Primitive reflexes in Parkinson’s disease

Fred W Vreeling, Frans R J Verhey, Peter J Houx, Jellemer Jolles

Abstract
A standardised protocol for the examination of 15 primitive reflexes in which
the amplitude and the persistence were scored separately, was applied to 25
patients with Parkinson’s disease and an
equal number of healthy matched control
subjects. Most reflexes were found con-
siderably more often in the patients than
in the control subjects, especially the
snout, the glabellar tap, and its variant,
the nasopalpebral reflex. Only the mouth
open finger spread reflex was present
more often in the control subjects. For
all reflexes except this last, the scores for
amplitude and persistence of the reflexes
for the control group never exceeded the
scores for the patient group. Reflexes
persisted more often in the patients than
in the control subjects. Parkinsonism
alone can explain a large number of
primitive reflexes, irrespective of the
severity or duration of the disease. In
contrast, the number of reflexes was
related more closely to cognitive scales.
It is concluded that such reflexes may be
helpful in diagnosing Parkinson’s dis-
ease. In addition, a standardised protocol
for eliciting and scoring is essential for
the study of these reflexes in parkin-
sonism and other neuropsychiatric
conditions.

(J Neurol Neurosurg Psychiatry 1993;56:1323–1326)

The prevalence and clinical value of primitive
reflexes in Parkinson’s disease have been dis-
cussed by many authors.1,4 Although some of
these reflexes can be elicited in normal adults5
and in patients with focal lesions,6 they are
found more often in patients with diffuse,
hemispherical disease.7–10

The glabellar tap,5,11,12 the snout,2,10–16 and
palpomental2,14,15 reflexes are especially fre-
quently found in Parkinson’s disease. The
proportion of glabellar tap, snout, nasopalpe-
bral, suck, and grasp reflexes increases with
the severity of the disease.16 Findings for
the palpomental reflex are controversial.2,13,15
The presence of primitive reflexes increases
with cognitive impairment.2,8,10 No relationship
has been found between the reflexes and the
duration of the disease or the degree of
depression of the patient.2,10 In other studies,
the incidence of the palpomental and the
snout reflexes was not significantly different
in patients with Parkinson’s disease and
healthy, age matched control subjects.1,5
Although a positive glabellar tap reflex is con-
sidered to be an important diagnostic sign of
parkinsonism,4 it is also found in patients
with intracranial disease who do not show any
other signs, or who show symptoms of a
clearly symptomatic parkinsonism.3,6 In one
study, the glabellar tap reflex correlated best
with the extent of the lesion and not with the
site of the lesion.7 Several authors have
reported the reversal of this reflex in patients
after therapy with levodopa,11,12,15
amantadine,11 or lisuride16; other authors,
have not confirmed these findings.18
In another study, the palpomental reflex was
found to be even more reliable than the
glabellar reflex as a clinical indicator of
Parkinson’s disease.13

To summarise, the published findings and
conclusions on primitive reflexes in parkin-
sonism are often confusing, controversial,
or not readily compatible. This is not because
of false diagnoses or heterogeneity of the patient
groups studied, but mainly because of a lack
of compatibility of methodology used to elicit
and score the primitive reflexes and the small
numbers of (mutually different) reflexes in
the various studies.

Recently, we found that experienced neu-
rologists differ considerably in how they elicit
and judge primitive reflexes.19 Reliable mea-
surement in adult patients with neurological
disease therefore requires a very elaborate
protocol. A standardised protocol for the
study of a ‘primitive reflex profile’ has not
been applied in Parkinson’s disease. Most
studies have examined only one, and rarely
two or three, primitive reflexes.1,3,8,9

The aim of the present study was therefore
to apply a standardised and semiquantified
test battery of 15 primitive reflexes to patients
with Parkinson’s disease to determine the
prevalence and the clinical value of these
reflexes, compared with healthy controls, by
correlating them to parameters such as sever-
ity and duration of the disease, cognitive
functioning, and depression. The battery that
was chosen was found to have high inter-
observer and intra-observer reliability.17
The primitive reflexes included: the glabellar
tap; palmar and plantar grasp; palpomental
and pollicomental; rooting; snout; suck; head
retraction; nuchoecholalic; asymmetrical tonic
neck; mouth open finger spread (MOFS);
and palmar and plantar support reflexes. Most of these are well known in research on neurological ageing.\(^7\) The last four reflexes have potential value for use in adults.\(^1,2\) A variant of the glabellar tap reflex, the nasopalpebral reflex, was added to the battery, because of its presumed clinical value in parkinsonism.\(^3,4\)

### Method

#### SUBJECTS

Twenty-five patients with a diagnosis of primary, degenerative Parkinson’s disease were selected at random from the neurological outpatient clinic. All had undergone an extensive general and neurological examination, biochemical analysis and CT of the brain, to exclude other causes of parkinsonism.

Twenty-five healthy control subjects were matched to the patients with respect to age and sex.

All patients underwent the following examinations (table): the reflex battery; the Webster rating scale for severity of disease;\(^2\) the Hoehn and Yahr scale for staging of parkinsonism;\(^3\) the global deterioration scale (GDS);\(^5\) and the mini mental state examination (MMSE)\(^6\) for assessment of cognitive functioning; and the Zung depression scale.\(^7\)

The control subjects underwent a neurological examination including the reflexes; none of them showed any neurological sign, or mental deterioration or depression in neurocognitive testing.

#### PROTOCOL OF THE PRIMITIVE REFLEX BATTERY

Briefly, a basic position was described and the subject was given instructions as to what was expected of him or her—for example, sitting or standing; eyes open or closed, etc.). The subject was not informed about the nature of the expected response, but was always informed about the nature of the stimulus in order to prevent startle reactions, which might influence the re-elicited response. Every reflex was measured at least three times, with about two seconds between each elicitation, except for the glabellar tap and the nasopalpebral reflexes, which were applied two times per second. All reflexes were assessed for amplitude and persistence, as proposed by other investigators.\(^4,13\) If apt, the reflexes were elicited on both sides.

#### Table Characteristics of patients and control subjects

<table>
<thead>
<tr>
<th></th>
<th>Patients</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of subjects</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Age (years)</td>
<td>66.5 (9-5)</td>
<td>67.5 (9-5)</td>
</tr>
<tr>
<td>Age range (years)</td>
<td>40-84</td>
<td>40-82</td>
</tr>
<tr>
<td>Sex</td>
<td>18 M/7 F</td>
<td>18 M/7 F</td>
</tr>
<tr>
<td>GDS</td>
<td>2.0 (0-9)</td>
<td>1.0</td>
</tr>
<tr>
<td>MMSE</td>
<td>27.4 (2-4)</td>
<td>N/A</td>
</tr>
<tr>
<td>MMSE (range)</td>
<td>21-30</td>
<td>N/A</td>
</tr>
<tr>
<td>Zung depression scale</td>
<td>32.6 (8-0)</td>
<td>N/A</td>
</tr>
<tr>
<td>Hoehn and Yahr</td>
<td>2.3 (0-9)</td>
<td>N/A</td>
</tr>
<tr>
<td>Webster</td>
<td>11.5 (4-4)</td>
<td>N/A</td>
</tr>
<tr>
<td>Parkinsonism since (years)</td>
<td>8.0 (6-2)</td>
<td>N/A</td>
</tr>
<tr>
<td>Diagnosed since (years)</td>
<td>6.4 (5-4)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Unless indicated otherwise, mean values are given. Numbers in parentheses denote standard deviations.

GDS = Global deterioration scale; MMSE = Mini mental state examination; N/A = not applicable.

### Results

The prevalence of primitive reflexes in patients and control subjects is shown in the figure. The prevalence increased with age in the control group (p < 0.01), but not in the patient group. The average number of reflexes per individual was, irrespective of age, however, considerably higher in the patients than in the control subjects: 2.4 ± 0.8; and 2.2 ± 0.7, respectively. For patients younger than 60 years this was 3.9 (SD 0.2), between 60 and 70 years 5.4 (SD 0.5), and for those older than 70 years 3.7 (SD 1.9). There was no difference between men and women.

All but one of the reflexes occurred more frequently in patients than in the control subjects. The overall difference in frequencies per reflex was significant (p < 0.01). The glabellar tap and snout reflexes occurred in nearly all patients (96 and 92%, respectively). These reflexes were also present in 12 and 20% of the control subjects, respectively. The nasopalpebral reflex was present in 88% of the patients but in none of the control subjects. The palmolental and palmothenal reflexes were also found more often in patients than in the control group; so were the suck and left nuchaloccephalic reflexes, albeit to a lesser extent. Only the left MOFS was present more often in the control subjects (20%) than in the patients (4%). Six reflexes (asymmetric tonic neck, palmar and plantar grasp, head retraction, rooting, and plantar support) were absent in both groups.

In the control subjects, amplitudes were never scored as ‘strong’ and only four out of 21 responses were persistent (19%). In the patients, the amplitude was scored as ‘strong’ six times, of which four were for the snout reflex; more than half of the responses, however, (64 out of 118) were scored as ‘persistent’ (54%). The most frequently persisting reflexes were the glabellar tap (19/24), the nasopalpebral (11/22), the snout (19/23), and the suck reflexes (5/8). Only the persistence of reflexes, not the amplitude, was related to the patient group.
The average number of reflexes did not increase with the duration of the disease, which was estimated retrospectively after the initial symptoms (range 2–25 years, mean 8-0, SD 6-2), or with the number of years since the diagnosis of Parkinson's disease had been established by a physician (range 1–22 years, mean 6-4, SD 5-4). Hoehn and Yahr, and Webster scores were closely related (p < 0-01), but did not show a significant correlation with the number of primitive reflexes. The number increased with the GDS: patients in stage 1–2 (n = 18) showed an average of 4-2 reflexes; patients in stage 3–4 (n = 9) showed 5-6 (p < 0-01). MMSE ratings were also weakly related (p < 0-05). Depression did not correlate with reflexes, but it did with the time since the diagnosis (p < 0-05), was established. Age did not correlate with the number of reflexes, but it did—slightly—with the Webster, Hoehn and Yahr, GDS, and MMSE scores (p < 0-05).

Discussion
Once an individual has definite symptoms of Parkinson's disease, some primitive reflexes show up and persist. The number of reflexes does not increase with the duration or severity of the disease. The correlation with the MMSE and GDS is compatible with the view that these reflexes are a sign of diffuse cerebral dysfunction, rather than a symptom of a distinct neurological disease.3,6,9,10,12,27

Our results confirm other findings concerning the most frequently found reflexes. Some state that the persisting gelabellar tap sign is probably the best corroborative test in Parkinson's disease.10,14 Gimenez-Roldan et al13 found the palommental reflex to be an even more reliable clinical indicator. Our results are not in agreement with this, but they do agree on the amplitude and persistence of the palommental reflex. The (re-)appearance of the nasopalpebral reflex is interesting, from an ontogenic as well as from a historical point of view.20 In our study, compared with healthy control subjects, this reflex seems to have an almost equally great sensitivity, and an even greater specificity for parkinsonism than the gelabellar tap reflex. The snout reflex equals the gelabellar sign as to specificity and sensitivity. The asymmetry of the nuchoechocephalic reflex was not associated with unilateral parkinsonism, in contrast to the palommental reflex in Maertens de Noordhout's study.4

We could not test the negative correlation between the gelabellar tap and the palommental reflexes and dyskinesia reported by Iriarte et al,28 since too few patients showed dyskinesia. As for the reversal of reflexes—for example, the gelabellar tap, after starting levodopa, lisuride, or amantadine treatment, we could not test this because our patients were on a stable drug regimen. Levodopa was taken by 56% of the patients, amantadine by 48%, and the combination of both drugs by 16%. The gelabellar sign was present in 96% of our patients, and 79% of these positive responses showed persistence. According to some authors, looking for these reflexes could give an objective, although indirect, evaluation of the patient's dopaminergic status.4,11,12 This was not confirmed by Huber and Paulson.29

Our findings do not support the view of Messina et al14, and Klawans et al21 about the habituation or reversal of the gelabellar sign.

The present findings suggest that the gelabellar tap, nasopalpebral, and snout reflexes, and especially their persistence, may be of relevance in the examination of patients with Parkinson's disease, in view of suggestions that these reflexes may be the best or both, are correlated with the degree of cerebral degeneration.7,6,8,10,12,17 A standardized protocol on how to elicit and score primitive reflexes is required for the study of a broad profile of these signs in neuropsychiatric disorders.

8 Bakchine S, Lacomblez L, Pallison E, Laurent M, Derouesne C. Relationship between primitive reflexes, extra-pyramidal signs, reflective apraxia and severity of
21 Webster DD. A method of measuring the dynamic characteristics of muscle rigidity, strength and tremor in the upper extremity. J Neurol Neurosurg Psychiatry 1999;6:159-64.
Primitive reflexes in Parkinson's disease.

F W Vreeling, F R Verhey, P J Houx and J Jolles

*J Neural Neurosurg Psychiatry* 1993 56: 1323-1326
doi: 10.1136/jnnp.56.12.1323

Updated information and services can be found at:
http://jnnp.bmj.com/content/56/12/1323

These include:

**Email alerting service**
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/