

# Do people stop conducting olfactory training when their olfaction recovers?\*

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**Rhinology** 62: 1, 127 - 128, 2024

<https://doi.org/10.4193/Rhin23.140>

**\*Received for publication:**

April 25, 2023

**Accepted:** July 24, 2023

## Dear Editor:

Olfactory training (OT) has been suggested as an effective method of smell rehabilitation <sup>(1)</sup>. Multiple studies confirmed its effectiveness <sup>(2)</sup> that is highest in patients with post-infectious olfactory dysfunction (PIOD) <sup>(3)</sup>. Parts of the variable success rates of OT may be due to differences in adherence to the procedure <sup>(4)</sup>. OT adherence is usually measured with diaries reporting the number of completed OT sessions <sup>(1,5)</sup>. However, there are other factors related to the treatment adherence other than the number of training sessions alone.

Morisky scale assesses four behaviors affecting adherence to pharmacological treatment, e.g., forgetting to take the prescribed medication <sup>(6)</sup>. In an effort to investigate how these behaviors relate to OT effectiveness we have modified the Morisky scale for the assessment of OT adherence (see Figure 1B for items). We aimed to explore if adherence to OT measured with the modified Morisky scale relates to post-OT olfactory functions of patients with PIOD.

We retrospectively analyzed data from 148 patients (66% women) aged 18 to 78 years (M=44.2, SD=13.9). All patients were from our tertiary smell and taste clinic and had PIOD (including 109 post-COVID-19 cases). Their olfactory functions were examined pre- and post-OT with odor Threshold, Discrimination, and Identification (TDI) tests from the Sniffin' Sticks battery <sup>(7)</sup>. Patients underwent at least 12 weeks of OT with at least 4 odors <sup>(1)</sup>. At post-OT appointment patients filled in the modified Morisky scale where scores range from 0 to 4 and greater scores indicate lower adherence to OT.

We ran Spearman partial correlation analyses to verify the relationship between the Morisky score and the post-OT Threshold, Discrimination, Identification, or TDI score while controlling for the pre-OT scores. We found that the Morisky score was weakly positively correlated with scores in Threshold ( $r=0.18$ ,  $p=0.033$ ), and TDI ( $r=0.20$ ,  $p=0.016$ ) at the post-OT appointment. This finding suggests that lower adherence to OT was related to greater olfactory abilities post-OT.

As it seemed counterintuitive and in opposition to previous findings <sup>(4)</sup>, we ran further analyses. Based on TDI scores at post-OT appointment patients were classified as anosmic, hyposmic or normosmic <sup>(8)</sup>. We used Kruskal-Wallis test to compare the score in Morisky scale between participants divided into these three groups. The non-parametric test was employed due to substantial group-size differences and Morisky score measured on an ordinal scale. We found that the Morisky score differed across groups ( $\chi^2_{(2)}=8.41$ ,  $p=0.015$ ) and this effect was explained by the significant difference in the score between anosmic and normosmic individuals ( $W=3.36$ ,  $p=0.046$ ; Figure 1A). Additionally, we split patients into two groups based on their responses to single items of the Morisky scale and compared post-OT TDI score of these groups with Mann-Whitney U test. We found no between-group differences for items #1, #2, and #4 (all  $p>0.05$ ), but patients who declared that they stopped OT when they felt their sense of smell is improving (item #3) had a higher TDI score post-OT ( $U=687$ ,  $p=0.001$ ; Figure 1B).

Our findings suggest that low OT adherence measured with the modified Morisky scale is related to greater olfactory performance post-OT. The item #3 ("When you feel your smell is getting better, do you sometimes stop the smell training?") mostly drives this result. Therefore, it is likely that in some patients the decrease of OT adherence measured with this scale might be actually caused by perceived (and reflected in post-OT TDI score) improvement of olfactory functions and not by the absence of desired OT effects. These results shed new light on reasons why patients might not come back for the post-OT assessment (i.e., they are already satisfied with their recovery). This factor calls for further investigation and should be considered when interpreting and designing the studies on OT effectiveness. If patients interrupt OT and drop out from clinical trials due to olfactory recovery, this might bias the study sample and lead to underestimation of OT efficacy.

Additionally, the distribution of the scores (Figure 1B) shows

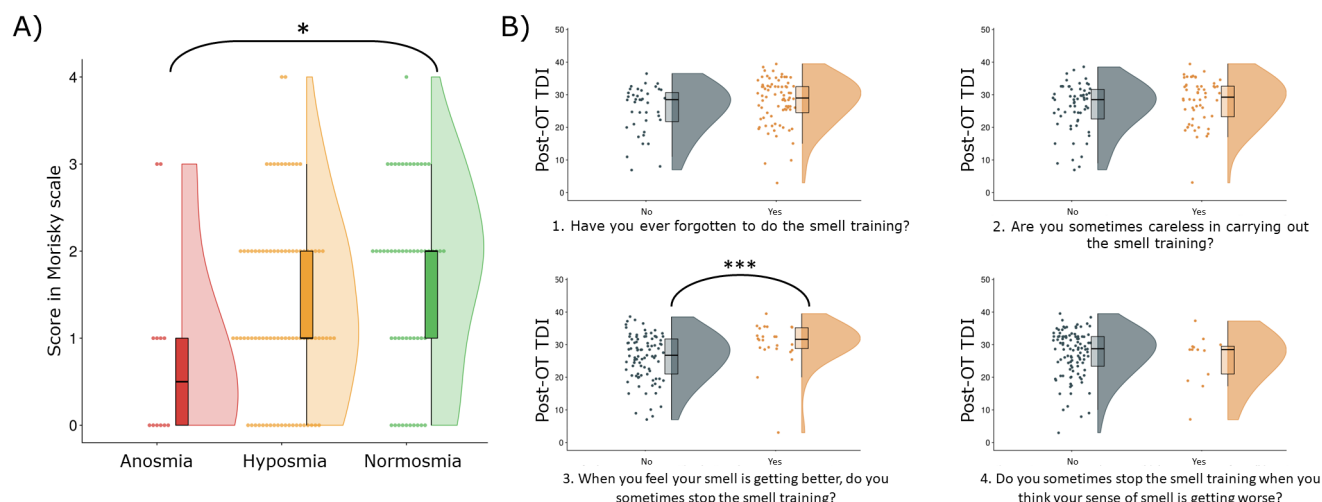


Figure 1. Relationship between OT adherence measured with the modified Morisky scale and overall olfactory functioning. Panel A presents scores in the modified Morisky scale in different clinical groups during post-OT appointment. Panel B presents post-OT TDI scores across group of patients who responded differently to the individual items of the modified Morisky scale. Note: TDI – Threshold, Discrimination, Identification Sniffin' Sticks score; \* $p < 0.05$ , \*\*\* $p \leq 0.001$ .

that adherence to OT is limited and affected mostly by forgetting to conduct OT or performing it in a careless way but not by adverse effects (i.e., decreased olfactory function). Therefore, when trying to maximize patients' adherence to OT, the efforts should be focused on performing OT regularly and according to instructions. To increase adherence to OT patients might be educated on the importance of regular OT or receive regular reminders about OT via text messages or e-mails<sup>(9)</sup>.

### Abbreviations

OT – olfactory training; PIOD – post-infectious olfactory dysfunction; TDI – score in Threshold, Discrimination, Identification tests from the Sniffin' Sticks battery.

### Authorship contribution

MP: Formal analysis, Writing - Original Draft, Visualization. TH: Conceptualization, Methodology, Writing - Review & Editing, Supervision, Project administration, Funding acquisition.

### Funding

This research was funded by the Deutsche Forschungsgemeinschaft „Olfactory Trainings in anosmic and normosmic individuals - DFG HU441/29-1". MP was supported by the National Science Centre grant (OPUS scheme 2020/37/B/HS6/00288).

### Conflict of interest

Authors declare no conflict of interest.

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