

Effects of hypnosis during pregnancy: A psychophysiological study on maternal stress



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ABSTRACT

Because it induces a state of reduced awareness and deep relaxation, hypnosis is thought to be efficient at relieving stress and anxiety. This study examined whether hypnosis may alter the pattern and time evolution of maternal and fetal stress. Here we report a 23-yrs-old primigravida woman at 31-weeks' gestation who underwent daily sessions of hypnosis during one week. An A (baseline)-B (intervention) – A' (return to baseline) design was used. Each study phase lasted one week. The State Anxiety Inventory (SAI) was completed daily. Uterine contractions as well as maternal and fetal heart rate were recorded over 24-h periods in each of the study phase. Uterine contractions and maternal systolic blood pressure showed clear reductions during the hypnosis phase. In addition, a statistically significant declining trend in anxiety scores was observed during the hypnosis phase, and anxiety re-increased in the return-to-baseline phase ($p < 0.05$). Coefficient of variation of maternal heart rate was found to be considerably lower during the hypnosis phase. Our results suggest that a short-lived hypnosis intervention (combined with standard care) holds sufficient promise for antenatal stress relief to justify testing its efficacy in larger groups of pregnant women.

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Introduction

Pregnancy is typically portrayed as a joyful time all over the media. However, about 7–20% of pregnant women experience stress and anxiety to the point of reducing their ability to function on a daily basis due to insomnia, obsessive thoughts, neuromuscular pains/stiffness, panic attacks, hot flushes, or restlessness [1]. It has been established that antenatal anxiety predicts poor infant physiological, mental, and psychomotor development as well as behavioral and emotional difficulties in early childhood [2,3]. In addition, some studies have indicated that high reported antenatal stress and anxiety symptoms were associated with an increased likelihood of depression in the postnatal period [4].

The use of benzodiazepines to treat antenatal distress poses particular problems because these medications can cross the placenta and be harmful to the developing fetus. Thus, non-

pharmacological interventions need to be considered for the management of stress and anxiety during pregnancy. The effectiveness of a variety of psychological and/or behavioral interventions has already been examined in past studies. For instance, passive and active relaxation were found to reduce subjective anxiety and different physiological parameters associated with stress/anxiety such as plasma cortisol in pregnant women [5].

Hypnosis has been employed for several decades in clinical practice to treat a variety of disorders: bulimia nervosa [6], substance-related disorders [7] and, of course, stress and anxiety [8,9]. Although the definition of hypnosis has varied a great deal between researchers, it can be described as a state of heightened awareness (the so-called "hypnotic trance"), concentration and receptivity to the suggestions of an expert who focuses the person's attention on a monotonous routine. There is some evidence that hypnosis can relieve stress directly. For instance, hypnosis integrated into daily life or work has been found to result in favourable alterations in the plasma concentration of various stress hormones, such as cortisol [10]. However, hypnosis may also pos-

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itively modulate stress indirectly through its positive effects on stress-related symptoms such as insomnia [11].

In spite of this ever-growing place of hypnosis in the clinical management of stress and anxiety [8], its effectiveness has not been investigated thoroughly so far, especially in the domain of perinatal practice. Likewise, existing research is mainly qualitative, and does not examine responses across multiple dimensions of stress reactivity (e.g., physiological, behavioral, self-report).

The hypothesis

In view of the lack of research into pregnant women, the aim of the current study was to assess the effects of a 7-day hypnosis intervention on both subjective (i.e., self-reported anxiety), behavioral (i.e., uterine contractions), and physiological (i.e., maternal and fetal heart rate) dimensions of stress in a pregnant woman during her last ten weeks of gestation. On the basis of the findings mentioned above, it was hypothesized that an hypnosis intervention integrated into her daily life would decrease stress, both emotional and physical.

Formal testing

Patient

M.H. is a 23-yr-old caucasian woman, bank clerk, pregnant with first child. She was placed under daily medical supervision 31 weeks after the onset of amenorrhea. At this time, M.H. reported that her levels of anxiety – which had remained relatively low since she was pregnant – had started to become more of a regular thing and to make her tense and irritable. As a result, she indicated interest in participating in our study as a research volunteer. The purpose of our experiment was fully explained, and her written consent to participate was obtained. Our internal ethics committee approved our research project, and the study was conducted in line with the principles of the Helsinki Declaration and its following amendments.

Design and procedure

We used a single-subject A (baseline) – B (hypnotherapy treatment) – A' (return-to-baseline) research design to determine whether hypnosis would be more effective in reducing the antenatal stress response (or in slowing down its progression) than standard prenatal care and counseling. The pre-treatment assessments phase lasted seven days. During this phase, M.H. attended daily consultations only for the purpose of recording outcomes; no treatment other than basic nursing and standard counseling was provided (i.e., clinical routine practice). The hypnotherapy treatment phase was then implemented. It consisted of daily sessions of Ericksonian hypnosis for a similar duration (one full week). Each session was approximately 50 min in duration and began with a review of health questions or concerns that may have arisen. Then, hypnosis was induced through an eye-fixation technique, and deepened with progressive relaxation. The first two sessions primarily focused on external suggestions and utilized metaphoric guided imagery (e.g., likening personal control and strength to an oak tree). Each subsequent session included progressively more pregnancy-related suggestions and imagery. Examples of mental imagery included picturing goal attainments (e.g., portraying herself as a gleeful mother glowing with the satisfaction of being a parent), as well as relaxing landscapes emphasizing calmness and harmony. Finally, the post-treatment phase was conducted at 4 weeks post-treatment and was identical to the pre-treatment phase, except that it lasted for 5 days instead of 7.

Measurement instruments

Uterine contractions and fetal heart rate were measured for frequency, duration and intensity using an EDAN fetal and maternal monitor (F9 express, EDAN instruments). Maternal heart rate and arterial pressure were measured via a digital OMRON sphygmomanometer (HEM-742, Omron Healthcare Inc.).

State anxiety was assessed on a daily basis throughout all phases at approximately 9.00 pm using the State-Anxiety Inventory (SAI) [12]. The SAI is a 20-item self-report questionnaire that evaluates both somatic (e.g., “I am tense”) and cognitive aspects (e.g., “I am worried”) of anxiety. Participants are asked to rate their current level of anxiety by circling the number that best corresponds with the way they're feeling. Responses are recorded on a 4-point continuum from 1 (not at all) to 4 (very much so). Internal consistency coefficients for this scale are usually found to be in the range 0.85–0.95 [12].

Data analysis

An interrupted time series approach was used in which the hypnosis intervention was evaluated by measuring maternal self-reported anxiety (STAI), maternal stress (uterine contractions, heart rate, arterial pressure) and fetal stress (heart rate) several times prior to the institution of the intervention and several times after it has been put into effect. Data were graphed and changes were examined over time for evaluation of trends (before/during/after hypnosis). If maternal and/or fetal stress is at a steady and high level before the intervention begins, then drops during the hypnosis intervention, and remains low for some time afterwards, this provides a good indication of hypnosis success regarding antenatal stress/anxiety.

As far as self-reported scores of anxiety are concerned, a more sophisticated statistical technique was applied. First, a celeration line was calculated and drawn to identify the linear trend and slope for the data points obtained for each study phase. Then comparisons were made among baseline, treatment, and post-treatment periods for trend and slope using a binomial test. A *p*-value of 5% or below was considered statistically significant.

Results

Influence of hypnosis on cardiovascular indicators of stress

As can be seen from Figs. 1a and 1b, systolic (but not diastolic) blood pressure appeared to be 10 mm Hg lower during the intervention phase compared with the baseline and return-to-baseline phases.

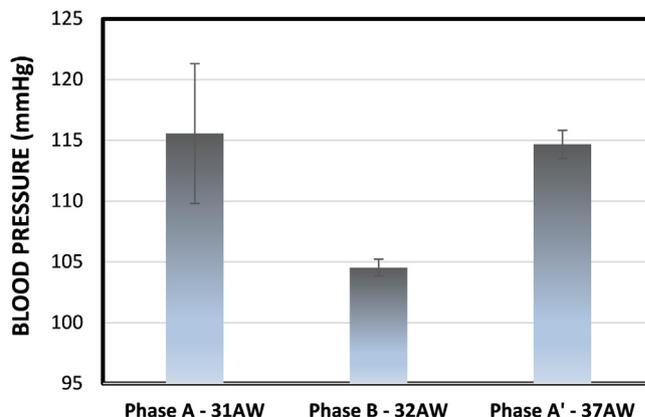


Fig. 1a. Maternal systolic blood pressure (SBP) in the baseline, treatment, and return-to-baseline phases (error bars = standard deviation).

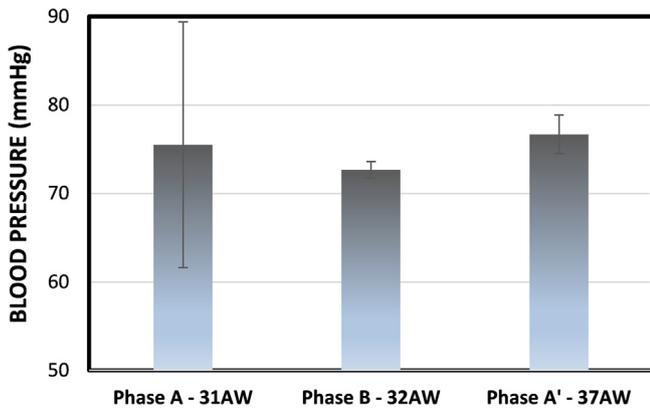


Fig. 1b. Maternal diastolic blood pressure (DBP) in the baseline, treatment, and return-to-baseline phases (error bars = standard deviation).

In a similar vein, we found that the coefficient of variation of (maternal) heart rate during the hypnosis intervention (CV = 3.3%) was half or less of what was recorded during the baseline or return-to-baseline phases (CV = 8.7% and 9.4% respectively) (Fig. 2).

Finally, fetal heart rate tracings showed large oscillations (110 bpm–180 bpm) in both study phases (see examples of recordings on Fig. 3), which is indicative of a good vitality.

Influence of hypnosis on uterine contractions

The amplitude of uterine contractions was found to be considerably decreased during the hypnosis intervention (range: 0.5–1.5 kPa) compared with the baseline phase (range: 1–6 kPa), as can be noted from Fig. 4.

Influence of hypnosis on self-reported anxiety

The SAI scores are presented in Fig. 5. A celeration line was computed using median scores in the baseline phase and was extended into the intervention phase to demonstrate how the trend would have continued if no change occurred because of hypnosis. As can be seen in Fig. 5, the celeration line in the baseline period (thick line) exhibited an upward trend, indicating increasing anxiety during this phase. With 6 out of 7 treatment-phase points below this line, we can conclude that systematic change occurred from baseline to treatment (using the simple binomial test, the probability of such an event was $p = 0.05$). The treatment (hypnosis) phase trend line showed a decelerating pattern (dotted line), with self-reported anxiety that decreased to its minimal value

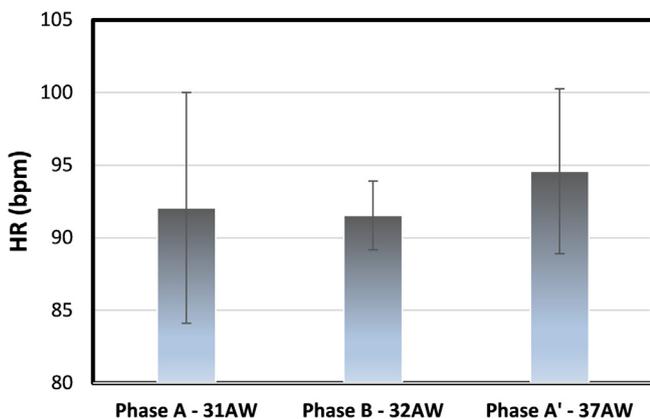


Fig. 2. Maternal heart rate (HR) in the baseline, treatment, and return-to-baseline phases (error bars = standard deviation).

(i.e., 20) right in the middle of the treatment cycle. This line was extended into the return-to-baseline (post-intervention) phase. The probability of having all five data points above the celeration line was found to be $p = 0.03$, showing evidence of return to pre-intervention levels after treatment withdrawal.

Conclusion and future directions

This ABA single-subject study investigated the short-term impact of hypnosis on antenatal stress and anxiety in a 23-years-old primigravida woman. Both visual and statistical analyses were completed to determine the magnitude of change in heart rate, blood pressure, uterine contractions, and self-rated anxiety across the different study phases (pre-intervention; hypnosis; post-intervention).

Uterine contractions have been found to be of lower intensity during hypnosis days. The positive association between emotional stress and increased uterine contractions (frequency and/or intensity) in pregnant women has been established in many previous studies [13]. It's been proposed that emotional stress causes an elevation of corticotrophin-releasing hormone (CRH) which can trigger the release of prostaglandins, which in the end intensifies uterine contractions.

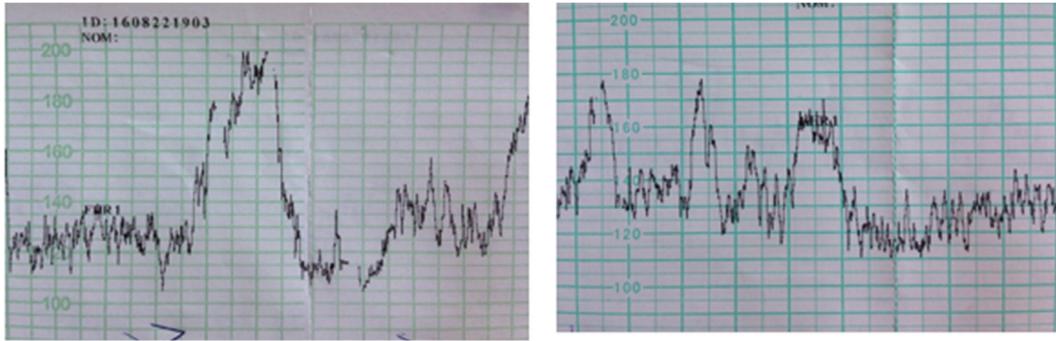
Systolic blood pressure (SBP) appeared to be 10 mmHg lower during hypnosis days. Decreased SBP levels have been regularly shown to be associated with lower stress and anxiety in women [14].

Despite the variability in the data in self-reported anxiety, the celeration line and binomial test approach demonstrated a significant reduction in anxiety levels during the intervention phase as compared with the baseline values. In addition, anxiety scores were found to increase significantly when the hypnosis program was discontinued during the return-to-baseline condition. Taken together, these results provide convincing evidence that daily hypnosis can reduce antenatal anxiety, or may help protect against the build-up of anxiety in the last few weeks of pregnancy.

Given the possible negative developmental (e.g., poor psychomotor development in the first months of life) and personal (e.g., postnatal depression) consequences that may be associated with intense or prolonged anxiety during pregnancy [2,4], the present findings can contribute to shape the development of targeted interventions for pregnant women particularly prone to anxiety and excessive worrying (e.g., those who have suffered years of infertility or infant loss).

That being said, the fact remains that the present study should be viewed only as an initial (albeit encouraging) step in determining the effectiveness of hypnosis for reducing pregnancy- or delivery-related distress. Indeed, there's a paucity of randomized controlled trials (RCTs) on the antidepressant and/or anxiolytic effects of hypnosis, with those available at high risks of bias, and none investigating the population of pregnant women. Furthermore, it currently remains unclear which biological or neurological mechanisms mediate the hypnosis-induced effects. It has been suggested recently that hypnosis might regulate the functioning of specific sites in regions of the brain involved in emotional experience such as limbic structures or prefrontal cortex [15]; but no MRI study has yet looked at this association. This should constitute a research priority for future investigations.

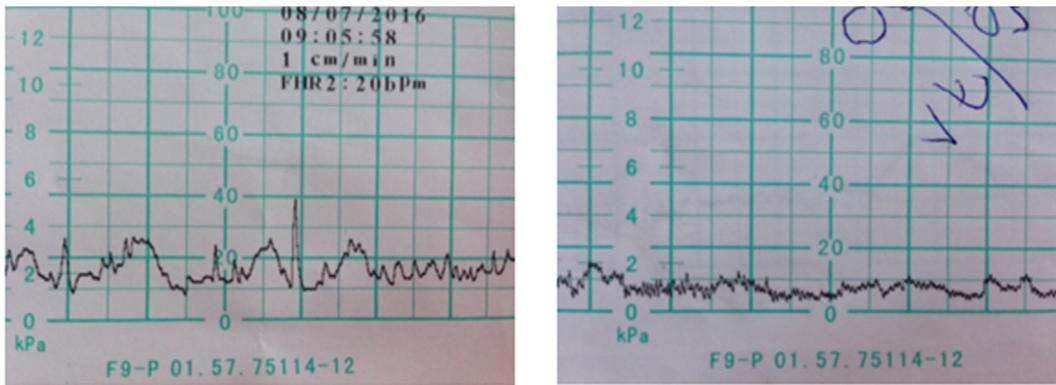
Another limitation that should be considered when evaluating the significance of our findings is that we used a single-subject design. By essence, it is not possible to generalize results from single-subject studies to a greater population. Nevertheless, single-subject studies are helpful in guiding future research with larger groups, and can give valuable insights into specific sub-



Without hypnosis –A' phase

with hypnosis –B phase

Fig. 3. Fetal heart rate (HR) in the return-to-baseline (left panel) and hypnosis (right panel) phases.



Without hypnosis –A phase

With hypnosis –B phase

Fig. 4. Uterine contractions during the baseline (left panel) and hypnosis (right panel) phases.

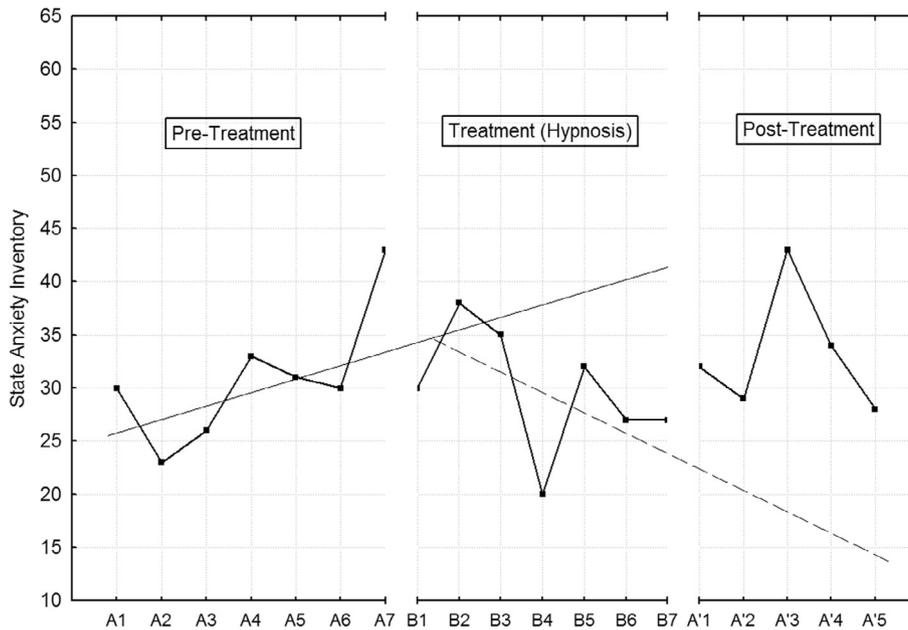


Fig. 5. Graphical representation and celeration line for self-reported anxiety during the different study phases.

groups providing information that might be useful for individualized treatment approaches.

In conclusion, although the single-subject methodology employed in this study limits generalisation of its findings, it did raise some interesting routes for future research. The mechanism

by which hypnosis produced such a marked and immediate improvement in anxiety requires further investigation.

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