



Late cortical positivity and cardiac responsivity in female dental phobics when exposed to phobia-relevant pictures

Verena Leutgeb*, Axel Schäfer, Anne Schienle

University of Graz, Institute of Psychology, Department of Clinical Psychology, Austria

ARTICLE INFO

Article history:

Received 20 July 2010

Received in revised form 4 January 2011

Accepted 9 January 2011

Available online 14 January 2011

Keywords:

Dental phobia

EEG

ERP

Heart rate

Late positive potential

Disgust

Fear

ABSTRACT

Objectives: Dental phobia is currently classified as a specific phobia of the blood-injection-injury (BII) subtype. In another subtype, animal phobia, enhanced amplitudes of late event-related potentials have consistently been identified for patients during passive viewing of disorder-relevant pictures. However, this has not been shown for BII phobics, and studies with dental phobics are lacking. Findings on cardiac responses in BII phobia during exposure are heterogeneous, as some studies showed a diphasic pattern of heart rate acceleration and deceleration, whereas others observed pure acceleration. In contrast, heart rate increase has consistently been shown for dental phobics, resembling the reaction of animal phobics. Moreover, the BII subtype is characterized by elevated disgust reactivity whereas the role of habitual disgust proneness in dental phobia is unclear.

Methods: We recorded the electroencephalogram and the electrocardiogram from 18 dental phobic and 18 healthy women while they watched pictures depicting dental treatment, disgust, fear and neutral items.

Results: Phobics relative to controls showed an enhanced late positive potential (300–700 ms) and heart rate acceleration towards phobic material, reflecting motivated attention and fear. Affective ratings revealed that dental phobics experienced significantly higher levels of fear than disgust during exposure to phobia-relevant material. Patients' elevated habitual disgust proneness was restricted to specific domains, such as the oral incorporation of offensive objects.

Conclusion: The psychophysiology of dental phobia resembles the fear-dominated subtypes of specific phobia reported in earlier studies. Future studies should continue to investigate whether the current classification of this disorder as BII phobia needs to be reconsidered.

© 2011 Elsevier B.V. All rights reserved.

1. Introduction

Diagnostic criteria of dental phobia refer to the fear of dentistry and of receiving dental care as well as to pronounced avoidance behavior. The symptoms lead to significant interference with the patients' well-being and have a negative impact on their dental as well as general health status (Armfield et al., 2009; Hägglin et al., 2001; Locker, 2003; Mehrstedt et al., 2004; Meng et al., 2007; Schuller et al., 2003). With a reported prevalence rate of 2–3% (Fredrikson et al., 1996; Oosterink et al., 2009) dental phobia is rather common in Western countries. Most studies found that women are more likely to suffer from this disorder than men (Heft et al., 2007; Enkling et al., 2006; Locker et al., 1996; Mehrstedt and Tönnies, 2002). According to the Diagnostic and Statistical Manual of Mental Disorders (DSM IV-TR, APA, 2000), dental phobia belongs to the blood-injection-injury (BII) subtype of specific phobia. Phobia-relevant situations are the sight of

blood and injuries, receiving injections and/or undergoing medical procedures (e.g., dental treatment).

To our knowledge, there are no published studies on electrocortical correlates of dental phobia during symptom provocation. In striking contrast, there are numerous EEG studies on the animal subtype of specific phobia. Very consistently, these studies observed enhanced amplitudes of late event-related potentials (ERPs) like the P300 and the late positive potential (LPP) for spider and snake phobics relative to non-phobic controls during the viewing of disorder-relevant pictures (e.g., Kolassa et al., 2005, 2006; Leutgeb et al., 2009, 2010; Michalowski et al., 2009; Miltner et al., 2005; Mühlberger et al., 2006; Schienle et al., 2008). This late positive wave has been interpreted to reflect greater activity in brain systems processing different stimulus features, including their motivational relevance. Especially disorder-relevant material leads to an enhanced automatic allocation of processing resources in patients which provokes pronounced late positivity (Cuthbert et al., 2000).

In contrast to the multitude of studies on animal phobias, there is only one published study on blood phobia employing a passive viewing paradigm (Buodo et al., 2006). This EEG investigation failed to find ERP enhancement to disorder-relevant material in the clinical group. Blood phobics and controls did not differ in their P300 and LPP

* Corresponding author. University of Graz, Institute of Psychology, Department of Clinical Psychology, Universitätsplatz 2/III, A - 8010 Graz, Austria. Tel.: +43 316 380 8507; fax: +43 316 380 9808.

E-mail addresses: verena.leutgeb@uni-graz.at (V. Leutgeb), axel.schaefer@uni-graz.at (A. Schäfer), anne.schienle@uni-graz.at (A. Schienle).

amplitudes while viewing phobia relevant pictures. The absence of increased late positivity was interpreted to result from contrary response tendencies in blood phobics. They showed a comparable degree of attention and avoidance as well as similar flight and freezing tendencies when confronted with the phobic situation. These opposing response tendencies might have led to a suppression of ERP amplitudes. Moreover, the authors speculated that the absence of an attentional bias in blood phobia might be related to the joint occurrence of disgust and fear. Whereas fear is associated with action tendencies, disgust leads to inhibition and freezing. However, in a more recent study employing a forced selection paradigm, [Buodo et al. \(2010\)](#) reported allocation of visuo-spatial attention to disorder-specific materials in blood phobics. Injury and disorder-irrelevant attack pictures were presented in pairs with neutral pictures and patients had to focus on a visual detection task. Only in blood phobics, but not in controls, injury pictures elicited an enhanced N2pc (180–240 ms after picture onset).

Findings on heart rate changes in BII phobia during confrontation are heterogeneous (for a review, see [Ritz et al., 2010](#)). Many studies showed a diphasic reaction pattern ([Cook et al., 1988](#); [Elsesser et al., 2006](#); [Lang et al., 1983](#); [Nesse et al., 1985](#)) which is also described in the DSM IV-TR. This reaction consists of an initial transitory increase in heart rate and blood pressure, which is followed by a marked decrease in these parameters. These changes in cardiac output, blood pressure, and respiration can lead to reductions in cerebral blood flow and finally to fainting ([Graham et al., 1961](#); [Ritz et al., 2010](#); [Stephoe and Wardle, 1988](#)). Indeed, it is the fear of fainting which is often the central concern of patients with blood-related fears ([Page and Martin, 1998](#)). According to the DSM IV-TR about 75% of patients afflicted with BII phobia report a history of fainting in phobia-relevant situations.

In striking contrast, other studies (e.g., [Sarlio et al., 2002, 2008](#)) failed to find a diphasic response, and showed pure heart rate increases in blood phobics during exposure. Similarly, dental phobics display increases in heart rate during symptom provocation ([Elsesser et al., 2006](#); [Johnsen et al., 2003](#); [Lundgren et al., 2001, 2004](#); [McNeil et al., 1993](#); [Schmid-Leuz et al., 2007](#)) which is also typical for phobias from the animal subtype ([Hamm, 1997](#)). The somatic response is often accompanied by fears of pain and loss of control (e.g. [Armfield, 2008](#)).

Recently, it has been argued that some specific phobias might be rather disgust-based than fear-based (e.g., [Cisler et al., 2009](#); [Power and Dalglish, 2008](#)). In blood phobia fainting might reflect an intense disgust response ([Page, 2003](#)) as feelings of disgust are associated with heart rate deceleration (e.g. [Stark et al., 2005](#)). For dental phobia, only moderately positive correlations with overall disgust proneness have been reported in two studies ([Armfield, 2008](#); [Merckelbach et al., 1999](#)), whereas one study found no correlation ([de Jongh et al., 1998](#)). However, these studies might have overlooked elevated sensitivity in dental phobia regarding specific disgust domains such as core disgust, which is defined by [Rozin et al. \(2000\)](#) as an oral defense in relation to potential foods and their contaminants (e.g., body products, and “dirty” animals such as rats or cockroaches). Core disgust motivates an organism to reject such substances (e.g., by gagging or vomiting). As dental phobics perceive the placement of dental instruments in their mouths as very aversive, domain-specifically enhanced disgust for oral incorporation might be found.

The current study was designed to identify central electrocortical and cardiac response features in dental phobics during symptom provocation. Moreover, the present investigation aims to discuss results in relation to previously reported reactions in BII phobia and animal phobia. The classification of dental phobia within the BII category has previously been questioned and it has been argued that dental phobia might be a specific phobia independent from the BII subtype ([de Jongh et al., 1998](#)). We expected dental phobics to display an increased late positive potential and increased heart rate in

response to phobia-relevant pictures compared to controls. Furthermore, we expected elevated core disgust proneness in dental phobics.

2. Materials and methods

2.1. Participants

Eighteen right-handed, medication-naïve, female patients suffering from dental phobia (DSM IV-TR: 300.29) and eighteen non-phobic women (control group) participated in the study. They were recruited via an article in a local newspaper and announcements at the campus. Diagnoses were made by a board-certified clinical psychologist. The non-phobic females did not differ from the patient group with respect to age (phobics: $M (SD) = 27.6 (5.9)$ years; controls: $M (SD) = 26.3 (7.3)$ years). All participants gave written informed consent after the nature of the study had been explained to them. The study was approved by a local ethics committee. Patients were transferred to psychotherapy if interested.

2.2. Procedure

First, participants underwent a diagnostic session consisting of a clinical interview (Mini-DIPS, [Margraf, 1994](#)). They filled out the Dental Anxiety Scale (DAS; [Corah, 1969](#)), which consists of four questions targeting subjective anxiety during anticipation and actual dental treatment (Kuder–Richardson formula coefficient = .86). In the current study, we used the suggested cut-off score of 13 points (≥ 13 = phobic; < 13 = control). Moreover, participants filled out the Dental Cognitions Questionnaire (DCQ; [de Jongh et al., 1995](#)), which describes 38 negative cognitions about dental treatment that are widely experienced by dental phobics (Cronbach's alpha = .89). Furthermore, they completed the Blood-Injection Symptom Scale (BISS, [Page et al., 1997](#)), which consists of 17 items measuring fear of blood and injections (Cronbach's alpha = .89). Additionally, they filled out the Questionnaire for the Assessment of Disgust Sensitivity (QADS; [Schienle et al., 2002](#)), which consists of five subscales (death/deformation, body secretions, spoilage/decay, poor hygiene and oral rejection). Their internal consistencies (Cronbach's alpha) range between .69 and .90. Moreover, patients filled out the trait scale of the State-Trait Anxiety Inventory (STAI; [Laux et al., 1981](#); Cronbach's alpha = .90). Additionally, patients completed the Beck Depression Inventory (BDI; [Hautzinger et al., 1993](#)) which has a Cronbach's alpha of .74 for healthy subjects and of .92 for depressed patients. All participants of the current study had to display a nonclinical BDI score ≤ 11 points to be included in the sample. Patients were screened especially for anxiety and mood disorders, but also for psychotic and personality disorders. Patients who suffered from any other mental disorder than dental phobia were excluded. Control group participants who suffered from any mental disorder were excluded.

In a subsequent experimental session participants were exposed to a total of 120 pictures representing four different emotional categories: ‘Phobia’, ‘Fear’, ‘Disgust’ and ‘Neutral’ during electroencephalogram (EEG) and electrocardiogram (ECG) recording. Pictures were partly selected from the International Affective Picture System (IAPS, [Lang et al., 1999](#)), partly from a picture set belonging to the authors (e.g., disgusting contents ([Schienle et al., 2002](#))), and were partly generated for this study in order to specifically display dental surgery. The phobia-related stimuli depicted scenes of dental treatment. Disgust-relevant pictures represented different domains like ‘repulsive animals’ or ‘poor hygiene’. Fear-related pictures showed predators (e.g., shark, lion) or attacks by humans (e.g., with knives, pistols), whereas neutral pictures consisted of household articles. The pictures were shown in random order for 6000 ms each. Inter-stimulus intervals varied between 8000 and 12000 ms. After the experiment, participants rated their reaction to the pictures by means of the Self-Assessment Manikin (SAM; [Bradley and Lang, 1994](#)) for

Download English Version:

<https://daneshyari.com/en/article/7296060>

Download Persian Version:

<https://daneshyari.com/article/7296060>

[Daneshyari.com](https://daneshyari.com)