Evaluation of a novel automated oxygen desaturation analysis

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INTRODUCTION

BACKGROUND

The oxygen desaturation index (ODI) is a valuable parameter for the diagnosis of sleep-related breathing disorders.

- ODI correlates with apnea-hypopnea index (AHI)
- Encodes severity of obstructive sleep apnea in adults and children [1,2,3]
- Predictor for incidence of cardiovascular events and death [4,5]

ODI is interesting parameter for home-based sleep studies and/or screening

- Non-invasive and intuitive hardware
- Home-based recordings increasingly more prevalent

An accurate and reliable automated extraction of the ODI can be a valuable tool to assist sleep clinicians and experts in their scoring activities.

RESEARCH OBJECTIVE

In the current study, we investigated the feasibility of the automated solution provided by Somnilog for ODI extraction (>3% drop) in both ideal (i.e. lab-recorded studies) and ambulatory settings (i.e., home-recorded studies).

RESULTS

We selected 20 polygraphies

10 lab-recorded	10 home-recorded

Each recording was scored twice for desaturation events

manual: certified sleep technician	automated: Somnilog algorithm

The dataset consists of a representative sample of the patient population

	Minimum	Maximum	Mean	Std
Age	21	74	53	16.7
BMI	21.5	37.4	28.8	4.8

The automated scoring is in near-perfect agreement with the expert scoring

	Precision	Recall	ICC
ODI automated wrt expert	0.97	0.96	0.99

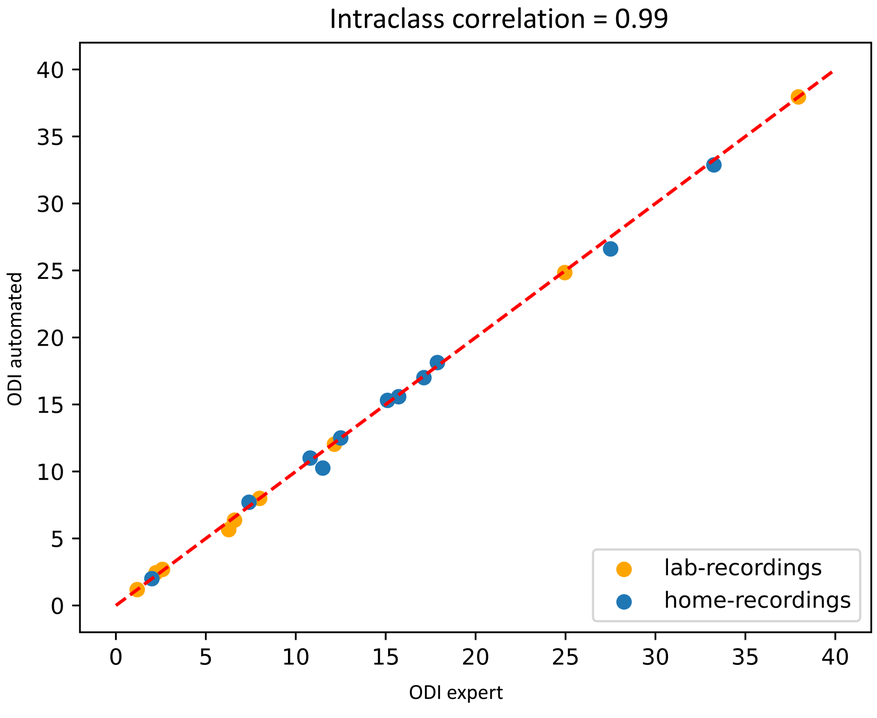

Figure 1: ODI obtained by the expert correlates very well with the one from the the automated solution

There is no significant difference between lab- or home-based recordings

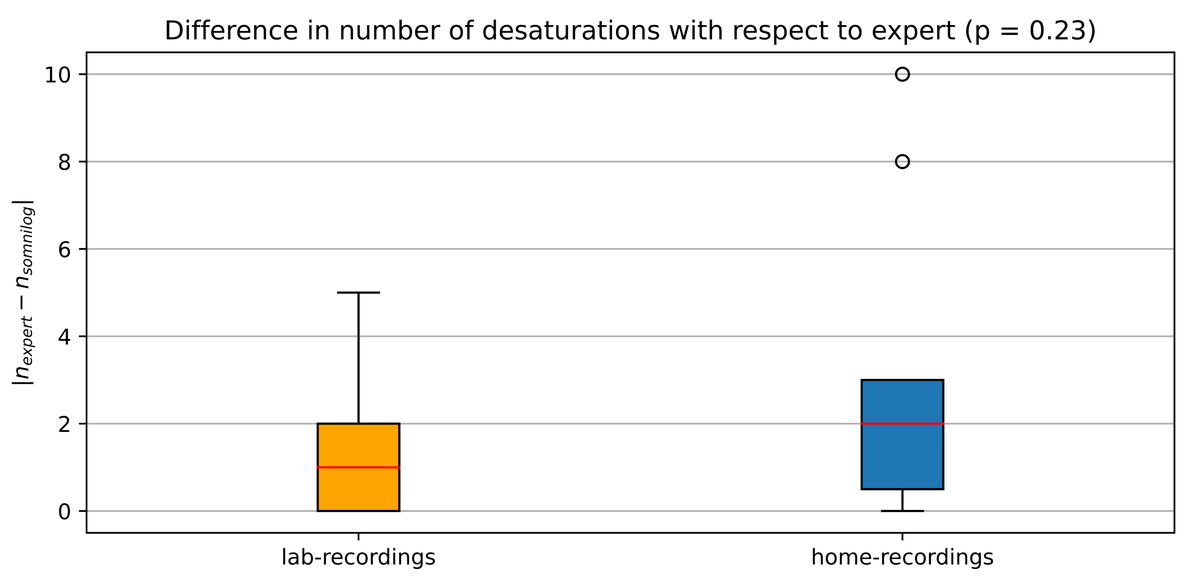

Figure 2: Boxplot of the difference of number of desaturations scored by the expert and the automatic solution. There is no relevant statistical difference between the lab- and home-based recordings groups.

CONCLUSION

- ❑ The desaturation events found be the automated solution were in near-perfect agreement with those scored by the expert.
- ❑ The automated tool can also be applied in ambulatory settings, which are typically more prone to artifacts.
- ❑ Can be deployed to assist sleep experts with the increasing volumes associated with the shift towards ambulatory sleep studies.
- ❑ The algorithm used by the automated solution is not a black-box approach and can provide explanation on why events were detected as such.

REFERENCES

1. Rashid, N.H., Zaghi, S., Scapuccin, M., Camacho, M., Certal, V. and Capasso, R., 2021. The value of oxygen desaturation index for diagnosing obstructive sleep apnea: a systematic review. *The Laryngoscope*, *131*(2), pp.440-447.
2. Chang, L., Wu, J. and Cao, L., 2013. Combination of symptoms and oxygen desaturation index in predicting childhood obstructive sleep apnea. *International journal of pediatric otorhinolaryngology*, *77*(3), pp.365-371.
3. Temirbekov, D., Güneş, S., Yazıcı, Z.M. and Sayın, İ., 2018. The ignored parameter in the diagnosis of obstructive sleep apnea syndrome: the oxygen desaturation index. *Turkish archives of otorhinolaryngology*, *56*(1), p.1.
4. Trzepizur, W., Blanchard, M., Ganem, T., Balusson, F., Feuilloy, M., Girault, J.M., Meslier, N., Oger, E., Paris, A., Pigeanne, T. and Racineux, J.L., 2022. Sleep apnea–specific hypoxic burden, symptom subtypes, and risk of cardiovascular events and all-cause mortality. American journal of respiratory and critical care medicine, 205(1), pp.108-117.
5. Azarbarzin, A., Sands, S. A., Stone, K. L., Taranto-Montemurro, L., Messineo, L., Terrill, P. I., ... & Wellman, A. (2019). The hypoxic burden of sleep apnoea predicts cardiovascular disease-related mortality: the Osteoporotic Fractures in Men Study and the Sleep Heart Health Study. *European heart journal*, *40*(14), 1149-1157.

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