Hypnosis is more effective than clinical interviews:

Occurrence of trauma in fibromyalgia

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Abstract

In order to determine whether or not hypnosis is more effective than conventional interviewing to find traumatic life events in patients with fibromyalgia, a within-subject experimental design with complete intragroup counterbalancing was carried out. Thirty-two women under care in a public primary care center gave two identical interviews, with an interval of three months, in which the occurrence of traumatic life events was explored, once in state of wakefulness and once in a state of hypnosis. The state of consciousness was evaluated using three measures: bispectral index, skin conductance level and pain intensity. In the hypnotic state, the patients expressed 9.8 times more traumatic life events than in the wakefulness state, a statistically significant difference and with a large effect size.

Key words: Life events; within-subject experimental design; fibromyalgia; hypnosis; bispectral index; trauma.

Fibromyalgia is a disorder characterized by chronic generalized pain, including hyperalgesia and allodynia, and is usually accompanied by fatigue, sleep problems, rigidity in the joints and fibro-fog or mild cognitive impairment, among other symptoms. Paradigmatically psychosomatic, it is currently considered one of the medically unexplained symptoms (MUS). Its diagnosis is clinical, based on the examination of a minimum number of sensitive points in determined locations of the body (Wolfe et al., 1990). The new proposal of diagnostic criteria even eliminates the exploration, and is based exclusively on self-reporting of the severity of pain and the associated symptoms (Wolfe et al., 2010).

Diverse evidence links traumatic life experiences with fibromyalgia. On the one hand, studies exist that demonstrate the comorbidity between fibromyalgia and post-traumatic stress disorder: the probability of developing the second after suffering the first is three times greater than in the normal population (Raphael, Janal, & Nayak, 2004). On the other hand, some cross-sectional studies have compared the trauma history in fibromyalgia patients and the normal population, without finding differences, except in cases of rape (Ciccone, Elliott, Chandler, Nayak, & Raphael, 2005), while others find a significantly greater incidence of trauma history in the patients (Anderberg, Marteinsdottir, Theorell, & von Knorring, 2000). Other cross-sectional studies have focused on the differences within patient groups linked to trauma histories. For example, greater levels of child and adult victimization have been documented in patients with fibromyalgia than with rheumatoid arthritis (Walker et al., 1997). Likewise, greater levels of severity (Fernandes et al., 2011), disability (Filippon, Bassani, Aguiar, & Ceitlin, 2013) and self-harm (Sansone, Sinclair, & Wiederman, 2009) were documented in fibromyalgia patients with traumatic histories compared to fibromyalgia patients without traumatic histories.

In addition, some epidemiological studies have been carried out. In one of them, with a sample size of 10,424 people, the fibromyalgia patients (3.7% of the sample) presented significantly greater percentages of maltreatment and sexual abuse, although not of emotional abuse or detachment, nor of life threatening traumas, nor of traumatic life events (Haviland, Morton, Oda, & Fraser, 2010). In another study, with a sample of 7,342 women, the proportion of fibromyalgia patients who had suffered child abuse was 1.65:1 with respect to the rest of the sample (Fuller-Thomson, Sulman, Brennenstuhl, & Merchant, 2011). Also, some longitudinal studies have revealed, for example that: suffering a trauma prior to the diagnosis of fibromyalgia predicts greater levels of disability and use of medical services (Aaron et al., 1997); child sexual abuse is a significant predictor of suffering chronic pain at twenty-two years of age (Brown, Berenson, & Cohen, 2005); and, together with the level of depression, the history of previous traumas was the best predictor of acute pain chronification (Casey, Greenberg, Nicassio, Harpin, & Hubbard, 2008).

Through meta-analytical studies. Paras et al. (Paras et al., 2009) found an odds ratio of 1.61 in sexual abuse, and 3.35 in rape, in samples of fibromyalgia patients. Recently, Afari et al. (Afari et al., 2014) examined the association between traumatic life events and the diagnosis of functional somatic syndromes, finding an odds ratio of 2.52 in fibromyalgia patients.

An excellent review (Roelofs & Spinhoven, 2007) summarized the main findings on trauma and MUS: a) patients with MUS have greater rates of trauma; b) the best currently available explanation integrates mechanisms of dissociation, emotional regulation, attention and information processing; c) the traumas can have long term effects in the hypothalamic-pituitary-adrenal axis, a fact that occurs in MUS patients, which can increase sensitivity to stress; and, d) alterations in the activation of the central nervous system are common in patients with MUS.

In general, therefore, it seems that traumatic experiences are a factor of vulnerability for fibromyalgia sufferers. Nevertheless, the studies made show very different percentages of the presence of traumatic events in the history of fibromyalgia patients: 23% in the study of Greenfield, Fitzcharles, & Esdaile (Greenfield, Fitzcharles, & Esdaile, 1992); 35% in that of Riberto, Pato, & Battistella (Riberto, Pato, & Battistella, 2006); 47% in that of Fernandes et al. (Fernandes et al., 2011); 60% in that of Gonzalez, Baptista, Branco, & Ferreira (Gonzalez, Baptista, Branco, & Ferreira, 2013); 65% in that of Anderberg et al. (Anderberg et al., 2000); 71% in that of Haviland et al. (Haviland et al., 2010); 91% in that of Walen, Oliver, Groessl, Cronan, & Rodriguez (Walen, Oliver, Groessl, Cronan, & Rodriguez, 2001); and 96% in that of Filippon et al. (Filippon et al., 2013).

One possible explanation for the disparity of results is the nature of the trauma itself, which can remain (semi) unconscious for the person. In this regard, hypnosis is a technique that could facilitate controlled access to repressed memories and/or the dissociative experiences. Jensen et al. (M. P. Jensen et al., 2015) have recently carried out a review of the mechanisms of hypnosis. They demonstrate the role of six biological factors related to the brain: activity of the frontal cortex, activity of the anterior cingulate cortex, functional connectivity, structural connectivity, hemispheric asymmetry and electroencephalographic activity, especially that relative to the theta waves; four psychological factors: expectations, hypnotizability, motivation and absorption, and, two social factors: rapport and appropriate hypnotic context. Based on similar empirical evidence, Lynn et al. (Lynn, Laurence, & Kirsch, 2015) proposed an integrative model that includes cognitive, social and cultural factors. They maintain that hypnosis is a special, but not altered, state of consciousness, genuine but idiosyncratic, not only between individuals, but within those individuals at different moments. Although there are individual differences in suggestibility, this

can be trained, so that any person can reach a hypnotic state. In addition to the factors mentioned by Jensen et al. (M. P. Jensen et al., 2015), Lynn et al. (Lynn et al., 2015) emphasize the shared cultural meaning of hypnosis, which provokes different effects from suggestions simply by whether or not they are called hypnotic. Although people can experience the hypnotic state in terms of involuntariness and automaticity, probably due to the cultural meaning of hypnosis, research shows that the brain behaves proactively in a hypnotic state, independently of the type of electroencephalographic waves that predominate.

The objective of the present study is to verify if hypnosis promotes finding traumatic life events in fibromyalgia patients, in comparison with a conventional clinical interview.

Method

Design and variables

A within-subject experimental design was used with an independent variable and complete intragroup counterbalancing. The independent variable was the state of consciousness during the exploration, with two categories: the state of wakefulness versus the state of hypnosis, which were determined based on the bispectral index, the level of skin conductance and the verbal self-reporting of the intensity of the pain, as described in the Materials section. The dependent variable was the number of traumatic life events expressed in the interview, and determined according to the definition of traumatic life events described in the DSM-IV-TR. The complete intragroup counterbalancing consisted of the randomization of the order of the interviews: half of the patients were interviewed first in the wakeful state and then under hypnosis, and the other half were interviewed in the reverse order.

Participants and procedure

The sample comprised 32 people attending a health center, selected at random from among those which compose the South Seville Primary Care Health District, specifically the Doña Mercedes Health Center, in the town of Dos Hermanas (Seville). The inclusion criteria were: a) to be 18 years old (legal age in Spain); b) to have a diagnosis of fibromyalgia by a professional of the Andalusian Health Service; and, c) to sign the informed consent.

Authorization was requested to carry out the Study from the Ethics Committee of the South Seville Health District, and all the patients participated with consent. All the inherent rights of the people were respected and it was guaranteed that the technique did not involve any risk for their physical or psychological well-being.

Materials

Semi-structured interview

The measurement of the dependent variables, the socio-demographic variables and the descriptive clinical variables of the disorder took place in a semi-structured interview. Regarding the clinical variables, aspects common to all the studies on chronic pain were evaluated: diagnosis, previous and present treatments, pain duration, pain intensity, pain frequency, pain interference, chronicity, and medication. In this interview, the Spanish version of the Fibromyalgia Impact Questionnaire was applied (FIQ) (Monterde, Salvat, Montull, & Fernández-Ballart, 2004), which offers a score between 0 and 100, from lesser to greater impact of the illness. Additionally, the Medication Quantification Scale (MQS-III) was used (Harden et al., 2005). It is an instrument with potential clinical and research applications for quantifying medication use in chronic pain populations. The two dependent variables were, life events not related to the disease and life events related to the disease.

Hypnotic state

The patients were informed that they were going to participate in a hypnosis session, the purpose of which was to promote a better knowledge of their illness and to improve their state of health. The hypnotic state took place in three phases. The induction phase included instructions to promote relaxation by means of guided imagination and stimulation of concentration in secure surroundings for the person. In the suggestion phase, the two opening questions were asked by which the dependent variables were measured: "What events had occurred in their life when the illness appeared?" and "Do those events have any relation to the illness?" It is known that different types of induction can influence the characteristics of the hypnotic state (M. P. Jensen et al., 2015; Lynn et al., 2015; Wark, 2006). Following the recommendation of Jensen and Patterson (M. P. Jensen & Patterson, 2005), the induction in this study was made as neutral as possible, without associated suggestions (Oakley, 2008). The termination phase consisted of the slow, gradual return to consciousness. For the purpose of this study we considered all the traumas expressed in response to either of the two questions mentioned above.

Two systems of physiological monitoring of the hypnotic state were used: the bispectral index (BIS) and the level of skin conductance. The BIS is a validated electroencephalographic parameter with widely demonstrated clinical utility in Anesthesiology. It is obtained using a combination of measures originating from the processing of the EEG signal that includes bispectral analysis, power spectral analysis and time domain analysis. These measures are combined by means of an algorithm to optimize the correlation between the EEG and the clinical effects of the anesthesia, and they are quantified by means of the BIS. The BIS is a number between 0 and 100. BIS values close to 100 represent a "wide-awake" clinical state, whereas the value 0 denotes the maximum possible effect on the EEG (that is, an isoelectric EEG) (Kelley, 2010). When BIS values diminish below 70, the memory function is reduced significantly and the probability of explicit recall

descends considerably. The BIS was obtained by means of the BIS Vista monitoring system, marketed by Aspect Medical Systems, using electrodes positioned at the forehead and temple. Taking into account the parameters established by the manufacturer of the BIS Vista^{TM} system (Kelley, 2010), and taking the only related study, of which we are aware, in the field of psychology as reference (Jaber et al., 2007), we decided to establish a BIS level of between 70 and 80 as indicative of the hypnotic state we intended to obtain.

The skin conductance value (SCV) has been associated with waking, since low levels are observed during sleep, as well as with attention, since the responses are sensitive to the newness, intensity and significance of the stimulus. In the present test, the SCV was introduced as a measurement complementary to the BIS in the control of the acquisition of the modified state of consciousness. The SCV was evaluated with a digital meter, EDG1500, marketed by Psitronic, to measure the galvanic response of the skin and peripheral temperature. The cut-off point was established as 1/3 of the base score (Sobrinho et al., 2003).

Procedure and analysis

The recruitment lasted approximately two months, and was undertaken by the doctors of the Center using the appointments system of the Andalusian Health Service, whenever a patient visited who fulfilled the inclusion criteria. The first 32 patients who were willing to participate in the study were included, all which participated in its entirety.

Once recruited, the patients were randomly assigned to one of the two assessment groups, each one composed of sixteen patients. The group called ‘wakeful’ received the first assessment session in a wakeful state and then, after an interval of three months, received an identical assessment session under hypnosis. The group called ‘hypnosis’ followed the opposite time sequence. The only objective of the grouping was to control the possible influence of the order of the interventions

and not to apply it as an authentic independent variable. For that reason, after the interventions, the scores in the various measures for each patient were added, independently of the order, thereby constituting a single group of 32 patients.

The sessions were carried out, by the first author of this paper, during working day afternoons, when less people attend the health centers. They took place in a small, separate room, with a rest bed. The wakeful group of patients took part in the semi-structured interview. In the hypnosis group, this interview was conducted by means of hypnotic protocol. The BIS and SCV, together with the self-reporting of pain intensity, served to measure the state of consciousness throughout the sessions. The reason for using pain intensity is that it is an important outcome variable of hypnosis efficacy for chronic pain problems (Adachi, Fujino, Nakae, Mashimo, & Sasaki, 2014; M. Jensen & Patterson, 2006). In the hypnotic state, the patients were only asked about life events, in addition to pain intensity. The work sessions were registered in writing and recorded in audio, with previous written authorization, by informed consent, from the patients or their representatives. After six months, including the three month period between interventions, all the data were entered and then processed with the Statistical Package for Social Sciences (SPSS) version 22. Averages, standard deviations, median, maximums, minimums, absolute and relative frequencies were used for descriptive purposes. The general linear model of repeated measures was used, assuming sphericity to verify the differences of averages in the number of traumatic life events in both conditions of the independent variable, as well as control of the hypnotic state, before and after being induced. All the tests were considered statistically significant with a confidence level of $p<0.05$ (two-tailed). Also, the effect sizes in the differences of averages were computed by means of partial R^2, dividing the sum of squares of the factor between the summation of the sum of squares of the factor, the sum of squares of the error between groups, and, the sum of squares of

the within-subject error. According to the standards of partial R^2, 0.01 would indicate a small effect size; 0.06 medium; and 0.14 large.

Results

All the participants were women. The average age was 52 years (SD=7). The majority were married with a median of two children. Also, they mainly presented a level of primary studies and the most common employment situations were housewife (31%) and retired (28%).

Some 85% of the sample were diagnosed by a rheumatologist, and the rest by a primary care doctor. In addition to the usual medication in these patients (analgesics, anxiolytics and even antidepressants), 50% received acupuncture treatment, alone or in combination with other therapies, and around 15% received psychological treatment.

The average chronicity of the pain was 12.36 years (SD = 9.98), with a minimum value of 1 and a maximum of 35 years. The interference of the pain was slight (it did not prohibit or hamper daily activity) in 3% of the patients; moderate (it hampered but did not prohibit daily activity) in 56%; and severe (it prohibited daily activity) in 41%. The average impact of the fibromyalgia according to the FIQ score was 67 (SD = 13) points out of a maximum of 100.

In relation to the frequency of the pain, 87.5% of the sample referred to having daily pain. The rest, every other day (6.3%) and twice a week (6.3%). Regarding the pain duration, there was a variation between 6 and 24 hours, with the most common being a duration of 24 hours (reported by 75% of the patients).

The average score on the Medication Quantification Scale (MQS-III) (Harden et al., 2005) was 19.83 (SD = 9.42) with a minimum of 0 and a maximum of 41.2.

Control of the hypnotic state

The average BIS value prior to the induction of the hypnotic state was 96.91 (SD = 2.1), whereas within the hypnotic state it was 77.12 (SD = 6.65), a reduction that was statistically significant: [F (1.31) =284.27; p<0.001] and with a large effect size (partial $R^2 = 0.29$). The average reduction in the BIS value was 19.78 (SD = 6.64), with a minimum value of 8 and maximum of 42. The BIS values obtained for the 32 patients are shown in Figure 1.

The average SCV prior to the induction of the hypnotic state was 2.84 (SD = 1.24) whereas within the hypnotic state it was 1.42 (SD=0.73), a reduction that was statistically significant: [F (1.31) = 67.64; p<0.001] and with a large effect size (partial $R^2 = 0.33$). The average reduction in the SCV was 1.41 (SD = 0.97), with a minimum value of 0 and a maximum of 5.

The average pain intensity value prior to the induction of the hypnotic state, evaluated in a numeric scale from 0 to 10, was 6.77 (SD = 2.52) whereas in the hypnotic state it was 2.63 (SD = 2.9), a reduction that was statistically significant: [F (1.31) = 63.31; p<0.001] and with a large effect size (partial $R^2 = 0.37$). The average reduction in the pain intensity 4.14 points (SD = 2.94), with a minimum value of - 2 and a maximum of 10. On the contrary, in the wakeful state the average intensity of the pain before the interview was 7.45 (SD = 2.17), whereas after of the interview was 6.61 (SD = 2.30), a reduction that was statistically significant: [F (1.31) = 10.75; p<0.01] although with a small effect size (partial R2 = 0.035). The average reduction in the pain intensity was 0.84 points (SD = 1.46), with a minimum value of - 2 and a maximum of 5.

In addition to the difference showed by the above results, we compared the mean difference of pain reduction in both states: F (1.31) = 49.93 (p<0.001). A large effect size in favor of the hypnotic state (partial $R^2 = 0.34$) was found.

Traumatic life events expressed, based on the state of consciousness

The results of the 32 patients appear in Figure 2. In the wakeful state, 7 patients (22%) expressed a total of 7 traumatic life events. In the hypnosis state 28 patients (87%) expressed 69, traumatic life events with a maximum per patient of 4. Those 28 patients expressed more traumatic events in the hypnotic state than in the wakeful state.

The average number of traumatic life events expressed in the wakeful state was 0.22 (SD = 0.42) whereas in the hypnotic state it was 2.16 (SD = 1.322), a statistically significant difference: [$F(1.31) = 60.062$; $p<0.001$] and with a large effect size (partial $R^2 = 0.51$). The average increase in the number of expressed traumatic life events was 1.94 (SD = 1.32), with a minimum value of 0 and a maximum of 4.

Discussion

Our aim was to verify if hypnosis promoted the finding of traumatic life events in fibromyalgia patients in comparison with a conventional clinical interview.

A key aspect for achieving the said objective was the attainment of a reliable hypnotic state, complementing subjective measures, such as the self-reporting of pain intensity, with objective measures, such as the bispectral index and skin conductance.

Although all the patients reached at least two of the three mentioned requirements, six patients reached BIS levels slightly above the threshold of 80, whereas three obtained scores of between 87 and 88. A greater level of fibro-fog in these patients could explain those results, since hypnosis requires focal, attentive and receptive concentration (Spiegel & Spiegel, 2008). Also, after finalizing the session, it was recognized that other patients had a resistance to losing control, related to cultural myths about hypnosis, even though all were informed of the exact nature of the procedure. Another possible reason could be lack of rapport, an essential ingredient in the process (Lynn et al., 2015; Simões, 2002; Spiegel & Spiegel, 2008), since in half of the cases they only

met the therapist in that same session, having only a few minutes of contact prior to the hypnosis. In any case, and without taking a position on the matter, various authors hold that hypnosis does not necessarily involve a modified state of consciousness (Cardeña, Lynn, & Krippner, 2000; Kihlstrom, 2008).

On the other hand, only two people did not reach the levels proposed in the objective measures although they did in the subjective report. As occurs with the condition of reaching a modified state of consciousness, there is no evidence that physical or mental relaxation is indispensable for obtaining a hypnotic state (Oakley, 2008; Wark, 2006). Although relaxation was an enabling resource, other signals were also noted, such as the reduction of tonus, vasodilation or slight somnolence, especially when BIS values were unfavorable, until finding the moment at which the patient was receptive to the posing of the questions.

In contrast, two people obtained BIS values considerably below 70, the threshold below the hypnotic state, which may have been due to the powerful state of relaxation reached, associated with the type of experiences expressed. It was observed that lower BIS levels occurred when memories arose of encounters with deceased loved ones, above all in patients who attributed the illness to bereavement and loss.

In the wakeful state, only a small percentage of patients, almost identical to that obtained by Greenfield et al. (Greenfield et al., 1992), referred to some traumatic life event related to the disease. This could have been due to the difficulty of the patients to assimilate some of those experiences, precisely because of their traumatic nature.

In the hypnotic state, the percentage of patients who expressed traumatic life events, was much higher, exceeding those obtained in other studies (Anderberg et al., 2000; Fernandes et al., 2011; Gonzalez et al., 2013; Haviland et al., 2010; Riberto et al., 2006), and reaching a similar level to

that of Walen et al. (Walen et al., 2001), and only below that obtained by Filippon et al. (Filippon et al., 2013).

It has been experimentally shown that hypnosis can be used to create clinical confabulation by giving subjects concrete suggestions (Cox & Barnier, 2015). First, this was not our case, because we only asked if something happened when they became ill. Second, a confabulated disclosure could be therapeutically useful. Although not in the specific case of confabulation, benefits of disclosure in patients with fibromyalgia are well documented (Broderick, Junghaenel, & Schwartz, 2005; Gillis, Lumley, Mosley-Williams, Leisen, & Roehrs, 2006).

The average number of traumatic life events expressed in the hypnotic state was almost ten times that expressed in the wakeful state, at 2.16, lower than the 3.6 obtained by Walen et al. (Walen et al., 2001). As the authors themselves argued in the discussion of their work, exploring traumatic life events using questionnaires could increase the number of such events that the patients report. We did not use questionnaires in this study, but rather minimally structured interviews.

Although it was not the aim of this work, we cannot ignore the notable reduction in pain intensity that occurred under hypnosis compared to the wakeful state. The therapeutic effect of hypnosis in chronic pain and fibromyalgia is well documented (Adachi et al., 2014; M. Jensen & Patterson, 2006; Patterson, 2010). In our study, the disclosure of traumas could probably strengthen the analgesic effect of the hypnosis.

The mechanism through which hypnosis promotes the unblocking of traumatic experiences may result from the controlled access to the dissociated experiences or to the repressed memories, and the consequent restructuring of the traumatic experience (Rodríguez-Vega, Fernández-Liria, & Bayón Pérez, 2005). Current models of hypnosis emphasize biological, psychological and social

mechanisms of hypnosis enabling the patients, guided by the therapist, to restructure their traumatic experiences (M. P. Jensen et al., 2015; Lynn et al., 2015).

An important implication derives from our results, that of pointing to a possible conceptualization of fibromyalgia as a primary disorder or as a disorder secondary to traumatic events (Greenfield et al., 1992), for which hypnosis could be considered as a useful tool.

The study presents limitations intrinsic to its nature. On the one hand, it must not be forgotten that the study was made in a public health primary care context. Through being a health context as opposed to other contexts such as the support groups, it would be reasonable to think that there is a bias towards a greater severity of the illness in the patients. Through being a primary care context, where the patient obtains an appointment on their own initiative, there could be a greater representation of patients who use the service very frequently, which could also be associated with greater seriousness. Through being a public, as opposed to a private context, the people cared for usually belong to less favored social classes. It is known that the lower social class, the more frequent are the traumatic life events (Dohrenwend, 1973; McLeod & Kessler, 1990). These factors could impact in a greater prevalence of traumatic life events in our sample.

Alternatively, although a self-controlled design, such as ours, presents the advantage of eliminating the individual differences as a possible extraneous variable, with respect to controlled designs, our study would have been stronger if it had had a non-patient control group, as it was done in other studies (Anderberg et al., 2000), which could have equally been self-controlled. However, for ethical reasons, our research agreement with the South Seville Health District does not allow interventions that are not directed at improving the quality of life of the patients.

Also, of course, it would have been desirable to have a greater number of participants. This was not possible due to the high cost of acquiring a BIS Vista Monitoring System. We obtained the temporary loan of a system, which limited the number of patients that we could see.

Our study demonstrates the potential utility of hypnosis to access memories of traumatic life events and to integrate them into the treatment of patients with fibromyalgia.

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Figure 1. Bispectral index (BIS) values obtained for the 32 patients in the wakeful state versus the hypnotic state

Figure 2. Number of traumatic life events expressed by the 32 patients in the wakeful state versus the hypnotic state