FACIAL EMOTION EXPRESSIVENESS AND RECOGNITION IN PARKINSON'S DISEASE

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BACKGROUND: Altered emotional processing, including reduced facial expressivity and defective facial emotion recognition, have been reported in Parkinson's disease (PD). However, only few study have objective investigated the kinematic abnormalities of facial expressivity in PD. Again, the possible relationship between altered facial emotion expressiveness and recognition in PD are unclear.

OBJECTIVE: To investigate possible deficits in facial expression and recognition and their relationship, if any, in PD.

METHODS: Eighteen patients with PD and 16 healthy controls were enrolled in the study – *TABLE 1*. Facial expressions were recorded using a 3D optoelectronic system and analysed using the facial action coding system – *FIGURE 1*. We investigated deficit in emotion recognition using the Ekman test. Participants were assessed in one experimental sessions.

	PD patients	HS	P values
Gender ratio	7F/11M	6F/10M	0.93
Age	58.8±5.5	61.2±9.8	0.54
Education	11.8±4.2	10.8±4.3	0.65
Disease duration	5.9±2.3	-	-
MDS-UPDRS (part III)	16.9±3.9	-	-

TABLE 1. Demographic and clinical characteristics of participant groups. Parkinson's disease (PD); females (F), males (M). Age, education and disease duration are expressed in years. Data given are means ± 1 standard deviation.

FIGURE 1. The 3D optoelectronic system (SMART motion system, BTS, Engineering, Milan, Italy) comprises three infrared cameras - sampling rate, 120 Hz (left panel) able to follow the displacement of 21 reflective markers (central panel) taped on the face of subjects (right panel).

RESULTS: Patients had reduced expressivity of all the six basic emotions in comparison to healthy controls - *TABLE 2*. Patients also yielded worse scores than healthy controls in the Ekman global scores and for individual scores of disgust, sadness and fear- *FIGURE 2*. Emotion recognition and expressivity deficits did not correlate each other or with clinical and demographic features.

	Peak Velocity			Amplitude		
	PD Patients	HS	P values	PD patients	HS	P values
Anger						
Brown Lowerer - AU4	23.57±4.51	32.89±4.77	0.147	3.25±0.60	4.69±0.81	0.144
Upper Lip Raiser - AU10	22.21±3.45	39.74±4.90	0.009*	2.17±0.28	5.76±1.31	0.011*
Jaw Drop - AU26	50.07±11.38	131.29±63.41	0.205	7.18±1.41	12.17±2.46	0.080
Disgust						
Nose Wrinkler - AU9	22.02±4.85	42.50±6.54	0.017*	3.58±0.56	6.68±0.79	0.002*
Lip Corner Depressor - AU15	23.78±3.83	33.23±9.54	0.345	4.81±0.99	6.87±1.13	0.180
Jaw Drop - AU26	33.83±6.77	52.14±13.46	0.218	7.33±1.51	10.77±2.34	0.217
Fear						
Inner Brown Raiser - AU1	18.15±2.44	35.67±3.57	<0.001*	2.30±0.38	3.52±0.35	0.030
Outer Brown Raiser - AU2	27.58±2.78	47.91±7.00	0.012*	2.80±0.42	4.50±0.45	0.011*
Jaw Drop - AU26	45.28±9.54	123.42±28.60	0.010*	8.75±2.32	14.12±3.68	0.215
Happiness						
Cheek Raiser - AU6	17.74±4.17	40.44±6.60	0.005*	2.53±0.37	6.03±0.95	0.001*
Lip Corner Puller - AU12	30.26±4.76	53.03±7.17	0.011*	5.01±0.57	8.98±1.16	0.003*
Sadness						
Brown Lowerer - AU4	7.82±1.09	13.91±2.17	0.014*	1.31±0.24	1.97±0.34	0.116
Lip Corner Depressor - AU15	9.86±1.61	18.57±2.49	0.005*	1.70±0.27	3.36±0.43	0.002*
Surprise						
Inner Brown Raiser - AU1	25.90±3.35	46.14±4.99	0.002*	2.88±0.40	4.04±0.52	0.086
Outer Brown Raiser - AU2	32.26±3.60	54.26±4.44	<0.001*	3.66±0.39	4.86±0.41	0.045
Jaw Drop - AU26	60.59±9.07	156.20±41.02	0.022	10.09±1.95	17.20±4.89	0.169

TABLE 2. Kinematic variables of facial emotion expressions in patients with Parkinson's disease (PD) and in healthy subjects (HS). Plus and minus values are mean±1SEM. Data of all the action units (AU), except AU26, are pooled from both hemi-faces. Asterisks indicate statistically significant between group difference.
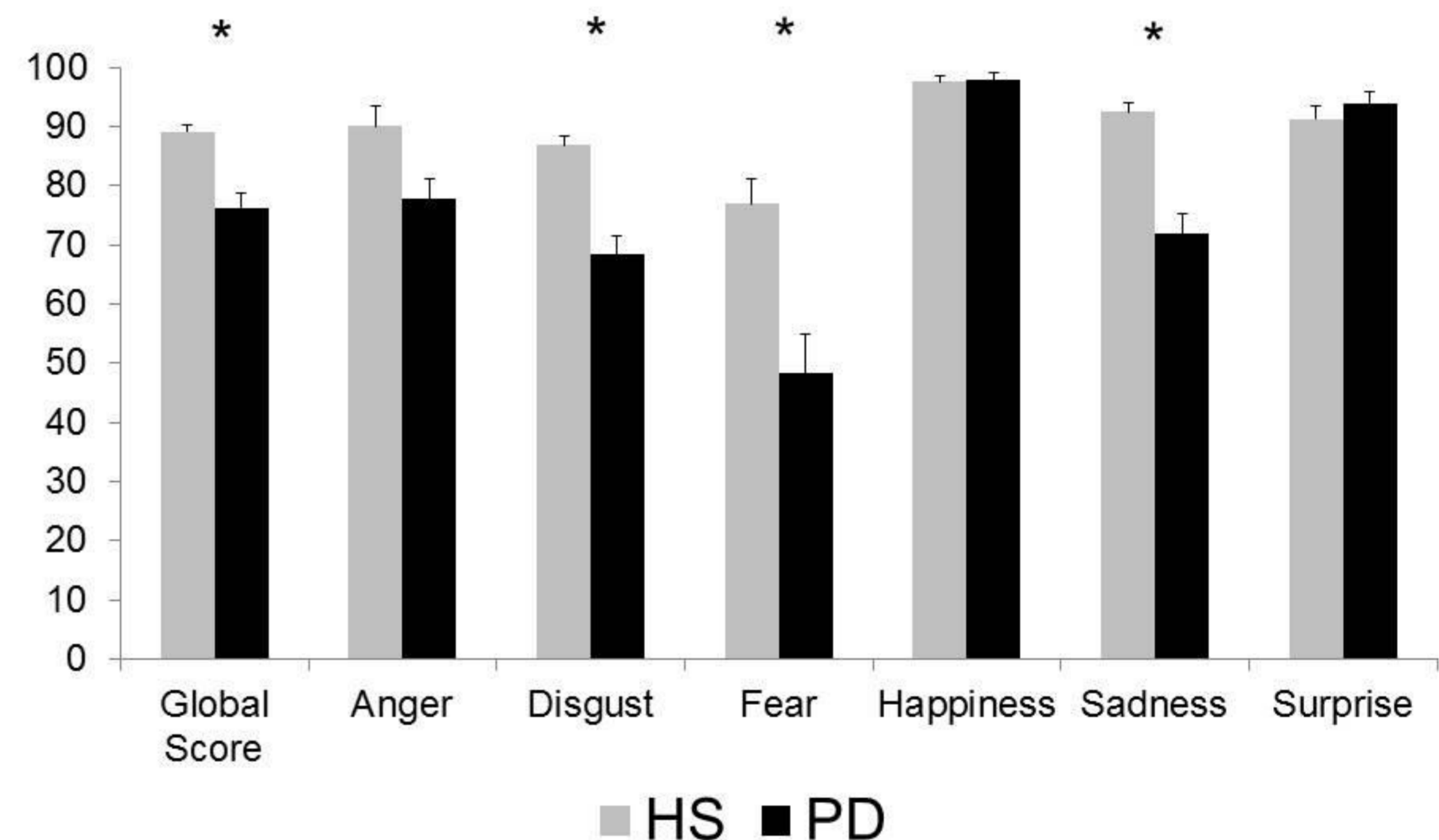

FIGURE 2. Results of the Ekman 60 Faces test in healthy subjects (HS) – grey histograms, and in patients with Parkinson's disease (PD) – black histograms. The X axis indicates the global score and sub-scores for the six basic emotions during the Ekman test; the Y axis indicates the percentage of correct responses in each group. Vertical bars indicate 1 standard error of the mean. Asterisks indicate statistically significant between group difference.

CONCLUSION: The present study provides novel information on altered facial motor control and altered emotional processing in patients with PD. The lack of correlation between deficits of emotion expressivity and recognition in patients with PD suggests that the two abnormalities are mediated by different pathophysiological mechanisms.

MAJOR REFERENCES:
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