SENSORY DIFFICULTIES IN PEOPLE WITH PARKINSON'S DISEASE

People with Parkinson's Disease may present with a variety of sensory difficulties, including problems with their visual and auditory systems. Consider the following studies and the recommendations flowing from them.

CHANGES IN THE VISUAL SYSTEM

(Arrigo et al., 2017)
They found that patients presented significant changes in the brain structures associated with the visual system, such as changes in the optic radiations, decreased white matter volume and reduced volume of the optic chiasm (where the left and right optic nerves meet). As a consequence, patients experienced visual alterations, such as an inability to perceive colors, decreased visual acuity, and a reduction in blinking, which often led to dry eyes.

(Ekker et al., 2017)
We discuss six common disorders in more detail: dry eyes; diplopia; glaucoma and glaucoma-like visual problems; impaired contrast and colour vision; visuospatial and visuoperceptual impairments; and visual hallucinations. In addition, we review the effects of PD-related pharmacological and surgical treatments on visual function, and we offer practical recommendations for clinical management. Greater awareness and early recognition of ocular and visual problems in PD might enable timely instalment oftailored treatments, leading to improved patient safety, greater independence, and better quality of life.

(Armstrong, 2011)
Changes in vision in PD may result from alterations in visual acuity, contrast sensitivity, colour discrimination, pupil reactivity, eye movements, motion perception, visual field sensitivity, and visual processing speeds. Slower visual processing speeds can also lead to a decline in visual perception especially for rapidly changing visual stimuli. In addition, there may be disturbances of visuospatial orientation, facial recognition problems, and chronic visual hallucinations. Some of the treatments used in PD may also have adverse ocular reactions. The pattern electroretinogram (PERG) is useful in evaluating retinal dopamine mechanisms and in monitoring dopamine therapies in PD. If visual problems are present, they can have an important effect on the quality of life of the patient, which can be improved by accurate diagnosis and where possible, correction of such defects.

(Vanegas et al., 2019)
Compared with controls, patients exhibited a significantly higher initial ssVEP amplitude that quickly decayed over time, and greater relative suppression of ssVEP amplitude as a function of surrounding stimulus contrast. Meanwhile, EEG frequency spectra were broadly elevated in patients relative to controls.Thus, contrary to what might be expected given the reduced contrast sensitivity often reported in PD, visual neural responses are not weaker; rather, they are initially larger but undergo an exaggerated degree of spatial and temporal gain control and are embedded within a greater background noise level. **These differences may reflect cortical mechanisms that compensate for dysfunctional center-surround interactions at the retinal level.**

SENSORY DIFFICULTIES IN PEOPLE WITH PARKINSON'S DISEASE
(Continued)

CHANGES IN THE AUDITORY SYSTEM

(Folmer et al., 2017)
Since Parkinson's Disease (PD) primarily affects older people, a majority of PD patients have age-related hearing loss (HL) that will worsen over time.The goal of this study was to assess peripheral and central auditory functions in a population of PD patients and compare the results with a group of age-matched control subjects. Study participants included 35 adults with PD (mean age = 66.9 ± 11.2 years) and a group of 35 healthy control subjects (mean age = 65.4 ± 12.3 years). Assessments included questionnaires, neuropsychological tests, audiometric testing, and a battery of central auditory processing tests. Both study groups exhibited patterns of sensorineural hearing loss (slightly worse in the PD group) which were typical for their age and would contribute to difficulties in communication for many participants. Compared to the control group, PD patients reported greater difficulty in hearing words people are speaking. Although 27 PD patients (77%) were good candidates for amplification, only 7 (26%) of these hearing aid candidates used the devices. Because it is important for PD patients to optimize communication with their family members, caregivers, friends, and clinicians, it is vital to identify and remediate auditory dysfunction in this population as early as possible. THAT IS – MINIMAL IF ANY CHANGES IN CENTRAL PROCESSING

(Lopes et al., 2018)
The profile found corresponds to descending sensorineural hearing loss and alteration in otoacoustic emissions, temporal ordering and noise gaps detection. Only losses in temporal order are associated with the disease, especially in men, individuals under the age of 65 and in the initial stage.

(Shetty et al., 2019)
Asymptomatic auditory dysfunction (where patients with PD do not themselves report hearing impairment but on testing do reveal impairment – that is, early stage of hearing loss) is a common non-motor manifestation of early-onset PD and more frequent in younger patients, indicating that it may be independent of aging. The mechanism underlying this dysfunction appears to be peripheral, although a central dysfunction cannot be ruled out based on the findings of this study.

COMPLICATIONS OF COMORBID SENSORY IMPAIRMENT

(Lin et al., 2004)
vision impairment at baseline was associated with cognitive (odds ratio (OR)=1.78, 95% confidence interval (CI)=1.21-2.61) and functional (OR=1.79, 95% CI=1.15-2.79) decline. Hearing impairment was not associated with cognitive or functional decline. Combined impairment was associated with the greatest odds for cognitive (OR=2.19, 95% CI=1.26-3.81) and functional (OR=1.87, 95% CI=1.01-3.47) decline. CONCLUSION: Sensory impairment is associated with cognitive and functional decline in older women. Studies are needed to determine whether treatment of vision and hearing impairment can decrease the risk for cognitive and functional decline.

(Michalowsky et al., 2019)
This analysis adds important evidence that contributes to the limited body of knowledge about the association between hearing and/or vision loss and dementia. It further demonstrates that, of the two, only hearing impairment affects patients' cognition and thus contributes to dementia risk.

(Tran et al., 2020)
These results suggest that visual impairment may be a risk factor for dementia; findings are limited by sample size, and more research is needed in a larger population.

(Gilbert, 2019)

Tips and Takeaways

- Although cognitive decline can be a feature of PD itself, there may be other medical issues that are contributing. Being evaluated for these issues is crucial as modifying them can have a positive impact on cognition and your quality of life.
- Therefore it's very important that you tell your doctor about any changes you notice (or that loved ones point out) in your cognitive function so potential corrective action can be taken as early as possible.
- Hearing loss can be a treatable contributor to cognitive decline. If hearing loss is suspected, consider asking your doctor for a referral for an audiogram. Hearing aids will likely improve your well-being and may improve cognitive decline as well.
- There are many other treatable contributors to cognitive decline including: medication effects, infection, thyroid abnormalities, low Vitamin B12 levels, strokes, head trauma, orthostatic hypotension, and sleep apnea.

(Manenti et al., 2018) A THERAPY FOR COGNITIVE IMPAIRMENT?

Method
Twenty-two patients with PD were assigned to either active tDCS plus computerized cognitive training (CCT) or sham tDCS plus CCT groups. Each patient underwent two weeks' treatment of daily application of tDCS for 25 minutes during CCT focalized on functions related with prefrontal cortex. Each patient was evaluated at baseline, after treatment and at 3-month follow-up.

Results

A significant reduction of depressive symptoms was observed in the active tDCS group from baseline to post-treatment assessment and from baseline to 3-month follow-up. An improvement in cognitive performances, referring more specifically to language, attentional and executive functions, was observed in both groups post-treatment and at follow-up. However, phonemic verbal fluency showed significant greater changes from baseline in the active tDCS group.

Conclusions

We concluded that cognitive training along with active tDCS is a useful combined approach in the management of mood and cognitive dysfunctions in PD.

(Beretta et al., 2020)

Results:

Seventeen of an initial yield of 408 studies satisfied the criteria. Studies involved small sample sizes. Tdcs protocols and characteristics of combined interventions varied. The reviewed studies suggest that synergistic effects may be obtained for cognition, upper limb function, gait/mobility and posture when tDCS is combined with cognitive and/or motor interventions in PD.

Conclusion:

The reported results encourage further research to better understand the therapeutic utility of tDCS and to inform optimal clinical use in PD. Future studies in this field should focus on determining optimal stimulation parameters and intervention characteristics for maximal benefits in people with PD

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