Journal of Affective Disorders 239 (2018) 1–10

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Review article

The association of affective disorders and facial scarring: Systematic review and meta-analysis

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ARTICLE INFO

Keywords:
Anxiety
Depression
Facial scarring
Facial trauma
Prevalence

ABSTRACT

Background: Facial scarring can have a dramatic effect on a patient's psychological health and wellbeing and present unique management challenges. This patient population remains poorly characterised in the contemporary literature.

Aims: To evaluate the prevalence of, and risk factors associated with affective disorders in adult patients with facial scars.

Methods: A systematic review was conducted using a protocol registered with PROSPERO and in line with the PRISMA statement. A comprehensive search of the literature was conducted using PubMed, MEDLINE, EMBASE, PSYCHInfo and The Cochrane Library.

Results: Twenty one studies were included, with a total of 2,394 participants. Using a random effects model, the weighted pooled prevalence of anxiety was 26.1% (95% CI 17.9%-36.3%) and the weighted pooled prevalence of depression was 21.4% (95% CI 15.4%-29.0%). Studies identified female gender, past psychiatric history and violent causation as factors associated with anxiety and depression.

Limitations: Included studies were limited to those published in peer reviewed journals. Longitudinal trends in both anxiety and depression were limited by a short duration of follow up.

Conclusions: There is a high and persistent burden of affective disorders in patients with facial scars. Additional research is required to further characterise this population and develop effective management strategies.

Introduction

It is estimated that 569,000 people are living with a facial disfigurement in the United Kingdom (Changing Faces, 2017). Aetiology for facial scarring is diverse and can be present at birth or acquired throughout life across all patient demographics (Bayat et al., 2003). In addition to physical symptoms, facial scarring can have significant psychosocial implications on a patient's health and well-being (Rumsey and Harcourt, 2004). Despite an improved understanding of scar pathophysiology and advances in surgical technique, effective treatment of facial disfigurement remains limited (De Sousa, 2008). It is, therefore, essential that the psychosocial needs of these patients are adequately assessed and addressed (Roberts and Gierasch, 2013).

The face is essential for social interaction and is thought to be the most important physical feature in formulating our perception of identity (Shaw, 1981). In a society which is pre-occupied with appearance and the pursuit of a "perfect" body image, the consequences of facial scarring can be far reaching.

Price (1990) developed one of the most recognised models of body image; consisting of three main components: body reality (the way our body actually is), body ideal (our perception of how our body should look, feel and behave) and body presentation (how our body appears to others). These components are influenced by individual coping strategies and social support networks (Price, 1990). The association of facial scarring and an altered body image is well documented in the literature (Macgregor, 1982, 1990; Rumsey and Harcourt, 2004). Facial scarring often leads to a pre-occupation with appearance, lower self confidence and negative perceptions from others; leading to an altered body image (Rumsey et al., 1986; Rumsey and Harcourt, 2004). This, in turn, creates a vulnerability to developing mental health conditions

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https://doi.org/10.1016/j.jad.2018.06.013
Received 6 April 2018; Received in revised form 29 May 2018; Accepted 4 June 2018
Available online 20 June 2018
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(Rumsey and Harcourt, 2004). As demonstrated in numerous studies, facial scarring reduces health-related quality of life (Levine et al., 2005; Stubbs et al., 2011). However, there are few studies investigating the association between facial scarring and anxiety or depression.

Anxiety is defined by pathological worry or dread, that undermines normal function, whereas depression is characterised by low mood and anhedonia (American Psychiatric Association, 2013). Left untreated, both diseases are common causes of disability with a broad impact on morbidity and mortality which are well documented in the literature (Fawcett, 1993). Symptoms of depression and anxiety are linked with increased health costs, influence patient compliance with health care, substance misuse, unemployment and poor results in education (McLaughlin, 2011). This aspect of facial scarring is often overlooked by services that are primarily concerned with physical health, leading to sub-optimal care (Bisson et al., 1997). This occurs despite numerous authoritative publications prioritise psychological rehabilitation as one of their key recommendations following facial burns or trauma (Choudhury-Peters and Dain, 2016; National Network for Burn Care, 2013).

To our knowledge, the prevalence of anxiety and depression in patients with facial has not been systemically assessed. Therefore, a systematic review and meta-analysis was performed to assess the relationship between facial scarring and anxiety and/or depression. Given the extensive research into the psychosocial repurcussions of facial scarring, as outlined above, we hypothesised that the prevelance of anxiety and depression would be higher in this population group.

Methods

2.1 Search strategy and selection criteria

A systematic review protocol was developed in accordance with the Preferred Reporting for Items for Systematic Reviews and Meta-Analyses-Protocols (PRISMA-P) and registered with PROSPERO (CRD42017075415). The search strategy was constructed in line with PRISMA guidelines (Moher et al., 2009), the Cochrane handbook (Higgins JPT, 2011), and guidance from Terwee et al (Terwee et al., 2012). To identify all papers that investigated the association of facial scarring and anxiety and/or depression, three separate constructs were explored; Facial scarring, depression and anxiety. Searches were performed in MEDLINE (Ovid), Embase (Ovid), PyschINFO (Ovid), Cochrane and CINAHL (EBSCO). An example search strategy can be seen in *Supplementary Figure 1*. Grey literature and reference lists were also searched using Google and Google Scholar. Searches were performed by two independent researchers on the same day in September 2017, with results uploaded to the reference management software package, EndNote® Version X7 (Clarivate Analytics). Duplicates were removed using the functionality in EndNote®, with all references transferred to the online programme Covidence (www.covidence.org) for title and abstract screening. References were screened by two independent reviewers (EA and JG) according to the inclusion and exclusion criteria (Table 1), with all remaining articles downloaded in full-text format and re-screened. Discrepancies were discussed between the two reviewers with a third reviewer (TD) consulted if required.

Table 1
Inclusion and exclusion criteria for choosing studies.

Inclusion Criteria	Exclusion Criteria
• Any paper describing a study looking at facial scarring and depression or anxiety. • Any cause for facial scarring. • Any scoring system for depression or anxiety. • English language studies only.	• Non-English language papers. • Studies not investigating an association between facial scarring and anxiety or depression.

Data extraction and analysis

Data was extracted from all papers included in the final review by two reviewers (EA and JG). Data pertaining to study and participant characteristics, symptoms of anxiety and/or depression and method of measurement were extracted. All data were then uploaded to Excel (2016, Microsoft Corp., Redmond, USA) for analysis.

Assessment of bias

Individual studies were assessed for risk of bias using the validated Quality in Prognosis Studies (QUIPs) tool (Hayden et al., 2013). Studies were assessed for bias in one of five domains; study participation, study attrition, outcome measurement, study confounding and statistical analysis and reporting. Each of the five domains was rated as having a high, moderate or low risk of bias. A summated score of the five domains was then calculated. Publication bias was assessed with funnel plots and Eggers test (Sterne and Egger, 2001).

Statistical analysis

Between study heterogeneity was calculated using the I^2 statistic, a description of the percentage of total variation across studies caused by heterogeneity. A value of 0% represents minimal heterogeneity and higher values represent greater heterogeneity. Pooled data that was classified as having low heterogeneity ($I^2 < 50\%$) were analysed using a fixed effects model, which assumes that studies are conducted under similar conditions (e.g same sample size, similar subjects). Pooled data that was classified as having moderate to high heterogeneity ($I^2 > 50\%$) were analysed using a random effects model, which adjusts for within and between study variability (Borenstein et al., 2010; Higgins et al., 2003).

Pooled prevalence was calculated based on dichotomous event rates and weighted based on sample size with a 95% CI. For longitudinal studies measuring prevalence at multiple time points, the prevalence at the final assessment was used for the pooled prevelance. Forest plots were generated to graphically display the results of the pooled analysis using DistillerSR Forest Plot Generator from Evidence Partners (Ottawa, Ontario, Canada). All statistical analysis was performed using the Comprehensive Meta-Analysis software package (Biostat, Englewood, New Jersey, USA).

Results

A total of 964 studies were identified using our search strategy (Fig. 1), which after review left 21 articles conducted between 1996 and 2016, in our analysis (Table 2) (Bisson et al., 1997; Choudhury-Peters and Dain, 2016; Fares et al., 2014; Gandjalikhan-Nassab et al., 2016; Gironda et al., 2009; Hoogewerf et al., 2014; Hull et al., 2003; Islam et al., 2012a; Lento et al., 2004; Levine et al., 2005; Murphy et al., 2010; Prashanth et al., 2015; Rahtz et al., 2018; Robinson et al., 1996; Sen et al., 2001; Shetty et al., 2003; Shiraz et al., 2014; Tebble et al., 2006; Ukpong et al., 2007; Ukpong et al., 2008). Fifteen studies examined the prevalence of depression (Bisson et al., 1997; Choudhury-Peters and Dain, 2016; Fares et al., 2014; Gandjalikhan-Nassab et al., 2016; Gironda et al., 2009; Hoogewerf et al., 2014; Hull et al., 2003; Islam et al., 2012a; Rahtz et al., 2018; Sen et al., 2001; Shepherd et al., 1990; Shetty et al., 2003; Shiraz et al., 2014; Ukpong et al., 2008; Versnel et al., 2012) and 13 articles examined the prevalence of anxiety (Bisson et al., 1997; Choudhury-Peters and Dain, 2016; Fares et al., 2014; Gandjalikhan-Nassab et al., 2016; Hull et al., 2003; Islam et al., 2012a; Rahtz et al., 2018; Sen et al., 2001; Shepherd et al., 1990; Shetty et al., 2003; Shiraz et al., 2014; Ukpong et al., 2008; Versnel et al., 2012); 13 articles looked at the prevalence of both anxiety and depression (Bisson et al., 1997; Choudhury-Peters and Dain, 2016; Fares et al., 2014; Gandjalikhan-Nassab et al., 2016; Hull et al., 2003; Islam

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