ORIGINAL ARTICLE

The Malay Posttraumatic Stress Disorder Checklist for DSM-5 (MPCLC-5) as Screening Tool for PTSD: Determination of Cut-off Point Against Clinician Administered PTSD Scale for DSM-5 (CAPS-5)

Muhammad Najib Mohamad Alwi[1] and Rafidah Bahari[2]

[1] International Medical School, Management and Science University, University Drive, Off Persiaran Olahraga, Section 13, 40100 Shah Alam, Selangor Darul Ehsan, Malaysia.
[2] Faculty of Medicine, University of Cyberjaya, Persiaran Bestari, Cyber 11, 63000 Cyberjaya, Selangor Darul Ehsan, Malaysia.

ABSTRACT

Introduction: Posttraumatic stress disorder (PTSD) is a mental health condition which develops following exposure to life-threatening events. This cross-sectional study was conducted among adult patients from all walks of life who had injuries related to motor vehicle accidents to determine the cut-off point of the Malay Posttraumatic Stress Disorder Checklist For DSM-5 (MPCLC-5) for its use as a screening tool for PTSD in the Malaysian population. **Methods:** Using convenient sampling method, 204 subjects who fulfilled the inclusion criteria were recruited and they were given the 17 item self-rated MPCLC-5 to fill up. Subsequently, trained personnel administered the gold standard Clinician Administered PTSD Scale for DSM 5 (CAPS-5). ROC curve analysis was done to determine appropriate cut-off point for the MPCLC-5. **Results:** Cut off point of 42/43 would yield the most preferable sensitivity and specificity for MPCLC-5 when compared to CAPS-5 (Sensitivity: 67.56% (95%CI 55.68% to 78.00%); Specificity : 80% (95% CI 72.08% to 86.50%)). **Conclusion:** The easy to administer MPCLC-5 is suitable for screening of PTSD among local patients with a proposed cut off point of 42/43.

Keywords: Post-traumatic stress disorder, Cut-off point, MPCLC

Corresponding Author:
Muhammad Najib bin Mohamad Alwi, PhD
Email: muhd_najib@msu.edu.my
Tel: +6012-9897475

INTRODUCTION

Posttraumatic stress disorder or PTSD is a mental health condition which develops following exposure to life-threatening events. The diagnosis first appeared in the Diagnostic and Statistical Manual of Mental Disorders 3rd Edition (DSM III) in the 1980s (1). The condition affects people of all ages. Prevalence of PTSD varies largely across the globe, ranging from 0.4% in China, 1.9% in Europe, 6.8 % in the United States of America and 8.8% in high-conflict Northern Ireland (2–5). Generally, following exposure to traumatic events, most people will experience posttraumatic symptoms which resolves spontaneously with time (6). However, if symptoms do not remit after six months, patients will more likely suffer from chronic PTSD (7).

Without treatment, the condition may not only persist, but may even develop into other health conditions (8). Fortunately, the condition is treatable. There are plenty of evidences that exposure-based interventions such as Trauma Focussed Cognitive Behaviour Therapy (TF CBT), Eye Movement Desensitisation and Reprocessing (EMDR) and Prolonged Exposure are effective for PTSD (9,10). Nevertheless, the best treatment is nothing if the condition is not diagnosed first.

Over the years, there had been revisions to the diagnostic manual. In the most recent revision, the 5th Edition of the DSM (DSM-5), PTSD now falls under a new category, "Trauma-and-Stressor-Related Disorders" (11). According to the new revision, PTSD now has four symptom clusters instead of three, and three new symptoms were also added. With these recent changes, new diagnostic instruments were created to comply to DSM-5. The gold-standard tool to diagnose PTSD is the Clinician Administered PTSD Scale for DSM-5 (CAPS-5) (12). It is a 30-item standardised interview that can be

used for making a diagnosis of PTSD as well as assessing changes in symptoms of PTSD over time. However, since CAPS-5 requires time and trained personnel to administer to tool, its usefulness is thus limited.

Hence, there is a need for a brief screening tool for PTSD, one that can be used in busy setting such as the emergency department and can be rated by patients themselves. An example include the PTSD Checklist for DSM-5 (PCL-5) which has been demonstrated to be a psychometrically valid instrument (13).

The Malay version of the PCL-5, the MPCL-5 has also shown to be valid and reliable, with Cronbach's Alpha of .89 and inter-rater reliability, r = .81 (14). However, there has not been a recommendation yet as to the cut-off scores for PTSD using the MPCL-5, and how good it is in comparison to the gold standard, the CAPS-5. Hence, the objective of this paper is to identify optimal cut-off score for the PCL-5 in relation to the gold standard Clinician-Administered PTSD Scale for DSM-5 (CAPS-5) among traumatically injured individuals who attended Orthopaedic Ward and Outpatient Departments of a hospital in Selangor, Malaysia.

MATERIALS AND METHODS

This cross-sectional study was conducted from March 2017 to February 2018. Prior to its commencement, ethical approval was obtained from the Medical Research Ethics Committee (MREC), Ministry of Health, Malaysia.

Study Sample
The study was conducted in a large government general hospital located just outside Kuala Lumpur. Patients of all ages, all ethnicities and from all walks of life attend this hospital. Subjects were recruited from those attending out-patient clinic and admitted as in-patient to the Orthopaedics Department of the hospital. Only those above the age of 18, attended the hospital due to injuries related to motor vehicle accidents (MVA) and only Malaysian citizens were included in the study. Those who suffered significant head injury from the MVA, had major cognitive impairment and those not able to understand the Malay language were excluded from the study.

Subjects who fulfilled the inclusion and exclusion criteria from the in-patient and out-patient registration lists were identified. They were approached for consent to take part in the study. In order to recruit subjects, convenience sampling method was used. According to Nunally (15), the sample size in a validation study is calculated as the product of the number of items in the questionnaire multiplied by five to ten. The MPCLC-5 is a self-report 17-item tool. According to this method, the least number of subjects for this study is 85, and the most is 170. According to Arafat (16) 100-250 subjects

is generally appropriate for a validation study, hence we targeted 200 as the sample size for this study.

Study Instrument
As mentioned earlier, the MPCLC-5 is a validated self-report questionnaire consisting of 17 items which is in compliance with the newly revised DSM-5. Its use include screening and diagnosis for PTSD and to monitor treatment response (13).

Since the current gold standard for diagnosing PTSD is CAPS-5 (12), we used CAPS-5 to determine the cut-off point for the MPCL-5. In order to ensure valid diagnosis with CAPS-5, the interviewer completed an online training module for administrators provided by the Center for Traumatic Stress of the United States of America Veteran Affairs Department.

RESULTS

204 subjects were included in the study. The median time of interview since the MVA was 6 weeks. Majority of the participants were married Malay males, working in technical to professional occupations and has had at least secondary level education (Table I).

Table I : Subjects' demographical information.

	n (%)	Median (SD)
Age		27 (9.7)
Gender		
Male	175 (85.8)	
Female	29 (14.2)	
Race		
Malay	167 (81.9)	
Chinese	6 (2.9)	
Indian	28 (13.7)	
Others	3 (1.5)	
Marital Status		
Married	86 (42.2)	
Single	115 (56.4)	
Others	3 (1.5)	
Occupation		
Professionals and Managerial	52 (25.5)	
Technical and Skilled occupations	82 (40.2)	
Unskilled occupations	16 (7.8)	
Student	27 (13.2)	
Unemployed	27 (13.2)	
Education		
Tertiary	74 (36.2)	
Secondary	113 (55.4)	
Others	17 (8.3)	

SD: Standard deviation

The prevalence of PTSD – diagnosed cases of PTSD – as measured by CAPS-5 in the subjects was 36.27% (95%CI 29.68% to 43.28%). The MPCLC-5 and CAPS-5 were comparable in our sample with Cronbach's alpha of 0.80 (95% CI 0.75 to 0.86).

Determination of Cut off point for MPCLC-5

To determine the best cut-off point for MPCLC-5, a Receiver Operating Characteristic (ROC) curve was mapped by plotting sensitivity versus 1-specificity for various cut-off points from the MPCLC-5 total score results when compared to CAPS-5 diagnosis of PTSD (a case is defined as a score of ≥ 2 or more on Criteria B, C, D and having Criterion E as case). (Figure 1).
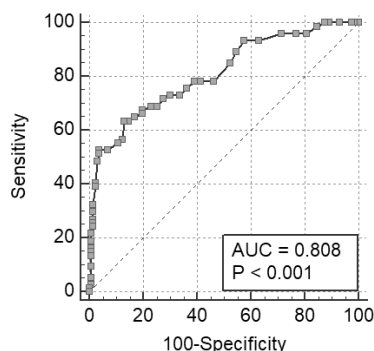

Figure 1 : ROC curve for the PCL-5 compared to the CAPS-5 PTSD diagnosis, among study sample (n = 204).

Figure 1 presents the ROC curve for the total sample (AUC = 0.808 (95% CI 0.748 to 0.860), SE= 0.00324, Significance level P (Area=0.5)<0.0001), which is reasonably robust.

In order to determine favourable cut-off point for the MPCLC-5, a few test characteristics of the test are calculated. Sensitivity ($\frac{True\ Positive}{(True\ Positive+False\ Negative)}$) and specificity ($\frac{True\ Negative}{(True\ Negative+False\ Positive)}$) gives the most consistent characteristic of the test, independent of disease prevalence. Positive predictive value ($\frac{True\ Positive}{(True\ Positive+False\ Positive)}$) (PPV) and negative predictive value ($\frac{True\ Negative}{(True\ Negative+False\ Negative)}$) (NPV) are best thought of as the clinical relevance of the test because they use the prevalence of a condition to determine the likelihood of a test diagnosing that specific disease. Hence, PPV and NPV would give a clearer indication of the usefulness of the test, in this case to determine a case of PTSD, given the prevalence.

Nevertheless, a main limitation of PPV and NPV is that these measures are not invariant characteristics of the tests because of the dependence on the prevalence of the disease in the population tested [17]. A solution to this problem is to use Likelihood Ratios (LR) which is independent of prevalence. LR shows how much more likely someone is to get a positive test if he/she has the disease, compared with a person without disease. Positive LR ($\frac{Sensitivity}{(1-\ Specificity)}$) is usually a number greater than one and the negative LR ($\frac{1-\ Sensitivity}{(Specificity)}$) usually is smaller than one.

Using the cut-off point of 33 (32 = non-case / 33 and above = case) as recommended by Bovin et al. [18], the sensitivity and specificity for MPCLC-5 were 85.14% (95%CI 74.96% to 92.34%) and 47.69% (95%CI 38.86% to 56.63%) respectively (Table II). It also gave positive predictive value (PPV) and negative predictive value (NPV) of 48.09% (95%CI 43.39% to 52.83%) and 84.93% (95%CI 76.04% to 90.92%) respectively. The same cut-off point also gave positive likelihood ratio (PLR) and negative likelihood ratio (NLR) of 1.63 (95%CI 1.35 to 1.97) and 0.31 (95%CI 0.18 to 0.55) respectively.

However, based on the ROC curve, the cut-off point of 43 (42 non-case/43 and above case) gave the most optimum test characteristics (sensitivity: 67.56% (95%CI 55.68% to 78.00%); specificity: 80% (95%CI 72.08% to 86.50%)) respectively. The same cut-off point also gave a reasonable predictive values (positive predictive value (PPV) : 65.79% (95%CI 56.85% to 73.74%); negative predictive value (NPV) : 81.25% (95%CI 75.52% to 85.89%)). Furthermore, the cut-off point of 43 also brings about the most favourable likelihood ratios compared to other cut-off points (Positive Likelihood Ratio: 3.38 (95%CI 2.31 to 4.93); Negative Likelihood Ratio : 0.41 (95%CI 0.29 to 0.57)).

DISCUSSION

Cut-off points or scores are selected points on the score scale of a test. The points are used to determine whether a particular test score is appropriate for the purported intention of the test or instrument. There are several ways to calculate cut-off points depending on the purpose of the study. In clinical trials, it is most appropriate to determine a clinical cut-off score which represents the boundary between "normal" and the "clinical range" on an outcome measure [21]. In the context of determining the prevalence or case detection of a disease however, this method is probably less appropriate.

Hence, in this study, we chose ROC curve method to determine cut-off point, where the optimum cut-off point is where the match between sensitivity – the ability to accurately detect cases and specificity – the ability to also detect non cases would the highest possible. The recommended cut-off point for the MPCLC-5 is 43 which coincidentally corresponds to about 63% total score of the scale (maximum score = 68).

This cut-off point is comparably higher than that recommended by Bovin et al. [18] and Geier et al. [19] of 33 and 31, respectively for the original English version (PCL-5). Furthermore, this cut-off point appears to be very high when compared to that recommended by Ibrahim H et al. [20] for displaced Kurdish and Arab population (cut-off point = 23).

The obvious difference between ours and the previous study is the language and cultural variation. Perhaps Malaysian trauma patients were more prone to over-rate

Table II : MPCLC-5 cut scores and corresponding diagnostic estimates for determining PTSD diagnosis, among study sample (n = 204).

Cut-off Point	Sensitivity	Specificity	+LR	-LR	+PV	-PV	Efficacy
19/20	100	0	1	-	36.3	-	0.36
20/21	100	1.54	1.02	0	36.6	100	0.36
22/23	100	6.92	1.07	0	37.9	100	0.41
24/25	100	12.31	1.14	0	39.4	100	0.44
25/26	98.65	15.38	1.17	0.09	39.9	95.2	0.46
26/27	95.95	19.23	1.19	0.21	40.3	89.3	0.47
27/28	95.95	23.08	1.25	0.18	41.5	90.9	0.50
28/29	95.95	28.46	1.34	0.14	43.3	92.5	0.53
29/30	93.24	36.92	1.48	0.18	45.7	90.6	0.57
31/32	89.19	45.38	1.63	0.24	48.2	88.1	0.61
32/33	85.14	47.69	1.63	0.31	48.1	84.9	0.61
33/34	78.38	53.85	1.7	0.4	49.1	81.4	0.63
34/35	78.38	58.46	1.89	0.37	51.8	82.6	0.66
36/37	75.68	63.85	2.09	0.38	54.4	82.2	0.68
37/38	72.97	66.15	2.16	0.41	55.1	81.1	0.69
38/39	72.97	70	2.43	0.39	58.1	82	0.71
39/40	71.62	72.31	2.59	0.39	59.5	81.7	0.72
40/41	68.92	74.62	2.71	0.42	60.7	80.8	0.73
41/42	68.92	76.92	2.99	0.4	63	81.3	0.74
42/43	67.57	80	3.38	0.41	65.8	81.3	0.75
43/44	66.22	80	3.31	0.42	65.3	80.6	0.75
44/45	64.86	83.08	3.83	0.42	68.6	80.6	0.76
45/46	63.51	85.38	4.35	0.43	71.2	80.4	0.77
46/47	63.51	86.92	4.86	0.42	73.4	80.7	0.78
49/50	52.7	93.08	7.61	0.51	81.2	77.6	0.78
50/51	52.7	96.15	13.7	0.49	88.6	78.1	0.80
52/53	51.35	96.15	13.35	0.51	88.4	77.6	0.80
53/54	48.65	96.92	15.81	0.53	90	76.8	0.79
54/55	40.54	97.69	17.57	0.61	90.9	74.3	0.77
55/56	39.19	97.69	16.98	0.62	90.6	73.8	0.76
56/57	32.43	98.46	21.08	0.69	92.3	71.9	0.75
57/58	29.73	98.46	19.32	0.71	91.7	71.1	0.74
58/59	27.03	98.46	17.57	0.74	90.9	70.3	0.73
59/60	25.68	98.46	16.69	0.75	90.5	69.9	0.72
63/64	18.92	99.23	24.59	0.82	93.3	68.3	0.70
64/65	16.22	99.23	21.08	0.84	92.3	67.5	0.69
65/66	14.86	99.23	19.32	0.86	91.7	67.2	0.69
66/67	13.51	99.23	17.57	0.87	90.9	66.8	0.68
68/69	9.46	99.23	12.3	0.91	87.5	65.8	0.67
69/70	5.41	99.23	7.03	0.95	80	64.8	0.65
71/72	2.7	99.23	3.51	0.98	66.7	64.2	0.65
72/73	1.35	100	-	0.99	100	64	0.64
73/74	0	100	-	1	-	63.7	0.64

PPV : Positive Predictive Value; NPV : Negative Predictive Value;
PLR : Positive Likelihood Ratio; NLR : Negative Likelihood Ratio

the severity of their symptoms due to subtle semantic differences in wording that occurred in the translations, hence the higher scores on this self-rated questionnaire. The extremely higher cut-off point when compared to the study by Ibrahim H et al. on the other hand, could be caused by inaccuracy of diagnosis because they used clinician's diagnosis as the gold-standard (20).

Nevertheless, the proposed cut-off point of 43 is probably relevant only for post motor vehicle trauma patients. What will be required in future studies would be proposed cut-off points of MPCLC-5 for diagnosis of PTSD in other traumatic conditions that might lead to PTSD.

CONCLUSION

Cut off point of 42/43 would yield the most preferable sensitivity and specificity for MPCLC-5 to diagnose PTSD especially for Malaysian post motor-vehicle accidents (MVA) patients.

ACKNOWLEDGEMENT

REFERENCES

1. Wright J, Robinson B. Post-traumatic stress disorder. InnovAiT RCGP J Assoc Train. 2013 Sep;6(9):586–91.
2. Lee S, Tsang A, Zhang MY, Huang YQ, He YL, Liu ZR, et al. Lifetime prevalence and inter-cohort Variation in DSM-IV disorders in Metropolitan China. Psychol Med. 2007;37(1):61–71.
3. Hauffa R, Rief W, BrΔhler E, Martin A, Mewes R, Glaesmer H. Lifetime traumatic experiences and posttraumatic stress disorder in the German population: Results of a representative population survey. J Nerv Ment Dis. 2011 Dec;199(12):934–9.
4. Atwoli L, Stein D, Koenen KC, McLaughlin KA. Epidemiology of posttraumatic stress disorder: prevalence, correlates and consequences. Curr Opin Psychiatry. 2015;28(4):307–11.
5. Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Arch Gen Psychiatry. 2005 Jun;62(6):593–602.
6. Neria Y, Nandi A, Galea S. Post-traumatic stress disorder following disasters: A systematic review. Psychol Med. 2008;38(4):467–80.
7. Hepp U, Moergeli H, Buchi S, Bruchhaus-Steinert H, Kraemer B, Sensky T, et al. Post-traumatic stress disorder in serious accidental injury: 3-year follow-up study. Br J Psychiatry. 2008 May;192(5):376–83.
8. Pietrzak RH, Goldstein RB, Southwick SM, Grant BF. Medical comorbidity of full and partial posttraumatic stress disorder in United States adults: Results from Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions. Psychosom Med. 2011;73(8):697–707.

9. Australian Centre for Posttraumatic Mental Health. Australian Guidelines for the Treatment of Adults with Acute Stress Disorder and Posttraumatic Stress Disorder. 2007. 1–192 p.

10. National Institute for Health and Care Excellence. Post-traumatic stress disorder (PTSD): The management of PTSD in adults and children in primary and secondary care. Clinical guideline 26. 2005.

11. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders 5th edtion (DSM 5). Fifth Edit. American Psychiatric Publishing. American Psychiatric Publishing; 2013. 991 p.

12. Weathers FW, Blake DD, Schnurr PP, Kaloupek DG, Marx BP, Keane TM. Clinician-Administered PTSD Scale for DSM-5 (CAPS-5). PTSD Natl Cent PTSD. 2015;1–18.

13. Weathers FW, Litz BT, Keane TM, Palmieri PA, Marx BP, Schnurr PP. The PTSD checklist for DSM-5 (PCL-5). Natl Cent PTSD. 2013;5(August):2002.

14. Bahari R, Alwi MNM, Ahmad MR. Translation and Validation of the Malay Posttraumatic Stress Disorder Checklist for DSM-5 (MPLC-5). Malaysian J Med Heal Sci. 2019;15(Supplemet 1l):15–20.

15. Nunnally J, Bernstein I. Psychometric theory. Tata McGra. Psychometric Theory. New Delhi: Tata McGraw-Hill; 2010.

16. Arafat S. Validation study can be a separate study design. Int J Med Sci Public Heal. 2016;5(11):2421.

17. Sedighi I. Interpretation of Diagnostic Tests: Likelihood Ratio vs. Predictive Value. Iran J Pediatr [Internet]. 2013 Dec;23(6):717. Available from: https://www.ncbi.nlm.nih.gov/pubmed/24910762

18. Bovin MJ, Marx BP, Weathers FW, Gallagher MW, Rodriguez P, Schnurr PP, et al. Psychometric properties of the PTSD Checklist for Diagnostic and Statistical Manual of Mental Disorders–Fifth Edition (PCL-5) in veterans. Vol. 28, Psychological Assessment. Marx, Brian P.: National Center for PTSD, VA Boston Healthcare System (116B-4), 150 South Huntington Avenue, Boston, MA, US, 02130, brian.marx@va.gov: American Psychological Association; 2016. p. 1379–91.

19. Geier TJ, Hunt JC, Nelson LD, Brasel KJ, deRoon-Cassini TA. Detecting PTSD in a traumatically injured population: The diagnostic utility of the PTSD Checklist for DSM-5. Depress Anxiety. 2019;

20. Ibrahim H, Ertl V, Catani C, Ismail AA, Neuner F. The validity of Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5) as screening instrument with Kurdish and Arab displaced populations living in the Kurdistan region of Iraq. BMC Psychiatry [Internet]. 2018 Aug 16;18(1):259. Available from: https://www.ncbi.nlm.nih.gov/pubmed/30115040

21. Jacobson NS, Truax P. Clinical Significance: A Statistical Approach to Defining Meaningful Change in Psychotherapy Research. J Consult Clin Psychol [Internet]. 1991;59(1):12–9. Available from: http://www.sciencedirect.com/science/article/B6WY6-46VM4D3-1C/2/a558f53bf8a62ee493e7303c1d620261