

## THE RATIO SCALE FOR THE INTENSITY OF POST ANALGESIA PAIN DURING LABOR

Érika Zambrano, Simone Saltareli, Luis Vicente Garcia and  
Fátima Aparecida Emm Faleiros Sousa  
*University of São Paulo at Ribeirão Preto, Brazil, ez5871@yahoo.com.br*

### Abstract

*The objective of this paper was to measure the intensity of pain with combined raqui-peri post analgesia during the labor through the psychophysical methods, which are category estimations and magnitude estimations, in order to verify the stability and to validate the psychophysical scale of the perception of pain. The methods utilized were magnitude estimations and intermodal pairing. This study was comprised of 39 patients (22 received analgesia and 17 did not receive analgesia). The psychophysical scale of pain intensity prior to analgesia was validated with the exponent, and after analgesia, the exponent was. Spearman's correlation coefficient (rs) employed to the estimates for each method before and after analgesia was of  $rs=0,51$  and  $rs=0,96$  respectively, indicating the rank order derived from the estimates is highly concordant.*

The mensuration and pain management, in the clinical context, has been an issue more than substantial to the domain of pain. The investigators have been primarily interested in the evaluation of pain relief after pharmacological intervention, other than the assessment of the human experience in itself, in that the procedures of uni-dimensional registers have been the most frequently employed. Some of the indicators utilized to measure and assess pain in clinical situations are: behavior measures, observational data, self-reported behavior, questionnaires, and scales based on descriptors which qualify the undergone pain. (FALEIROS SOUSA, 2002).

During childbirth, pain is a complex physiological, subjective, and multidimensional response to the sensorial stimuli generated by the uterine contractions. (LOWE, 2004). Pain during labor is a difficult phenomenon to qualify due to its subjectiveness, and it appears in a diversified manner for each woman, where it can be excruciating or easily tolerable. (GURGEL et al, 1997). Bonica (1990), in studies with expecting mothers, found 20% with complaints about extremely severe pain, 30% severe, 35% mild, and only 15% with little pain during labor.

Analgesia became popular in Latin America in the early 1950s, developing into one of the main resources in childbirth assistance because of the multiple advantages inherent to its employment, among them the non-interference with the uterine contractions, the easy applications, and the ability to be adjusted to each clinical case. (PEREIRA; CECATTI; OLIVEIRA, 1998; OWEN et al, 1998).

Psychophysics seeks to relate the existence among the physical characteristics of stimulus, its psychological characteristics, or the manner the stimulus is perceived, it can be considered as a technique for scale construction. The observer attempts to translate the behavioral phenomenon in figures, which result from the perceptions of physical stimuli. (MANNING & ROSENSTOCK, 1974). It tries to correlate the physical scale of the stimuli to the perception or even to the psychophysical value of the stimuli. The sensations and the

perception of the painful stimulus is an issue studied by the psychophysical clinic with the aim to unravel such a complex phenomenon that pain is.

The procedures of magnitude estimations and intermodal pairing establish how much an attribute is greater than another, and not only confirm they are different, they are considered as a ratio scale, which has the properties of a nominal, ordinal, and interval scale, where any types of mathematical operations are carried out, and it is possible to define a true zero point (FALEIROS SOUSA; KAMIKAZI; DA SILVA. 1999; SANT'ANNA, et al. 2002).

Therefore, the importance of an experimental study is emphasized, since the tools of observation, along with experiment, and more precise mensuration with data that can be replicated in the assessment for acute pain need to be utilized.

The objectives were:

- To measure the intensity of pain with combined post analgesia raqui-peri during labor utilizing the psychophysical methods, either through category estimations or magnitude estimations.
- To verify the pain perception stability of combined post analgesia raqui-peri during labor.
- To validate the psychophysical scale of pain perception for combined post analgesia raqui-peri during labor.

## METHOD

### **Experiment 1 – Task for the determination of pain thresholds.**

In this phase, the absolute threshold (less intensity of stimulus in a continual perceived pain) for pain was determined after hospitalization.

**Participants.** The study was comprised of 39 expecting mothers (22 received analgesia, and 17 without analgesia), ranging from 18 to 35 years of age, with a single fetus, a physical state of ASA I or II, with no periferic ateriopathy. All of the participants were contacted and assessed immediately upon admission to the Obstetric Center of the Hospital. During this time, they were assessed and notified about the study.

**Procedure.** The scaling method used was the serial exploration method, which functions through gradually decreasing and increasing the intensities of a stimulus until the perception limit or the perceptual discrimination to determine the thresholds. In order to induce pain pressure on an upper left limb was performed and determined on the grounds of arterial systolic pressure, utilizing a sphygmomanometer (tourniquette of pneumatic cuff with a manometer) cuff with a manometer, which is used to verify the arterial pressure. The level of pressure was twofold greater than the systolic pressure, that is, after the inhibition of the arterial pulsation; in which there was a considerable safety limit, according to the criteria related to the pressure in the upper limb. The intensity of pain in the method applied does not cause impairment of the upper limb. (REIS JUNIOR, 1998). The participant's task was to signal after the pressure time determined by him as a minor stimulus of perceived pain to determine the absolute threshold. There were three serial attempts, and the time was registered in seconds. The absolute threshold was the result of the arithmetic median for all three attempts. Subsequently, the standard stimulus was designated and it was given a value of 100 (Module) for the magnitude estimations, and a value of 50cm (Module) for the intermodal pairing method with the response modality of line-lengths. The tasks for the threshold determination was carried out upon the participant's hospitalization. The standard stimulus was used to compare the pain felt by the participant in each of the pain assessments performed every 60 minutes.

**Results:** The absolute threshold of pain in the subjects was obtained in seconds. Each individual presented his own timing to determine his absolute threshold, and this was the standard stimulus. The psychophysical and psychological aspects made evident that pain is a unique and individual experience.

**Experiment 2- Psychophysical validation of the ratio scale for the perception of pain with combined post analgesia raqui-peri during active labor using the intermodal pairing method.**

The objectives of this experiment were: 1) to verify whether the rank order for derived pain for both methods were comparative, 2) to validate the derived ratio scale for the non-metric continual post analgesia raqui-peri perception of pain during active labor; 3) to verify the stability and /or equivalence of the ratio scales produced by the two modalities of different responses, be it unlimited numeric (magnitude estimations) and visual (line-lengths).

**Participants.** The same 39 subjects who participated in Experiment 1.

**Material.** Two notepads containing specific instructions for each type of psychophysical method on the first page and in the following pages space to register the time of the pain assessment, a pen and a tape measure of 5m/16' (Stanley) of length/width.

**Procedure:** The psychophysical methods utilized were, magnitude estimations and intermodal pairing involving a continual of response for line-lengths. The task of the participants for the magnitude estimations was to assign a number for each complaint of pain that was proportional to the intensity of pain felt, and in comparison to the standard stimulus with a value of 100. In this manner, if the participant deemed that a given pain had twice as more intensity as the pain induced (standard stimulus applied after hospitalization), he should assign it a number twice as more. In the intermodal pairing involving a continual response for line lengths, the participant's task consisted in pairing one line length for each complaint of pain that was proportional to the intensity of pain felt compared to the standard stimulus, having a visual size of 50cm. By this means, if the participant judged that a given pain had twice as more intensity as the induced pain, then, it should be paired with a line length twice as much the value. For the group that received analgesia during labor, the sensation of pain was assessed in the last assessment prior to analgesia. The analgesia utilized for delivery was the technique of combined raqui-peri. No sooner the puncture was done, than 10 micrograms of sufentanil was administered in the subdural space. Following that, the epidural catheter was placed for post analgesia fifteen minutes after the catheter was placed and the sufentanil was administered in the subdural space, a new assessment was performed when the observation period was finalized. For the group that did not receive analgesia during labor, the pain sensation was assessed in the last assessment before the finalization of the delivery. Labor with or without analgesia was the responsibility of the medical team, and the participant could accept or decline.

**Results:** The geometric medians (GM) and the geometric standard deviations (SD) were calculated. The exponents of the power function were calculated. The values are presented in Table 1, along with graphs, showing the power function between the magnitude estimations and the line-length in logarithmic coordinates, in function of the length required for the presentation of this work. We opted to present only two graphs (graph 1 and graph 2).

In Table 1 the results for the pain intensity assessment are presented before and after analgesia applied during labor, and the assessment of the pain intensity for the group that did not receive analgesia during labor, the values are presented in magnitude estimations and intermodal pairing in the response with line lengths modality.

**Table 1-** Geometric Median and Standard Deviation of the Geometric Median of the Magnitude Estimations (ME) and Line lengths (LL) attributed to the intensity of pain during labor with and without combined raqui-peri analgesia.

	WITH ANALGESIA		WITHOUT ANALGESIA
	BEFORE	AFTER	
<b>GM/ME</b>	742,05	31,06	608,50
<b>SDGM/ME</b>	291,54	31,64	390,74
<b>GM/LL (cm)</b>	237,87	17,50	190,29
<b>STGM/LL (cm)</b>	107,00	14,49	103,38

In order to compare the pain intensity during labor before and after analgesia, the Wilcoxon statistical test was used, and a statistically significant difference between the intensities of pain before and after analgesia was found with a value of  $p < 0,001$ . This means the pain intensity in labor was statistically less after the analgesic medication (combined raqui-peri with sufentanil).

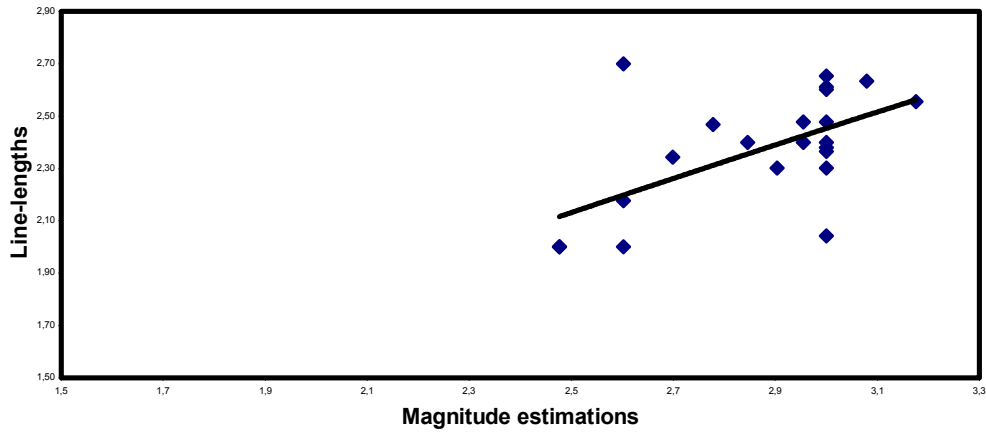
Capogna et al. (2001) account that the women who had induced labor with peridural analgesia liked and preferred this method as a pain reliever, compared to the ones whom experienced spontaneous labor.

The Mann Whitney statistical test was used to compare the pain intensity during labor in the groups with analgesia (after medication), and without analgesia, a statistically significant difference was found between the pain intensity group after analgesia and the group without analgesia, with a value of  $p < 0,001$ . This means that the pain intensity in labor was statistically less for the group that received analgesia (combined raqui-peri with sufentanil).

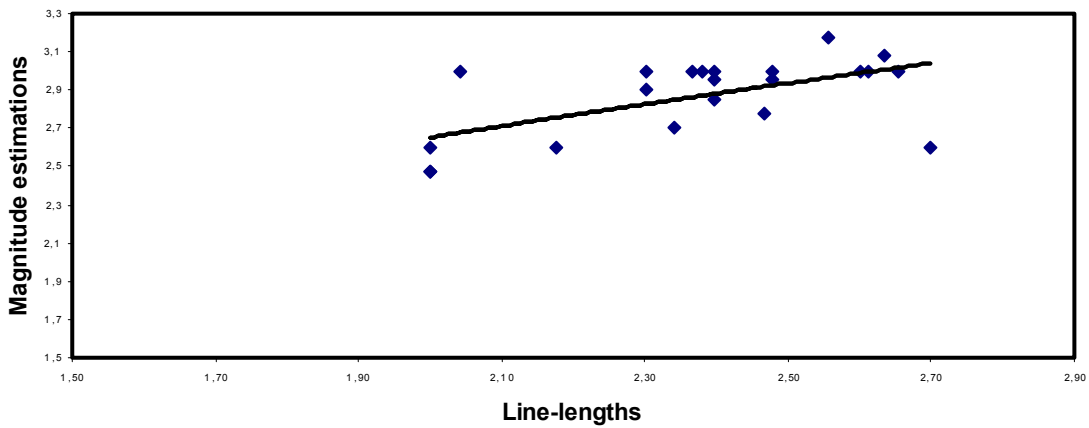
The Spearman's correlation coefficient (rs) applied to the estimates of each method (magnitude estimations and line-lengths) before analgesia, showed 0,51, indicating that the rank order derived from the estimates is correlate. After analgesia, the value was 0,96, indicating that the rank order derived from the estimates is highly correlate.

In Figure 1, the data for pain intensity before analgesia are shown. The geometric medians of the numeric estimates for pain intensity are projected in logarithmic coordinates in function of the corresponding geometric medians of the line-length estimates. Hence, since the observer is likely to restrain the amplitude of the adjustments in function of the the variable he controls, Figure 2 projects those medians in inverted coordinates, that is, the the line-lengths estimations in function of the numeric correspondent.

The psychophysical scale of the pain intensity before analgesia was validated with the exponent of 0,77 (magnitude estimations in function of the line-lengths), and 0,45 (line-lengths in function of the magnitude estimations), where a geometric median is 0,59, very close to 1,00, or rather, the predicted exponent 1,00 when expanded categories and numeric estimations;  $r^2 = 0,35$  were utilized.



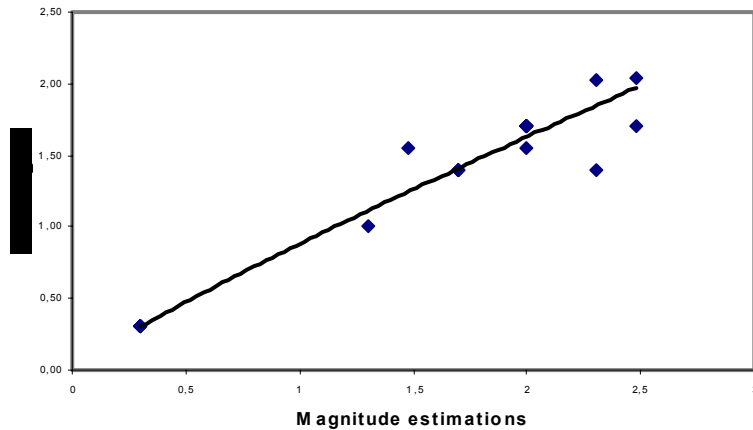
**Figure 1.** The relation between the geometric median logarithms of the magnitude estimations and the expanded category estimations logarithms of pain intensity after analgesia.



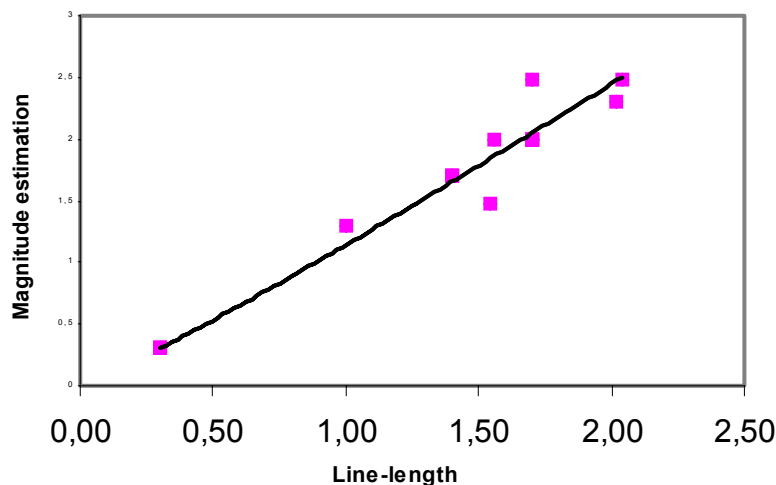
**Figure 2.** The relation between the logarithms of the geometric medians of the magnitude estimations and the logarithms of the expanded category estimations for the pain intensity before analgesia.

In figure 3, the data for pain intensity after analgesia is shown. The geometric medians for the numeric estimations for pain intensity are projected in logarithmic coordinates in function of the correspondent geometric medians of the line-length estimations. Thus, since the observer is likely to constrain the amplitude of the adjustments in function of the variable he controls, in Figure 4 those medians are projected in inverted coordinates, that is, the line-length estimations in function of the numeric correspondents.

The psychophysical scale for pain intensity after analgesia was validated with an exponent of 0,88 (magnitude estimations in function of the line-lengths), and 1,10 (line-lengths in function of the magnitude estimations), where a geometric median is 0,98, very close to 1,00, or rather, the predicted exponent of 1,00, when expanded categories and numeric estimates;  $r^2=0,98$ , were used



**Figure 3.** The relation between the logarithms of the geometric medians and the expanded category estimations, and the logarithms for the magnitude estimations attributed to the pain intensity after post analgesia



**Figure 4.** The relation between the logarithms of the geometric medians of the expanded category estimations, and the logarithms of the magnitude estimations attributed to the pain intensity post analgesia.

### FINAL CONSIDERATIONS

- Each patient presented a pain threshold, according to his individual perception of pain, which makes evident that pain is a unique and individual experience.
- The comparison between the groups, which received analgesia, with relation to the responses for the magnitude estimations and the intermodal pairing, showed a positive correlation.
- The psychophysical scale for pain intensity before and after analgesia with combined raqui-peri was validated, always demonstrating an exponent close to 1,00, which shows us a concordance between the patients' responses.

### REFERENCES

BONICA, J.J. **The measurement of pain.** 2º ed. Philadelphia: Lea & Febiger, p.1313-1343, 1990.

FALEIROS SOUSA, F.A.E. Dor: O quinto sinal vital. **Revista Latino-am de Enfermagem**, v.10, p.446-447, 2002.

FALEIROS SOUSA, F.A.E.; KAMIZAKI, R.; DA SILVA, J.A. Utilização de escalas de razão de variáveis clínicas e sociais. In: PASQUALI, L. (org.). **Instrumentos psicológicos: manual prático para elaboração**. Brasília. LABPAM, IBAPP, cap.4, p.73-104, 1999.

GURGEL, A.H; et al. Fenômeno da dor no trabalho de parto: Depoimentos de parturientes. **Revista Baiana de Enfermagem**, v.10, n1/2, p.95-105, 1997.

LOWE, K.N. The nature of labor pain. **Am J Obstet Gynecol**, v.186, p.16-24, 2002.

MANNING, S.A. & ROSENSTOCK, E.H. **Psicofísica Clássica e Métodos Escalares**. São Paulo – E.P.U., p.114, 1974.

MELZACK, R. et al. Severity of labour pain: Influence of physical as well as psychological variables. **CMAJ**, v.130, p.579-584, 1984.

PEREIRA, R.I.C.; CECATTI, J.R.; OLIVEIRA, A.S. Dor no trabalho de parto: fisiologia e o papel da analgesia peridural. **Revista Ciências Médica**, v.7, n.3, p.79-84, 1998.

REIS JUNIOR, A. **Dessangramento e garroteamento de membros com finalidade cirúrgica**. São Paulo. ATHENEU, 1998.

SANT'ANA, R.P.; HORTENSE, P.; GIUNTINI, P.B.; FALEIROS SOUSA, F.A.E. Validation of the ratio scale of postoperative pain descriptors through the cross-modality matching method. **Fechner Day**, p.514-519, 2002.