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## Implementation of wearable sensors for evaluation of disease severity in progressive supranuclear palsy

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*Introduction:* Progressive supranuclear palsy (PSP) is an atypical parkinsonism characterized by prominent motor and postural impairments [1]. The PSP rating scale (PSPrs) is a validated tool to evaluate disease severity [2]. Recently, wearable sensors such as APDM opal technologies have been used to investigate gait and related parameters in movement disorders [3].

*Objective:* To explore the relationship between a gait protocol using wearable sensors and the PSPrs.

*Methods:* PSP patients were evaluated with the PSPrs as well as the gait protocol with wearable sensors based on 2-minute walking, sway and 360 degree turning tests. Several parameters were extracted from the sensors. A Spearman rho correlation coefficient was calculated for the relationship between PSPrs (sub- and total scores) and sensor measurements. The sensor variables showing a significant correlation with PSPrs were subsequently included as independent variables in a multiple linear regression model in order to assess the sensor ability to predict PSPrs scores. The significance level in both analyses was set at $\leq 0.05$.

*Results:* Sixty-one evaluations from 33 patients were analyzed, with 27 patients being tested twice (at baseline and at 3-months follow-up). Gait, sway and turning parameters measured with sensors showed multiple significant correlations with the PSPrs total- and sub-scores (*rho* between ± 0.3 and 0.7; $p<0.05$). All linear regressions built thereafter were significant ($p<0.05$) with adjusted R Square always > 0.7, indicating a strong relationship between the sensor parameters and the PSPrs. The strongest relationship was observed between PSPrs total score and turning velocity and mean stance time (R Square 0.976, $p <0.001$).

*Conclusion:* Our clinic-based protocol evaluating gait and related parameters using wearable sensors has a strong relationship with the PSPrs. Therefore, wearable sensors could be easily introduced in clinical practice as well as in research settings as a tool to objectively evaluate disease severity in PSP.

**References:**

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