



## Short Communication

# Self-reported Morisky eight item medication adherence scale is a reliable and valid measure of compliance to statins in hyperlipidemic patients in India

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## 1. Introduction

Statin non-compliance remains a major contributor of preventable cardiovascular mortality and it needs to be identified and addressed adequately.<sup>1,2</sup> Self-reported Morisky eight-item medication adherence scale (MMAS) is a convenient measure to identify statin non-compliance in resource-limited settings but needs to be tested for reliability and validity. Previous studies have reported the concordance of MMAS with pill count and its correlation with serum lipid profile levels.<sup>3,4</sup> Additionally, the factors associated with statin non-compliance need to be recognized. Therefore, we aimed to evaluate the reliability and validity of MMAS for measuring statin compliance and assess the factors associated with statin non-compliance in hyperlipidemic patients.

## 2. Methods

We enrolled 200 hyperlipidemic patients at a tertiary care hospital in India on statins for any duration. MMAS scale includes an eight item questionnaire for measuring various aspects of medication adherence and the paper MMAS-8 questionnaire was used to measure statin compliance.<sup>5</sup> (Supplementary Table 1) Serum low density lipoprotein (LDL) and Hydroxy-3-methylglutaryl-coenzyme A (HMG-CoA) reductase levels were estimated at the end of 3 months. Reliability was assessed using Cronbach's alpha for internal consistency. Construct validity was examined using factor analysis. Demographic factors including age and gender, socioeconomic status (modified Kuppaswamy scale), education (low education was defined as education less than high school diploma) and clinical factors (comorbidities) predicting statin non-compliance and lipid profile were analyzed using a multivariate regression model.

## 3. Results

Out of a total of 200 patients, 58.5% patients had low adherence (MMAS score < 6) whereas 32.5% and 9% patients had medium

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(score of 6–7) and high adherence (score of 8) respectively. The Cronbach's alpha was 0.88 for items in the scale indicating good internal consistency. 95% of patients in the study had a “yes” response to item 5 of MMAS and if item 5 was deleted the Cronbach's alpha was 0.89. The factor loading for each item was greater than 0.6 (range = 0.61 to 0.95) and the total variance explained by the common factor was 51%. There was a statistically significant negative correlation between MMAS score and serum LDL levels ( $r = -0.750$ ,  $p = 0.000$ ) and HMG CoA-R levels ( $r = -0.497$ ,  $p = 0.000$ ). Low education was a significant predictor of non-compliance ( $p < 0.05$ ) and of sub-optimal control of LDL and HMG-CoA-R levels ( $p < 0.01$ ).

#### 4. Conclusions

MMAS is a reliable and valid measure of statin compliance in hyperlipidemic patients in India. There is a need to increase patient education to improve medication adherence and achieve the maximum therapeutic benefit of statins.

#### 5. Study limitations

We used the MMAS-8 paper questionnaire which has lower true positive sensitivity as compared to the MMAS-8 software widget. MMAS-8 has certain disadvantages including recall bias and acceptable response bias. Although the MMAS-8 was the only medication adherence scale used in this study, we have previously analyzed its concordance with the pill count method.<sup>4</sup> The MMAS-8 widget may have been a better tool to assess medication taking behaviors associated with low adherence.

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#### Declaration of competing interest

All authors have none to declare.

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Use of the ©MMAS is protected by US copyright laws. Permission for use is required. A license agreement is available from: Donald E. Morisky, ScD, ScM, MSPH, Professor, Department of Community Health Sciences, UCLA School of Public Health, 650 Charles E. Young Drive South, Los Angeles, CA 90095–1772, [dmorisky@ucla.edu](mailto:dmorisky@ucla.edu).

#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ihj.2020.06.016>.

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