	0.19
Trait anxiety	0.83	0.71	0.83	35.7	7.82	35.08	8.87	0.62	6.41	-0.6	1.84
Overall anxiety	0.86	0.76	0.86	74.11	12.53	74.16	15.2	0.046	9.89	-1.93	1.84

(+) p<0.001 for all ICCs (calculated from both testings)

(*) p<0.01 for all Pearson's coefficient

(**) Cronbach's alpha:note that Cronbach's alpha value given for each item represent the effect of removing that item from from the calculation of the alpha value (eg if item 1 is omitted, the resulting value for the scale is 0.51,

if item 2 is omitted, it is 0.63, and so forth)(calculated from both testings)

(***) t test for paired comparisons significant

Table II: Sensitivity to change: mean scores before and after TURP and effect size index

| STAI Items | PreTURP | | Post TURP | | | | |
	Mean	SD	Mean	SD	ean Differences	SD	Effect size index
1	2.39	0.68	1.91	0.58	0.48*	0.94	0.7
2	2.63	0.6	2.1	0.59	0.53*	0.87	0.88
3	1.34	0.55	1.15	0.43	0.19*	0.66	0.35
4	1.54	0.57	1.29	0.48	0.25*	0.72	0.44
5	2.57	0.65	2.29	0.62	0.28*	0.95	0.43
6	1.8	0.69	1.38	0.58	0.42*	0.97	0.61
7	1.89	0.78	1.48	0.66	0.4*	1.1	0.53
8	2.63	0.56	2.27	0.52	0.37*	0.75	0.66
9	1.86	0.75	1.48	0.64	0.38*	1.04	0.51
10	2.53	0.59	2.14	0.47	0.39*	0.74	0.66
11	2.62	0.74	2.29	0.62	0.33*	0.9	0.45
12	1.08	0.31	1.1	0.38	0.025	0.51	0.081
13	1.04	0.25	1.04	0.19	0	0.32	0
14	1.04	0.19	1.06	0.29	0.025	0.36	0.13
15	2.42	0.69	2.14	0.47	0.28*	0.83	0.41
16	2.57	0.61	2.18	0.5	0.39*	0.81	0.64
17	2.28	0.85	1.77	0.73	0.51*	1.06	0.6
18	1.06	0.25	1.08	0.38	0.013	0.47	0.052
19	3.02	0.73	2.97	0.68	0.051	0.95	0.07
20	2.75	0.71	2.38	0.61	0.37*	0.86	0.52
21	2.27	0.47	2.13	0.33	0.14*	0.5	0.3
22	2.05	0.35	1.97	0.39	0.076	0.55	0.22
23	1.3	0.51	1.2	0.43	0.1	0.74	0.2
24	2.32	0.65	2.15	0.62	0.17	0.95	0.26
25	2.01	0.54	1.96	0.54	0.051	0.71	0.094
26	2.37	0.58	2.21	0.47	0.15	0.75	0.26
27	2.57	0.55	2.25	0.49	0.32*	0.71	0.58
28	1.96	0.54	1.91	0.51	0.051	0.78	0.094
29	2.18	0.57	2.06	0.54	0.11	0.88	0.19
30	2.29	0.53	2.18	0.45	0.11	0.64	0.21
31	2.01	0.54	1.78	0.55	0.23*	0.78	0.43
32	1.52	0.5	1.39	0.52	0.13	0.67	0.26
33	2.49	0.55	2.21	0.52	0.28*	0.8	0.51
34	2.33	0.76	2.18	0.75	0.15	1.07	0.2
35	1.95	0.48	1.96	0.34	0.013	0.59	0.027
36	2.35	0.53	2.14	0.42	0.22*	0.67	0.42
37	2.16	0.52	2.04	0.44	0.13	0.67	0.25
38	1.71	0.64	1.56	0.53	0.15	0.89	0.23
39	2.34	0.55	2.23	0.55	0.11	0.8	0.2
40	1.51	0.6	1.37	0.53	0.14	0.78	0.23
State anxiety	41.11	6.91	35.61	5.65	5.5	6.88	0.79
Trait anxiety	41.72	5.42	38.53	4.93	3.19	5.53	0.59
Overall anxiety	82.83	11.55	74.01	9.87	8.82	11.89	0.76

Effect size index=Mean difference/SD PreTURP
* t test for paired comparisons significant

Table III: STAI domains characteristics of patients undergoing TURP and the control group: Sensitivity and Specificity

Sensitivity	N	Mean Changes	SEM	t statistics	p value
Item					
1	79	0.48	0.11	4.52	0.0001
2	79	0.53	0.098	5.4	0.0001
3	79	0.19	0.074	2.55	0.013
4	79	0.25	0.081	3.11	0.003
5	79	0.28	0.11	2.61	0.011
6	79	0.42	0.11	3.83	0.0001
7	79	0.41	0.12	3.26	0.002
8	79	0.37	0.085	4.33	0.0001
9	79	0.38	0.12	3.24	0.002
10	79	0.39	0.083	4.71	0.0001
11	79	0.33	0.1	0.24	0.002
12	79	0.025	0.057	0.445	0.658
13	79	0	0.036	0	0.5
14	79	0.025	0.04	0.63	0.531
15	79	0.28	0.093	2.98	0.004
16	79	0.39	0.091	4.32	0.0001
17	79	0.51	0.12	4.24	0.0001
18	79	0.013	0.052	0.241	0.81
19	79	0.051	0.11	0.476	0.636
20	79	0.37	0.097	3.77	0.0001
21	79	0.14	0.056	2.48	0.015
22	79	0.076	0.062	1.23	0.223
23	79	0.1	0.084	1.21	0.23
24	79	0.17	0.11	1.53	0.129
25	79	0.051	0.08	0.63	0.531
26	79	0.15	0.085	1.79	0.077
27	79	0.32	0.079	3.97	0.0001
28	79	0.051	0.088	0.575	0.567
29	79	0.11	0.099	1.15	0.252
30	79	0.11	0.072	1.58	0.118
31	79	0.23	0.088	2.58	0.012
32	79	0.13	0.075	1.69	0.096
33	79	0.28	0.09	3.09	0.003
34	79	0.15	0.12	1.26	0.213
35	79	0.013	0.066	0.19	0.849
36	79	0.22	0.076	2.84	0.006
37	79	0.13	0.075	1.69	0.096
38	79	0.15	0.1	1.51	0.135
39	79	0.11	0.09	1.26	0.21
40	79	0.14	0.088	1.59	0.117
State anxiety	79	5.5	0.77	7.12	0.0001
Trait anxiety	79	3.19	0.62	5.13	0.0001
Overall anxiety	79	8.82	1.34	6.6	0.0001

Specificity Item	N	Mean Changes	SEM	t statistics	p value
1	50	0.1	0.11	0.927	0.358
2	50	0.02	0.092	0.216	0.83
3	50	0.1	0.082	1.22	0.229
4	50	0.04	0.099	0.405	0.687
5	50	0.06	0.1	0.596	0.554
6	50	0.12	0.084	1.43	0.159
7	50	0.06	0.096	0.622	0.537
8	50	0.04	0.09	0.444	0.659
9	50	0.12	0.12	1.03	0.308
10	50	0.04	0.11	0.35	0.728
11	50	0	0.07	0	0.5
12	50	0.02	0.06	0.33	0.743
13	50	0.04	0.064	0.629	0.533
14	50	0.02	0.053	0.375	0.709
15	50	0.2	0.11	1.75	0.086
16	50	0.06	0.1	0.573	0.569
17	50	0.04	0.1	0.389	0.699
18	50	0.1	0.065	1.53	0.133
19	50	0.14	0.11	1.26	0.212
20	50	0.16	0.092	1.74	0.088
21	50	0.06	0.066	0.903	0.371
22	50	0.18	0.079	2.27	0.028
23	50	0.04	0.057	0.704	0.485
24	50	0.12	0.097	1.23	0.224
25	50	0.06	0.072	0.829	0.411
26	50	0.04	0.09	0.444	0.659
27	50	0.06	0.066	0.903	0.371
28	50	0.12	0.084	1.43	0.159
29	50	0	0.076	0	0.5
30	50	0	0.049	0	0.5
31	50	0	0.076	0	0.5
32	50	0	0.057	0	0.5
33	50	0.02	0.078	0.256	0.799
34	50	0.14	0.086	1.632	0.109
35	50	0.04	0.057	0.704	0.485
36	50	0.1	0.059	1.7	0.096
37	50	0.1	0.065	1.53	0.133
38	50	0.14	0.09	1.55	0.128
39	50	0	0.057	0	0.5
40	50	0.06	0.092	0.651	0.518
State anxiety	50	0.44	1.02	0.433	0.667
Trait anxiety	50	0.32	0.7	0.455	0.651
Overall anxiety	50	0.28	1.57	0.178	0.86

Table IV: STAI domain characteristics: Discriminant validity

Item	Pre TURP patients		Control		Mean difference	SEM	95% Confidence Interval		p value
	Mean	SEM	Mean	SEM			Lower	Higher	
1	2.39	0.077	1.86	0.099	0.53	0.12	-0.28	0.78	0.0001
2	2.63	0.068	2.04	0.09	0.59	0.11	-0.37	0.81	0.0001
3	1.34	0.062	1.26	0.094	0.082	0.11	-0.13	0.3	0.45
4	1.54	0.064	1.38	0.09	0.16	0.11	-0.049	0.38	0.13
5	2.57	0.074	2.04	0.099	0.53	0.12	-0.29	0.77	0.0001
6	1.8	0.077	1.62	0.12	0.18	0.14	-0.1	0.46	0.21
7	1.89	0.088	1.64	0.11	0.25	0.14	-0.037	0.53	0.09
8	2.63	0.063	2.2	0.086	0.43	0.1	-0.23	0.64	0.0001
9	1.86	0.084	1.72	0.13	0.14	0.14	-0.15	0.43	0.33
10	2.53	0.067	2.22	0.096	0.31	0.11	-0.087	0.54	0.01
11	2.62	0.083	2.16	0.096	0.46	0.13	-0.2	0.72	0.001
12	1.08	0.035	1.28	0.086	0.2	0.093	-0.39	0.019	0.05
13	1.04	0.028	1.08	0.039	0.042	0.047	-0.13	0.051	0.37
14	1.04	0.022	1.2	0.081	0.16	0.084	-0.33	0.0056	0.05
15	2.42	0.078	2.08	0.12	0.34	0.13	-0.07	0.6	0.05
16	2.57	0.069	2.3	0.1	0.27	0.12	-0.032	0.51	0.05
17	2.28	0.095	1.98	0.12	0.3	0.15	-0.0073	0.6	0.05
18	1.06	0.028	1.3	0.096	0.24	0.1	-0.44	0.037	0.05
19	3.02	0.082	2.76	0.11	0.26	0.13	-0.0022	0.53	0.05
20	2.75	0.079	2.42	0.081	0.33	0.12	-0.091	0.56	0.01
21	2.27	0.053	2.1	0.059	0.17	0.079	-0.0086	0.32	0.05
22	2.05	0.04	2.32	0.083	0.27	0.092	-0.45	0.086	0.005
23	1.3	0.058	1.28	0.064	0.024	0.089	-0.15	0.2	0.79
24	2.32	0.073	2.28	0.12	0.036	0.14	-0.25	0.32	0.8
25	2.01	0.061	1.74	0.08	0.27	0.1	-0.073	0.47	0.01
26	2.37	0.065	2.24	0.079	0.13	0.1	-0.077	0.33	0.22
27	2.57	0.062	2.1	0.087	0.47	0.1	-0.26	0.67	0.0001
28	1.96	0.061	1.64	0.094	0.32	0.11	-0.1	0.54	0.005
29	2.18	0.064	1.88	0.089	0.3	0.11	-0.085	0.51	0.01
30	2.29	0.06	2.06	0.078	0.23	0.098	-0.036	0.43	0.05
31	2.01	0.061	2.38	0.098	0.37	0.11	-0.6	0.14	0.005
32	1.52	0.057	1.48	0.071	0.039	0.091	-0.14	0.22	0.67
33	2.49	0.062	2.24	0.088	0.25	0.1	-0.046	0.46	0.05
34	2.33	0.086	1.76	0.093	0.57	0.13	-0.31	0.83	0.0001
35	1.95	0.054	1.84	0.077	0.11	0.094	-0.078	0.3	0.25
36	2.35	0.06	2.2	0.07	0.15	0.092	-0.028	0.34	0.096
37	2.16	0.058	1.9	0.065	0.26	0.09	-0.087	0.44	0.005
38	1.71	0.072	1.64	0.085	0.069	0.11	-0.15	0.29	0.54
39	2.34	0.062	1.98	0.078	0.36	0.1	-0.16	0.56	0.0001
40	1.51	0.067	1.4	0.09	0.11	0.11	-0.11	0.33	0.34
State anxiety	41.11	0.78	36.76	0.97	4.35	1.25	-1.88	6.82	0.001
Trait anxiety	41.72	0.61	38.28	0.95	3.44	1.08	-1.19	5.57	0.005
Overall anxiety	82.83	1.3	75.24	1.75	7.59	2.14	-3.35	11.84	0.001

Table V: Means scores of the state, trait and overall anxiety in all the groups

Groups	Anxiety	Before treatment	After treatment
Medical	S-Anxiety	38.5	39.18
	T-Anxiety	35.7	35.08
	Overall anxiety	74.11	74.16
Surgical	S-Anxiety	41.11	35.61
	T-Anxiety	41.72	38.53
	Overall anxiety	82.83	74.01
Control	S-Anxiety	36.76	36.32
	T-Anxiety	38.28	38.6
	Overall anxiety	75.24	74.96

Discussion

The STAI has proved to be valid and reliable in a sample of Malaysian patients with LUTS. It also has the ability to discriminate between patients with LUTS and those without LUTS. The reasonably large effect size index obtained when the questionnaire was administered before and after an intervention of known efficacy (TURP) indicated a high degree of sensitivity to change.

The reliability of the STAI was evidenced by the stability of the state, trait and overall anxiety levels and the scores of almost all the individual items measured at baseline and three months later.

Before treatment, in the medical group, it was noted that the state anxiety was higher than the trait anxiety. In contrast, the trait anxiety was higher than the state anxiety in the surgical group. This was probably because in the surgical group, most of the patients had been suffering from LUTS for quite sometime and the trait anxiety was therefore elevated whereas in the medical group, most of patients had just experienced the LUTS and thus had higher levels of state anxiety.

In general, it would be expected that those who are high in trait anxiety would have an elevation of state anxiety more frequently than low-trait anxiety individuals because they tend to react to a wider range of situations viewed as dangerous or threatening. High trait anxiety persons are also more likely to respond with increased state anxiety to situations that involve interpersonal relationships which pose some threat to self-esteem.

The anxiety level in the surgical group was noted to be high before surgery but it subsequently decreased following TURP, whereas the medical group did not show significant changes in anxiety levels before and after treatment. Therefore, the surgery improved the LUTS which subsequently alleviated the anxiety level in the patients.

Although the sensitivity and specificity in this study showed significant and non-significant results respective, nevertheless, the sensitivity and specificity also depends on the sample size. In other words, a significant results may not necessary implies good sensitivity likewise with the non-significant may not necessary implies good specificity. However, in this study based on the clinical changes of the anxiety level of the subjects, it has proven that the STAI are sensitive and able to detect clinical changes in the subjects.

These findings provide substantial assurance that scores obtained using the STAI is reliable. The STAI scores obtained from a sample of Malaysian population in the present study were similar with those obtained in the United States[3]. Although the scores of certain STAI items (viz items 1,2 and 40) changed significantly over the 12-week interval, this is not surprising because after 12 weeks, the urinary symptoms and accompanying anxiety would have improved or worsen. On the other hand, minimal changes of urinary symptoms and anxiety might occur if the retest was done one week, two weeks or one month after the initial assessment. The reason that the retest was done after 12 weeks was because most of the patients in the surgical group (TURP) would only achieve maximum recovery or total

withdrawal of symptoms at 8 weeks to 12 weeks and it would therefore be easier to make a comparison between patients with LUTS on medical treatment, control group patients and patients who undergo TURP during this time frame.

Discriminant analysis showed that most of the mean differences for all the items between the surgical and control group were in the range of lower and higher value of 95% Confidence Interval. The high anxiety level in the surgical group and the low anxiety level in the control group contributed to a higher discrimination between both groups. The STAI's ability to discriminate between LUTS in the surgical and the control subjects proved that STAI is suitable for assessing the anxiety changes in patients with LUTS.

Conclusion

The reliability and validity of the STAI for 237 patients were assessed. It showed relatively high degree of reliability and validity, responsiveness. Comparatively, based on the clinical diagnosis assessment, it was found that the changes of the anxiety level are parallel to the clinical changes of anxiety in terms of sensitivity and specificity assessed using the STAI. Therefore, this study found that the STAI is sensitive, useful, reliable, suitable and accurate tool for assessing the anxiety changes in patients with urinary symptoms.

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