

BEHAVIOURAL ASPECTS OF PARKINSON AND ALZHEIMER DISEASE: QUALITATIVE FEATURES OF DYSPERCEPTIONS

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Summary

Hallucinations are a common feature of Alzheimer (AD) and Parkinson's Disease (PD), and may significantly impair the quality of life of patients and caregivers. In spite of these common aspects some features differentiate the hallucinations found in AD from those found in PD subjects. In this work we focused on the qualitative features of hallucinations in AD and PD. Our aim was to achieve, through the analysis of these features, a better understanding of the neural mechanisms underlying the phenomenon. We found that visual hallucinations have a different content in AD and PD subjects. In AD they consist in images belonging to the past life of the subject while in PD they are less definable. The typical content reported by AD patients was that of a family member while the majority of PD subjects report unclear images often of ugly. We suggest that in PD there might be a partial 'de-afferentation' of the visual cortex giving to hallucinations the character of unusual, strange, and distorted that is so often described by these subjects.

Keywords: visual hallucinations, hallucinations in Alzheimer's Disease, hallucinations in Parkinson's Disease

Introduction

Hallucinations are a common feature of Alzheimer (AD)¹ and Parkinson's Disease (PD)², and may significantly impair the quality of life of patients and caregivers. Hallucinations usually occur in the moderate stage of AD but are found earlier in PD³. Here the dopaminergic medication has been considered the leading cause, but currently DOPA therapy is viewed as a precipitating but not causal factor. Hallucinations are attributed to shared mechanisms in Alzheimer and Parkinson's subjects, the most important being the impairment of the frontal system leading to the impairment of the reality monitoring system^{3,4,5,6}. In spite of these common aspects some features differentiate the hallucinations found in AD from those found in PD subjects. In this work we focused on the qualitative features of hallucinations in AD and PD. Our aim was to achieve, through the analysis of these features, a better understanding of the neural mechanisms underlying the phenomenon.

Material and methods

19 AD and 19 PD patients, both showing hallucinations, were submitted to a questionnaire aimed at evaluating their phenomenology. In all subjects the disease dated at minimum two years and none of the subjects had severe visual or auditory disturbances. The demographic aspects of the sample are summarized in Table 1. In all patients the cognitive profile was evaluated with neuropsychological tests. They comprehended :the Clock Drawing Test, the 15 Rey word recall, the Constructional Apraxia test, the Raven PM 47 Test, the Copy and Memory drawing of the Rey figure, the Phonemic Fluency Test, the Frontal Assessment Battery. All subjects were submitted to a questionnaire aimed at investigating the features of hallucinations. Questions concerned the frequency, modality, quality, content, time of appearance, and the emotions associated with hallucinations. Both patients and their main caregiver were involved.

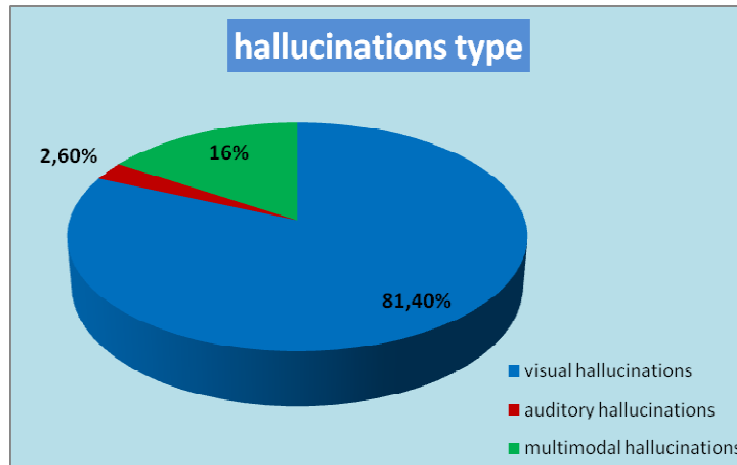
Table 1: The demographic aspects of AD and PD subjects

EDUCATION	AVERAGE	8.6	8.5
	SD	4.6	4.3
GENDER		8 M	12 M
AGE	AVERAGE	72.7	68.6
	SD	8	8.2

Results

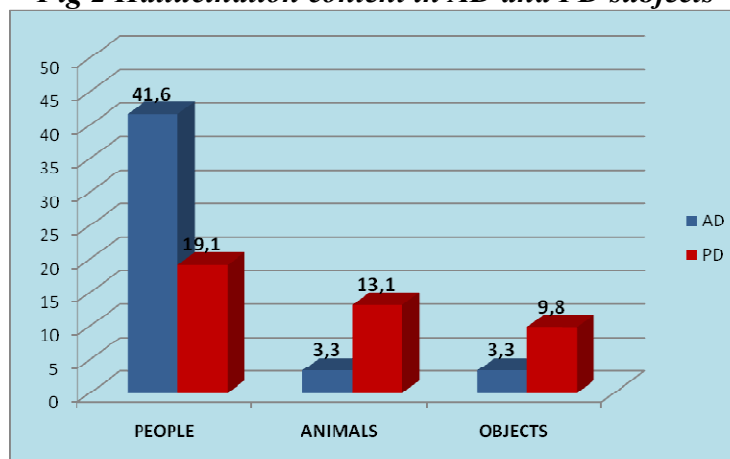
No difference in frequency, quality, features, persistency and time of appearance of hallucinatory phenomena was found between the groups (Table 2,3,4,5). 81,4% of the whole sample (AD and PD patients) reported visual and 2,6% auditory hallucinations. Multimodal (Visual and Auditory) hallucinations were reported by 16% of the patients (Fig 1).

Figure. 1 Hallucination type in AD whole sample



The contents of hallucinations was investigated . 41,6% of AD and 19,1% of PD subjects reported to have seen people. Animals were reported by 3,3% of AD and 13,1% of PD and objects by 3,3% of AD and 9,8% of PD (Fig. 2).

Fig 2 Hallucination content in AD and PD subjects



Only PD patients referred of seeing or having seen irregular spots-like images that were reported by 9,8% of the group. Images were perceived as full figures by all AD and by 84,2% of PD subjects (Table 6). The content differentiated the groups as AD subjects reported to see familiar “people”, most often their dead mother, while PD patients usually reported to see unknown persons, often frightening. When animals were seen, while AD patients mostly reported to have seen the pets, mainly those living with the family in the past, PD patients had perceived unpleasant animals (as fleas, rats, ants) (44,4%). In 55,5% of the cases PD subjects reported to see moving images (Table 7), which never occurred in AD. Finally the answer consistency between patients and caregivers was 100% in the PD group and 21,5% in AD group as the patients usually had forgotten the event. Another attribute of hallucinations reported by PD subjects was their rough and muddled quality that distinguished them from the tidy, clear images seen by AD patients. 73,7% of the PD group and only 10,5% of AD were frightened by the images (Table 8). PD subjects also reported to have had unpleasant feelings when seeing as to have been afraid or angry, differently from AD subjects who did not have an emotional involvement.

Table 2 Hallucination frequency in the two groups

Frequency	% AD	% PD
Once or twice during all illness course	31.6 %	15.8 %
Less than once per month	31.6 %	36.8 %
Several times in a week	36.8 %	47.4 %

Table 3 Quality of hallucinations

Quality	% AD	% PD
Clear	84.21 %	63.2%
Unclear	10.53%	31.5%
Inaccurate	5.26 %	5.3%
Deformed	0	0

Table 4 *Persistency of the phenomenon*

Persistency	% AD	% PD
Continues hallucinations	47.37%	26.3%
Protracted hallucinations	10.53	26.3%
Short lasting	31.58%	42.1%
Very short	10.53%	5.3%

Table 5 *Time of appearance of hallucinations*

Time of appearance	% AD	% PD
Morning	10.53%	10.5%
Afternoon	5.26%	31.5%
Evening	21.05%	15.8%
Night	15.79%	0%
Any time	47.37%	42.1%

Table 6 *Main features of the hallucinated images*

Main features	% AD	% PD
Whole and homogeneous	100%	84.2%
Fragmented, detached	0	15.8%
Double or triple	0	0

Table 7 *Modality of hallucinated images*

Modality	% AD	% PD
motionless	100%	44.5%
moving	0	55.5%

Table 8 *Emotional response*

Emotional response	% AD	% PD
Indifference	89.5%	26.3%
Happiness	0	0
Anger/fear	10.5%	73.7%

Discussion and conclusions

Visual hallucinations are different in AD and PD subjects. In AD they essentially consist in past images well known and easily recognizable; in PD images are unclear, poorly defined and strange. The typical hallucination of the AD patient refers to a family member, more usually the dead mother or the pet formerly living with the family⁷. Instead the majority of PD subjects see less clear images usually described as those of unknown people, of ugly animals or spots^{8,9}. The diversity may be related to different neural mechanisms. We suggest that the visual dysfunction described both at the retinal¹⁰ and central level in PD may contribute to hallucinations. Thus hallucinations in PD would represent a compromise between the altered external perceptions and the different possible internal interpretations. A recent research highlighted that PD patients usually have a retinal damage involving specifically the amacrine cells, that are those characterized by the employ of dopamine. This aspect may explain a visual disturbances¹⁰. These cells, being then unable to regulate the retinal excitatory and inhibitory systems allowing a normal vision, would send erroneous messages to the visual cortex. This aspect, together with the physiological impairment of visual acuity¹¹ and contrast sensitivity during ageing¹², could lead to a partial “de-afferentation” of the visual cortex. The deafferentation would contribute to the strange and unusual images so often described by these subjects^{13,14,15}.

In Alzheimer disease, inversely, the hallucinated contents clearly come from the memory store and are well known images, clearly perceived.

Beside this diversity in AD and PD hallucinated subjects another impairment is crucial, that is the dysfunction of the frontal executive system, that would allow the “reality monitoring”⁴. A frontal impairment has been actually found in these patients³. We argue that it may be the responsible of the attribution of the unreal images to outside reality.

These results suggest that hallucinations in AD and PD subjects derive from a common impairment (the reality monitoring dysfunction) and from specific damages (the visual impairment in PD and the memory impairment in AD)

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