

## REVIEW

## The palmomental reflex: a useful clinical sign?

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The palmomental reflex, an involuntary contraction of the mentalis muscle of the chin caused by stimulation of the thenar eminence, can be tested easily and rapidly. Its presence may alert the clinician to the possibility of cerebral pathology. However, the reflex is often present in normal people and may be absent in disease states. Testing merely for the presence or absence of the reflex therefore lacks both specificity and sensitivity. A strong, sustained, and easily repeatable contraction of the mentalis muscle, which can be elicited by stimulation of areas other than the palm, is more likely to indicate cerebral damage.

Stimulation of the thenar eminence can cause an involuntary contraction of the mentalis muscle of the chin. This reflex is known as the palmomental or palm-chin reflex.

This reflex was first described by Marinesco and Radovici in 1920.<sup>1</sup> In a young patient with amyotrophic lateral sclerosis they observed a slow, sustained contraction of the ipsilateral chin muscles in response to stroking the palm with a pin or light touch to the thenar eminence. The reflex could also be elicited by stimulating other areas of the skin or by urethral catheterisation, though the response was less pronounced. The reflex was first believed to signify damage to the pyramidal tract but it was later shown in many normal people.<sup>1</sup> However, in healthy people the trigger or release area was found to be confined to the palm and the response was weaker, short lived, and easily fatiguable.

The palmomental reflex is described in textbooks of neurology and books on clinical examination,<sup>2,3</sup> but some authors have questioned its diagnostic value.<sup>4</sup> Here we review the evidence on the epidemiology, pathophysiology, and clinical importance of the palmomental reflex. We have collected these data from English language papers identified in Medline, from searching the bibliographies of all papers found, and from the seminal publications of Marinesco and Radovici.

## EPIDEMIOLOGY

The reflex may be present in healthy people of all ages. The prevalence of the palmomental reflex is unknown because of the variability in the means of eliciting the reflex and the interpretation of its presence (table 1).<sup>5–8</sup>

In an early study of workhouse residents in Bucharest there was no increase in the prevalence of the reflex with advancing age.<sup>9</sup> The prevalence rates for the 50 to 60 age group and the 80 to 90 age group were 66% and 61%, respectively. However, the study included only 18 people between the ages of 80 and 90 years and 3 people over the age of 90. Subsequent studies suggested that the prevalence of the reflex falls during childhood and then increases during adult life.<sup>5,10,11</sup> It occurs in between 2.5% and 50% of healthy adults between 20 and 60 years of age.<sup>1,6,7,10–14</sup> A large Japanese study reported respective prevalence rates of 2.5% and 53.5% in students and older hospital patients.<sup>8</sup>

## HOW TO ELICIT A PALMOMENTAL REFLEX

Since the original description, several methods of eliciting the reflex have been proposed.<sup>1</sup> Most authors suggest stroking the thenar eminence in a proximal to distal direction using a sharp object such as the pointed end of a reflex hammer, key, paper clip, or fingernail.<sup>6,7,11</sup> The stimulus should cause discomfort but not pain. Contraction of the ipsilateral, contralateral, or both mentalis muscles may then be observed.<sup>7,8</sup>

Others have elicited the reflex by stimulation of the hypothenar eminence, palmar aspect of the thumb, forearm, chest, abdomen, or even the sole.<sup>1,13,15,16</sup> The presence of such a large receptive field has led to the proposal of the term "mentalis reflex".<sup>17</sup> More recent studies confirm that the reflex's trigger area is usually confined to the palms of healthy people but can extend to a much greater area in neurological patients.<sup>13,16</sup>

## CLINICAL CHARACTERISTICS

There are different definitions of a positive response (table 1). Some have classified it as the electromyographic detection of muscle activity.<sup>18</sup> Others have defined the persisting contraction of

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**Table 1** Examples of the methods used to elicit the palmomental reflex

Author and reference	Method	Definition of a positive response
Little and Masotti <sup>5</sup>	Firmly scratching thenar eminence with an applicator stick	Contraction of mentalis muscle on two or more occasions
Jacobs and Gossman <sup>6</sup>	Briskly stroking along the thenar eminence with a key	Contraction of ipsilateral mentalis muscle
Marti-Vilalta and Graus <sup>7</sup>	Stroking the thenar eminence with the nail of the index finger by two examiners on different occasions	Weak or strong contraction of the mentalis muscle
Otomo <sup>8</sup>	Stroking the thenar eminence with a key	Five successive contractions of the mentalis muscle

the mentalis muscle on the fifth consecutive stimulation as a positive response.<sup>8</sup> Many accept a visible contraction of the mentalis muscle as a positive reaction.<sup>6,7,13</sup>

The reflex is easily exhaustible in healthy people but is less fatiguable when neurological disease is present.<sup>1,7,13</sup> Clinical gradings of the reflex based on the strength of contraction of the mentalis muscle have been proposed.<sup>10</sup> Studies have confirmed the original observations of Marinesco and Radovici; there are weaker responses in healthy people and stronger responses in neurological patients.<sup>7</sup> The reflex may disappear during recovery from subarachnoid haemorrhage and subdural haematoma.<sup>19</sup> The presence and strength of the response also vary according to the person's level of anxiety or arousal. In a study of army recruits there was rise in the incidence of the reflex immediately before rifle practice.<sup>20</sup>

The reflex is not of value in identifying the site of cerebral pathology.<sup>19</sup> In nine patients with a unilateral palmomental reflex, five had bilateral lesions, two had contralateral lesions, and two had an ipsilateral injury.

### NEUROPHYSIOLOGICAL CHARACTERISTICS

The use of needle electrodes to record action potentials within skeletal muscle (electromyography) has shown the universal presence of the palmomental reflex in patients and medical student volunteers.<sup>17</sup> A stimulus of sufficient strength produces a contraction of the mentalis muscle in all subjects.

Caccia *et al*<sup>18</sup> provide detailed electromyographic data on the palmomental reflex in volunteers between the ages of 23 and 48. They observed the reflex electromyographically but not clinically in 16 of 23 (70%) healthy people. An ipsilateral response was recorded in 13, a bilateral response in two, and a contralateral response in one. In most cases the first stimulus would elicit an early (R1) and a late (R2) response. The mean latencies of the first and second responses were 30 ms and 112 ms, respectively. Stimuli delivered at a rate of 0.5 Hz led to a fusion of the responses by the fourth stimulus. The response disappeared by the 10th stimulus in all cases.

Two different neural pathways may account for the wide range of latencies.<sup>18</sup> The common afferent pathway consists of the cutaneous and muscular receptors of the thenar eminence and the median nerve. The common efferent pathway involves the motor nuclei of the facial nerve. Longer latencies may involve the thalamus and motor cortex and shorter latencies may result from brainstem integration of the reflex.<sup>18</sup>

A further study examined the neurophysiological characteristics of the palmomental reflex in untreated and treated parkinsonian patients and controls of a similar age.<sup>21</sup> On stimulation of the thenar and hypothenar areas, no difference was found between the prevalence of the reflex in patients and that in controls. Habituation and contralateral response rates were similar in patients with Parkinson's disease and in controls. A shorter reflex latency and duration were seen in the parkinsonian patients. Stimulation of the hypothenar eminence in the younger controls of the previous electromyographic study did not elicit the reflex.<sup>18</sup> Bilateral or contralateral responses were more frequently observed in parkinsonian patients than in younger people.<sup>18,21</sup>

These observations have led to suggestions that cortical inhibition of reflex and decussating brainstem pathways is lost with aging and disease states.<sup>18,21</sup>

### SPECIFIC MEDICAL CONDITIONS

The reflex is commoner in patients with such neurological diseases as stroke, multiple sclerosis, motor neurone disease, and cerebral tumours.<sup>7,8,13,19</sup> It is also commoner in those who have suffered severe head injuries.<sup>19</sup>

A high prevalence has been reported in Down's syndrome,<sup>5,22</sup> AIDS,<sup>23</sup> and vibroacoustic disease.<sup>24</sup> (Vibroacoustic disease is a systemic disorder caused by exposure to large

pressure amplitude, low frequency noise. The disease is characterised by a proliferation of the extracellular matrix of connective tissue. It may lead to cognitive problems, balance disorders, and epilepsy.) The conclusions of the first two studies must be treated cautiously, as there were no healthy controls. The presence of the reflex does not correlate with functional ability in cases of Down's syndrome, but the reflex is increasingly prevalent with advancing stages of HIV disease.<sup>23</sup>

Some report a higher prevalence in Parkinson's disease with the reflex becoming commoner and stronger with the degree of akinesia.<sup>25,26</sup> Others have found a similar prevalence in Parkinson's disease and healthy people.<sup>27</sup> Huber and Paulson<sup>28</sup> were unable to find a change in reflex prevalence related to levodopa administration but confirmed that the reflex was commoner in advanced disease.

### THE PALMOMENTAL REFLEX IN PSYCHIATRY

The palmomental reflex is commoner in patients with organic and functional psychoses than in age matched controls.<sup>29</sup> In a survey of schizophrenic patients with and without tardive dyskinesia, there were no significant differences in the prevalence of the palmomental reflex.<sup>30</sup> However, the snout, corneomandibular, and glabellar reflexes were commoner in patients with involuntary movements.

Several authors have examined the prevalence of the palmomental reflex in patients with dementia. Paulson and Gottlieb's study of 85 "senile" patients, with a mean age of 62 years, reported a prevalence rate 21%.<sup>31</sup> In Alzheimer's disease reported prevalence rates range from 2.5%<sup>32</sup> to 54%.<sup>33</sup> In the study reporting the lower prevalence rate, 41% of the participants were living at home, whereas in the second study all participants lived in a care home. However, two other studies have failed to find an association between the presence and intensity of the reflex with cognitive and functional impairment.<sup>34,35</sup> In a study of 20 patients with vascular dementia the reflex was present in over 70%.<sup>36</sup>

In a large Canadian study the primitive reflexes of 2900 older people were examined.<sup>37</sup> The palmomental reflex was present in 7.8% of cognitively intact people, 15.8% of the cognitively impaired people, and 25.8% of those with dementia. The authors concluded that the palmomental reflex is not sensitive enough to act as a marker of dementia.

### THE PALMOMENTAL REFLEX IN CHILDREN

The reflex can be elicited in most small premature infants regardless of whether they are awake, asleep, or comatose.<sup>38</sup> In an electromyographic study of 18 full term infants between one and six days old, the reflex was present bilaterally in 17 of the infants and unilaterally in one.<sup>39</sup> A clinical study of infants between the second and fifth day of life found that the reflex was present in 25%.<sup>7</sup> This contrasts with a study of infants between 1 and 21 days of age, which suggested a prevalence rate of 6.6%, increasing to 13% after feeding.<sup>11</sup> Another clinical study reported a prevalence rate of over 60% between birth and two years, falling to about 10% between the ages of 9 and 14.<sup>5</sup> The reflex has a similar prevalence in healthy adults and adolescents with behavioural disorders.<sup>40</sup>

### SUMMARY

The palmomental reflex can be tested easily and rapidly. Its presence may alert the clinician to the possibility of cerebral pathology. However, the reflex is often present in normal people and may be absent in disease states. Testing merely for the presence or absence of the reflex therefore lacks both specificity and sensitivity. A strong, sustained, and easily repeatable contraction of the mentalis muscle, which can be elicited by stimulation of areas other than the palm, is more likely to indicate cerebral damage.

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