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Evaluation of a German version of the Bain and Findley Tremor ADL scale



ARTICLE INFO

Keywords:

Essential tremor
Activities of daily living

ABSTRACT

The Movement Disorder Society recommends the Bain and Findley Tremor ADL Scale to assess ADL in patients with ET. In 45 medically and 14 surgically (DBS) treated ET patients, a German version of the scale correlated well with tremor severity and quality of life and was sensitive to postoperative change.

The impact of essential tremor (ET) on activities of daily living (ADL) and quality of life (QoL) is well-established [1]. For both scientific and clinical purposes, operationalization of tremor severity, disability and QoL using validated rating scales is essential. Although the popular Fahn-Tolosa-Marin Tremor Rating Scale (TRS) [2] contains an assessment of ADL, the Bain and Findley Tremor ADL Scale (BFTADL) [3] has been recommended by an MDS Task Force as a specific measure of ADL impairment selected from the multitude of instruments available [4].

We thus evaluated a German version of the BFTADL in a cohort of 45 ET patients recruited from our specialized outpatient clinic and patient support groups. Fourteen of these were later bilaterally implanted with DBS leads into the ventral intermediate nucleus of the thalamus and the posterior subthalamic area. The study was approved by the IRB of the University of Cologne (votes 12-116 and 14-282) and all patients provided written informed consent.

Along with the TRS and the Quality of Life in Essential Tremor Questionnaire (QUEST) [1] patients completed a German version of the BFTADL, generated by translation/back-translation by two certified translators (see Supplementary Material). The BFTADL comprises 25 items on typical daily activities such as “hold a cup of tea” or “unlock your front door with the key” self-rated from 1 (“able to do the activity without difficulty”) to 4 (“cannot do the activity by yourself”) [3].

In the medically treated 45 patients (19 female, 26 male, mean age 64.1 years, mean ET duration 13.4 years) the mean BFTADL was 44.4 (± 11.3), the TRS total score 31.1 (± 16.6) and the QUEST Summary Index (SI) 34.3 (± 15.0). The BFTADL strongly and significantly correlated with the “physical” subdomain of the QUEST and the QUEST SI but not with other subdomains (“psychosocial”, “communication”, “work/finance”, “hobbies/leisure”). It also strongly correlated with TRS part A, part B, part C, and the total score. The correlation with only the items for the dominant upper extremity of TRS parts A and B were equally strong and significant (see Table 1). The fourteen patients who later received DBS significantly differed preoperatively from the rest of the medically treated group in terms of higher scores in the TRS (24.2 ± 11.2 vs. 46.2 ± 16.9 , Mann-Whitney-U-test $p < 0.001$), the QUEST SI (30.6 ± 15.5 vs. 42.4 ± 10.2 , $p = 0.010$), and the BFTADL (41.0 ± 10.4 vs. 52.0 ± 9.7 , $p = 0.004$). One surgical patient was lost to follow-up, the BFTADL at one year after surgery was not available for another. Compared to preoperative baseline, the BFTADL significantly improved one year after surgery (51.7 ± 10.4 vs. 33.3 ± 15.0 , Wilcoxon signed-rank test $p = 0.006$), as did the TRS (47.4 ± 17.8 vs. 19.9 ± 18.4 , $p = 0.001$), the QUEST SI (40.6 ± 12.0 vs. 18.3 ± 17.1 , $p = 0.003$) and all QUEST subdomains except “communication” (see also Fig. 1). The postoperative

Table 1
Correlation analyses in the medical group.

BFTADL	TRS A	TRS B	TRS A + B	TRS C	TRS total	TRS A + B dominant upper extremity	QUEST physical	QUEST psychosocial	QUEST communication	QUEST hobbies/leisure	QUEST work/finance	QUEST SI
Spearman's ρ	0.51	0.53	0.59	0.72	0.67	0.53	0.75	0.20	0.20	0.08	0.13	0.52
p	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	n.s.	n.s.	n.s.	n.s.	< 0.001

Spearman's correlations for the Bain and Findley Tremor ADL Scale (BFTADL) with the Fahn-Tolosa-Marin Tremor Rating Scale (TRS), and the Quality of Life in Essential Tremor Questionnaire (QUEST) subdomains and Summary Index (SI) in the medical group (n = 45).

change in the BFTADL significantly correlated with the change in the QUEST SI ($\rho = 0.63$, $p = 0.028$) but not with the change in the TRS total score.

Unfortunately, our results are difficult to compare with other cohorts. The original publication involved 20 patients with both essential and dystonic tremor and used neither the TRS nor the QUEST [3]. However, the BFTADL strongly correlated with writing/spirography impairment and right upper limb tremor severity [3]. This focus on dominant hand function has been criticized [4]. In our sample, however, correlations with tremor ratings of the dominant upper extremity were not stronger than with overall tremor severity. In contrast to these results, a revised 20-item-version of the BFTADL did not significantly correlate with clinical tremor examination in another group of 16 ET patients [5]. Most probably, this inconsistency is attributable to the different methods of tremor assessment. In the surgical realm, only patients unilaterally treated for tremor caused by multiple sclerosis have been examined by the BFTADL. The scale demonstrated good test-retest properties and moderate sensitivity to postoperative change [4]. Based on our observations, the BFTADL seemed to be quite sensitive to the effects of bilateral DBS in ET.

In conclusion, the German version of the BFTADL correlated well with standard measures of tremor severity and QoL in our small cohort, it differentiated between less and more severely affected patients and was sensitive to change after DBS treatment. Therefore, our findings may encourage both clinicians and researchers to use the BFTADL more frequently.

1. Author roles

PR: acquisition of data, analysis and interpretation of data, drafting the article.

TT: analysis and interpretation of data, revising the article critically for important intellectual content.

AJ: conception and design of the study, acquisition of data, revising the article critically for important intellectual content.

JKS: acquisition of data, revising the article critically for important intellectual content.

HSD: analysis and interpretation of data, revising the article critically for important intellectual content.

VVV: acquisition of data, revising the article critically for important intellectual content.

MTB: conception and design of the study, revising the article critically for important intellectual content.

All authors have approved the article and have agreed to the submission of this final version.

Funding sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of competing interest

PR received a travel grant from AbbVie.

TT none.

AJ none.

JKS received travel grants from BIAL and Boston Scientific.

HSD none.

VVV received financial support for lectures and contributions to advisory boards from Medtronic, Abbott, Boston Scientific, and Aleva. She received a grant from SAPIENS Steering Brain Stimulation.

MTB received speakers' honoraria from UCB, GE Medical, Medtronic, Abbott, and BIAL and research grants from Medtronic and Boston Scientific.

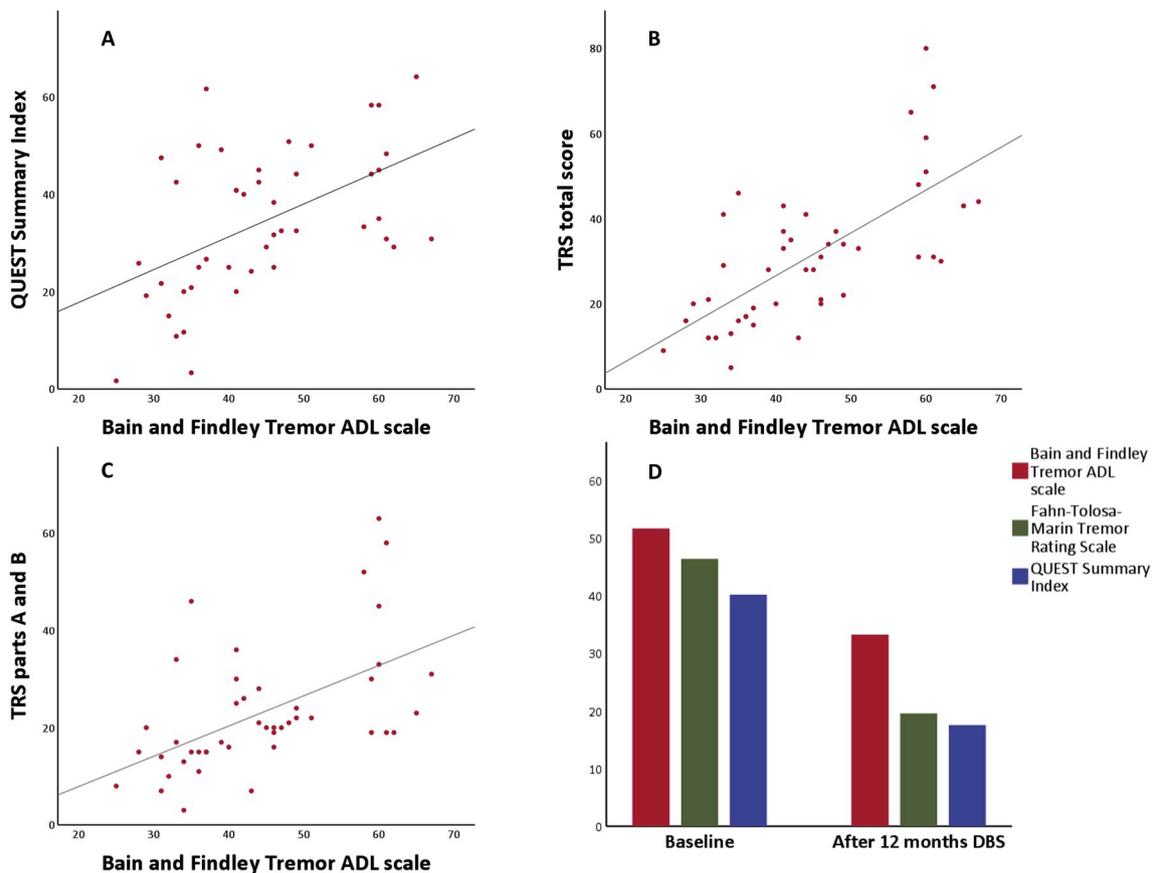


Fig. 1. Results.

Spearman's correlations for the BFTADL with A) the QUEST Summary Index, B) the TRS total score, and C) parts A and B of the TRS (i.e. without part C that evaluates ADL). D) Means of preoperative baseline and follow-up after 12 months for the DBS group. See text for statistical details.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.parkreldis.2019.09.024>.

References

- [1] A.I. Tröster, R. Pahwa, J.A. Fields, C.M. Tanner, K.E. Lyons, Quality of life in essential tremor Questionnaire (QUEST): development and initial validation, *Park. Relat. Disord.* 11 (2005) 367–373, <https://doi.org/10.1016/j.parkreldis.2005.05.009>.
- [2] S. Fahn, E. Tolosa, C. Marin, *Parkinson's Disease and Movement Disorders. Clinical Rating Scale for Tremor*, Williams & Wilkins, Baltimore, 1993.
- [3] P.G. Bain, L.J. Findley, P. Atchison, M. Behari, M. Vidailhet, M. Gresty, J.C. Rothwell, P.D. Thompson, C.D. Marsden, Assessing tremor severity, *J. Neurol. Neurosurg. Psychiatry* 56 (1993) 868–873, <https://doi.org/10.1136/jnnp.56.8.868>.
- [4] R. Elble, P. Bain, M.J. Forjaz, D. Haubenberger, C. Testa, C.G. Goetz, A.F.G. Leentjens, P. Martinez-Martin, A.P.-L. Traon, B. Post, C. Sampaio, G.T. Stebbins, D. Weintraub, A. Schrag, Task force report: scales for screening and evaluating tremor: critique and recommendations, *Mov. Disord.* 28 (2013) 1793–1800, <https://doi.org/10.1002/mds.25648>.
- [5] D.A. Lundervold, R. Pahwa, P.A. Ament, D. Edward Corbin, Validity of clinical and patient ratings of tremor disability among older adults, *Park. Relat. Disord.* 10 (2003) 15–18, [https://doi.org/10.1016/S1353-8020\(03\)00061-0](https://doi.org/10.1016/S1353-8020(03)00061-0).

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