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Pain in the newborn in a neonatology unit of a clinical Chilean hospital

Dolor del recién nacido expuesto a procedimientos de enfermería en la unidad de neonatología de un hospital clínico chileno

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ABSTRACT:

This study was **aimed** to assess the intensity of pain in newborns against nursing treatments, which were performed during care and treatment. This was sustained from the humanist view of Jean Watson.

Method: A cross-sectional descriptive-correlational study, whose population consisted of newborns hospitalized at the Neonatology Unit of the Herminda Martin Clinical Hospital of Chillán, Chile, in the period between June and September, 2015. In order to assess pain, Susan Givens Bell Assessment Scale was applied, as well as a semi-structured Questionnaire of sociodemographic variables.

Results: The sample consisted of 52 newborns in an equal percentage of men and women. The greatest number of procedures was the nasogastric tube insetion, venipuncture and arterial puncture, being the latter the cause of moderate pain in newborns. The level of pain presented by the sample was 42.3% intense pain, 23.1% moderate pain and in 34.6% no pain was presented. The instrument presented reliability with a Cronbach's alpha of 0.802.

Conclusions: Premature infants under 37 weeks felt greater pain than full-term newborns. Regarding Barth weight, it was observed that the greater the weight, the grater the pain. Birth APGAR in the study indicated that there is a direct but weak relation and the higher APGAR at birth, the greater the pain.

Keywords: Newborm; premature; pain; neonatal care

RESUMEN:
El **objetivo** de este estudio fue valorar la intensidad del dolor en los recién nacidos frente a procedimientos de enfermería, que les fueron realizados con ocasión de los cuidados y tratamiento. Se sustentó desde la visión humanista del cuidado de Jean Watson.

Metodología: Estudio descriptivo-correlacional, de corte transversal, cuya población estuvo constituida por recién nacidos hospitalizados en la Unidad de Neonatología del Hospital Clínico Herminda Martín de Chillán, en el período de junio a septiembre del año 2015. Para Valorar el dolor se aplicó la escala de valoración del dolor de Susan Givens Bell y un cuestionario semiestructurado de variables sociodemográficas.

Resultados: La muestra estuvo conformada por 52 Recién Nacidos en un porcentaje igual de hombres y mujeres El mayor número de procedimientos realizados fueron instalación de sonda orogástrica, punción venosa y arterial, siendo esta última la causante de dolor moderado en el R.N. El nivel de dolor presentado por la muestra, fue en un 42,3% dolor intenso, el 23,1% dolor moderado y en un 34,6 % no presentó dolor. El Instrumento presentó una confiabilidad con un alfa de Crombach de 0,802.

Conclusiones: Los prematuros menores de 37 semanas sintieron mayor dolor que los RN de término.El peso de nacimiento se observó que a mayor peso mayor es el dolor. El APGAR de nacimiento en el estudio se observó que hay una relación directa, pero débil, que a mayor APGAR al nacer, mayor es dolor.
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Palabras clave: Recién nacido; prematuro; dolor; cuidados neonatales

INTRODUCTION

The increase in the survival of preterm infants is due to the technological advances that have been injected into the neonatology units, which go hand in hand with the increased demand of skilled nursing care. These advances have increased the amount of procedures that must be provided to neonates in order to develop, mature and survive, which makes that from their birth are highly instrumentalized[1].

The practice of nursing in this area of specialized cares is not exempt of pain-causing care[2], necessary to increase the survival[3] of this neonate with high risk of complications such as: respiratory distress, hypoglycemia, alterations in thermoregulation, patent ductus arteriosus, necrotizing enterocolitis and intracranial hemorrhage among other[4,5,6].

More than a decade ago it was considered that there was an inability of the child to verbalize his feelings and his pain was synonymous of inability to express it and remember it[7]. Currently, as a result of the research carried out on fetal development and newborn behavior, it is demonstrated that neonates feel pain that many times is caused by manipulation and procedures carried out by the health team[8].

The newborn is neurologically immature and presents difficulty to be adapted to the invasive environment of the Neonatal Unit presented with bright light, high noise level, and where is subjected to medical and nursing interventions that produce pain and constant stress. In addition, the metabolic and physiological changes experienced by the neonate accumulate both pain and stress causing a low regulation of corticosterone receptors in the hippocampus, which can affect the endocrine regulation of these children, becoming more sensitive in later stages[9].

There are new research streams that mention morphological and functional changes in the brain of children who were premature and who experienced pain. These changes make them more susceptible to attention, cognitive and learning deficits, depression

disorders and low tolerance to pain and even to “Premature Apoptosis” processes at neuronal level (orderly process of cell death against intra or extracellular stimuli). It is suggested that it is secondary to nociceptive stimulation, to constant stress and the presence of neurotransmitters on structures that are in full development[10].

Some studies have demonstrated that newborns feel pain from moderate to intense when they are faced to a nursing procedure for their care. In Chile, in 2010 it was demonstrated in a study that 40.2% of the sample presented moderate pain and 15.2% presented intense pain[11], just as other authors who assessed pain in newborns and concluded that neonates are capable of perceiving moderate to intense pain in the different procedures[12]. In other study it was concluded that procedures that cause the greatest pain were lumbar punction, percutaneous catheter insertion in 100% of newborns and capillary glycemia in 69.2% of them[13].

Several non-pharmacological strategies to pain management in neonates have been developed which have proven to be effective. Among the most frequently tested strategies, the use of concentrated solutions of concentrated glucose/sucrose and non-nutritional suction have been considered[14-17].

It is important and necessary to reflect on the need to assess neonatal pain on the part of the nurse, as well as in other instances of hospital care in adult patients. The implementation of a registry of assessment of neonatal pain can help and unify criteria in the assessment that each professional applies at the time of performing a painful procedure in this type of patients. Failure to assess and control pain in the neonate can lead to short and long-term negative consequences among which, the following can be highlighted: behavioral disorders, learning and hormonal alterations[18]. Therefore, the current recommendations indicate that pain must be considered as the fifth vital sign to be assessed in comprehensive and holistic care in newborns and their family[19]. Because of the above, a question arises: What is the level of pain of the newborn in a Neonatology Unit in a Chilean Clinical Hospital?

MATERIAL AND METHOD

This is a quantitative, descriptive-correlational, cross-sectional study. The study sample consisted of newborns (NB) hospitalized in the Neonatology Unit of the Herminda Martin Clinical Hospital of Chillán, between June and September, 2015. A free and informed consent of the tutor was requested in order to participate in this study. Exclusion patients corresponded to newborns that are using some type of constant pharmacological analgesic, with defects in the neural tube (dysraphism), sedation or without authorization of the tutor.

Variables

The independent variables considered in the study were: Gestational age, birth weight, Apgar at birth and exclusive breastfeeding. As dependent variable, pain level was considered.

Instrument

An instrument that consists in two parts was used: a semi-structured questionnaire that collects biosociodemographic information of the newborn (gestational age, APGAR, birth weight and exclusive breastfeeding). On the other hand, the Pain

Assessment Scale by Givens was used. This instrument allows assessing the intensity of pain through changes in behavioral and physiological parameters that evidence in an objective and quantifiable way both pain and its intensity against nursing procedures rhar are painful for the newborn.

It should be noted that the informed consent was revised and authorized by the Ethical Committee of the Herminda Martin Clinical Hospital and the Ethical Committee of the University of Concepción. Likewise, authorization was required to the Supervisor Nurse and the Director of the Hospital, as well as the collaboration to clinical nurses of the Neonatology Unit of such hospital for the implementation of the study.

Data processing and analysis

This process started with the univariate descriptive analysis of the contextual and personal variables (moderating factors), through frequency tables, mediated summary and relevant graphs, according to the type of variables. In addition, a full analysis of the main variable, both its original quantitative value and the categorization proposed by the author of this study was also performed. In terms of the reliability of the scale, its internal consistency was studied through Cronbach's alpha. Then, a bivariate statistics was performed between the main variable and personal and contextual variables. In order to compare means, t test and ANOVA were used, and to analyze associations between quantitative variables the Pearson correlation coefficient was used. In cases where assumptions were met, the corresponding non-parametric tests were used (Mann Whitney, kruskal Wallis and Spearman correlation coefficient). Contrasts were considered significant at 5%. Both INFOSTAT and SPSS 17.0 statistical software were used for analysis.

RESULTS

The profile of the study sample had a numerical distribution of 52 pre-term and full-term premature newborns with equal proportions of boys and girls. Of the 53 neonates admitted to the study, the highest percentage received no exclusive breastfeeding, corresponding to 76.9% of the sample, and in a lower percentage, only 23.1% received it. During hospitalization, patients of the sample faced different nursing procedures, among which arterial puncture (32.7%) followed by the nasogastric tube insertion (23.1%) can be mentioned. The least performed nursing interventions corresponded to aspiration of secretions (9.6%) followed by the taking of PKU and TSH (7.7%), totaling 17.3% of the nursing interventions.

Sociodemographic characteristics of the participants are presented in Table 1.

Table 1: Distribution according to sex, gestational age and birth weight of newborns admitted to the Neonatology Unit of the Herminda Martin Clinical Hospital, 2015.

Variable	N°	Percentage
Sex		
Male	**26**	**50**
Female	**26**	**50**
Gestational age		
Less than 32 weeks	**32**	**61.5**
From 33 to 37 weeks	**10**	**19.2**
Over 38 weeks	**10**	**19.2**

Birth weight		
Between 800 and 1,000 g	**4**	**7.7**
Between 1000 and 2,000 g	**35**	**67.3**
Between 2000 and 3,000 g	**6**	**11.5**
Greater than 3,000 g	**7**	**13.5**

Source: own

The level of pain manifested by newborns against painful procedures at the Neonatology Unit indicated that of the 52 neonates, 65.4% presented moderate to intense pain with nursing procedures and a lower percentage of 34.6% presented no pain. The pain variable according to gestational age indicated that average pain per gestational age is higher in newborns between 33 and 37 weeks, with an average of 9.2. In neonates above 37 weeks, the average is 8.5 and in extreme premature newborns less than 32 weeks, the average obtained was 7.4. Results of the pain variable according to type of procedure are presented in Table 2.

Table 2: Distribution of pain, according to type of procedure in newborns exposed to nursing procedures at the Neonatology Unit of the Herminda Martin Clinical Hospital, 2015.

Variable and type of procedure	N	Mean	D.E.	Median	Min	Max	P
PKU and TSH	4	4.5	2.6	4	2	8	0.0035
Orogastric probe	14	4,.6	3.8	3.5	0	14	
Venipuncture	12	8.7	4.9	8.5	2	18	
Arterial puncture	17	9.5	4.8	10	1	16	
Aspiration of Secretions	5	12.8	5.1	15	4	16	

Source: own

Analysis of behavioral changes in the studied newborns showed that the highest percentage (78.8%) had alteration in crying and in the case of physiological changes; the most altered were heart rate (57.5%) and blood pressure (40.4%).

In relation to the determination of both validity and reliability of the Susan Givens Bell instrument, the scale with the 10 items that compose it was applied, indicating a Cronbach's alpha of 0.802, indicating that the applied instrument is highly reliable.

DISCUSSION

The level of pain in the newborn can be measured by different existing scales that have been validated. In this study, Susan Givens Bell scale was used, which is valid and reliable and was and validated in Chile in a study in 2010[11]. Pain was assessed in newborns hospitalized in a Neonatal Unit and this study concluded that these children felt intense pain in 15.2% and moderate in 40.2% of the cases compared to the present study where newborns presented moderate pain in 23.1% of the cases and intense pain in 42.3%. In a study carried out in Colombia in a Cardio Neonatal Unit[20], newborns presented intense pain in 95.3% of the cases. Here, it can be inferred that the procedures were different when measuring pain in the neonate, because in this research the pain was assessed in venipuncture, arterial puncture, aspiration of secretions and nasogastric tube insertion procedures, whereas in the Cardio Infant Unit in Colombia was only arteriovenous and heel puncture. It should be noted that the average level of pain by arterial puncture was 9.5 points and in venous puncture this value reached an average of 8.7, which categorizes as moderate to intense, higher

than in other procedures. In the present study, the highest average pain corresponded to aspiration of secretions, though it should be mentioned that the sample size very small to compare it with that of the arteriovenous puncture, a bias that should be recognized. For a future study, this result should be considered and thus both procedures should be measured in equal samples. Among the most evaluated procedures in the sample, arteriovenous punctures and nasogastric tube insertion can be mentioned.

The study showed that premature newborns felt greater pain than term infants. The average pain for those between 33 and 37 weeks was 9.2 and for those younger than 32 weeks gestation, this value was 7.4. This confirms that gestational age does indeed influence the pain that can be perceived in relation to certain procedures. It should be noted that the greater hospitalized population in Neonatal Units and those who require more daily procedures that cause pain correspond to extreme premature infants, due to their immaturity and severity must undergo to more than one painful procedure per day, It is important to emphasize that by being extreme premature they have longer hospitalization time and more risk of suffering complications derived from the permanent exposure to pain. Sex in the research shows greater average pain in boys, having a maximum score of 18 points in the applied instrument, though there are few studies that prove that sex influences the perception of pain in neonates. Therefore, this variable should be studied in further works. Regarding the variable birth weight in the study, it was observed that the higher the weight, the greater the pain.

Regarding the APGAR at birth, in the present study it was observed that there is a direct but weak relation that the greater APGAR the greater the pain. This result is similar to a study carried out by other researchers[21], who demonstrated that higher APGAR values contributed significantly to raise the scores referred to the facial expression of pain. Another research carried out in Brazil[16] where non-pharmacological methods were applied to treat pain such as music and the use of oral glucose it was observed that the higher the APGAR the greater the pain perceived by newborns. This may be related to the better neurological status of the newborn with higher Apgar score at birth.

The nursing procedures more frequently evaluated to newborns in this study corresponded to arteriovenous puncture in 63-5% and the lowest percentage, the aspiration of secretions, with 9.6%. This is related to the exams that should be taken to premature newborns. These results are similar to those in the study carried out by Gómez et al. [22], where the major procedures were venipuncture in 71% of the cases and nasogastric tube insertionin 8% compared to this study, in which the value for nasogastric tube insertionwas 23.1%. The procedure that can be considered as the minor cause of pain in neonates in the present study, documented in the same way in other investigations. Is the nasogastric tube insertion where results with zero score were obtained and with an average of pain of 4.6 in the applied pain scale. For this procedure, this aspect is classified as without pain.

In Colombia in 2007[20] pain in neonates was evaluated using the same Susan Givens Bell scale and alterations in vital signs such as heart rate, respiratory rate, increase in blood pressure and decrease in oxygen saturation were observed, with statistical significance that compared to this study there were also changes in vital signs. In this case, increase in heart rate (57.7%), blood pressure (40.4%), and in a lower percentage, respiratory rate and its characteristics in 26.9% were observed. In addition, it can also be compared with the study carried out in Chile in 2010, where it

was observed that the most altered physiological parameters in term of percentage were oxygen saturation and respiratory rate. Behavioral signs were also altered and the highest percentages were crying (78.8%) and facial expression of pain (67.3%). This can be compared with results obtained in a study carried out by Sawires et al.[23] who considered crying as the most characteristic sign to recognize pain in neonates by nursing professionals.

When considering the theoretical aspects that were analyzed from Watson with her theory of the humanized care, in one of the factors of care with a phenomenological component, it is emphasized the assistance in gratification of human needs. Here, the nurse recognizes biophysical, psychophysical, psychosocial needs and interpersonal skills of herself and patients who have to meet their needs in a lesser range before attempting to meet higher-order needs. Thus, one of their necessary conditions for providing care is that the nurse should have awareness and knowledge on somebody that needs care, because a helpless being that requires special care and even more, a newborn incapable to verbally express discomfort, pain or any need that has altered. Therefore, the nurse is responsible for interpreting and knowing the needs of their patients and this is why it is important that nurses of neonatal units to be trained in the care they should provide to newborns and especially to extreme premature infants who are more likely to present complications.

Newborns in their first stage of life that are submitted to frequent and prolonged is pain harmful to the nervous system and may cause physiological instability, increase the chance of permanent alterations in the plasticity of the immature brain, and increase the vulnerability of the premature to neurological injuries such as intracranial hemorrhage. In addition, an altered functioning of the response to pain associated with a reduction in the threshold of it. In the long-term, problems related to neurological deficit, cognitive alterations and learning difficulty may be produced. It has been shown in several studies[5-7] that non-pharmacological methods reduce the intensity of pain, such as non-nutritive sucking, music therapy, skin-to-skin contact with the mother, and the use of 30% dextrose among other alternatives facilitate the humanization of care.

Watson emphasizes that the nurse as health personnel has the capacity to recognize basic and biophysical needs that are present or altered in the neonate in order to provide the necessary holistic care and based on the knowledge of the nurse. Therefore is of vital importance that nursing personnel is constantly trained in relation to the pain of the newborn about how to treat it and assess it in the best way. Thus, mediate and immediate complications are avoided, because every day they work to minimize future consequences. However, due to the demand in the clinical practice and daily routine the professional depersonalizes care by not considering pain as the fifth vital sign, considering that these patients are not able to indicate it verbally.

The nurse must work to maintain a care environment in the neonatal units, allowing the neonate the neonate to develop and grow in the best possible way, reducing the chances of consequences. Therefore, the environment must be maintained as quiet and harmonious as possible, trying to alleviate what involves the separation of the maternal uterus. This is important when providing care, as expressed in Watson's theory: the nurse should go beyond procedures, tasks and techniques. Must apply care factors, be able to interact, and being connected at a spiritual transpersonal level through movements, gestures, expressions and sound when evaluating pain. These are important for the nurse, because she/he can more objectively witness pain in our neonates. Nurses should collaborate in reducing pain once presented through

affection, music, and skin-to-skin contact with the mother by applying the different non-pharmacological methods to alleviate it.

CONCLUSIONS

- The application of the Susan Given Bell ratings scale to neonates in the Neonatology Unit of the Herminda Martin Clinical Hospital could be performed although there were obstacles associated to the presence of professionals who may not like to be directly observed during the performance of their procedures.

- The Susan Givens Bell scale is practical, objective, easy to understand, and allows rapid assessment of pain by the nurse.

- Of the total sample. The highest percentage corresponded to extreme premature newborns of less than 32 weeks gestation, with a birth weight between 1,000 and 2,000 grams in 67.5%. The majority of the sample received no breastfeeding, which can be concluded that it is associated with the greater number of newborns with more days in the incubator.

- Newborns in the study who presented greater pain were premature infants of less than 37 weeks, together with extreme premature infants of less than 32 weeks gestation. This is relevant to what can be generated for the newborn: short-term sequels, intracranial hemorrhage, apnea, increase in oxygen consumption and liberation of catecholamines, as well as the increase in blood pressure[24,25,26]. In the long-term, they are more prone to attention deficit, cognitive and learning alterations, and low tolerance to pain[1,26.]

- This result of the present research is relevant to motivate pain assessment in these specialized services, considering the importance in the sequels that can be presented in the child. It is also an aspect of the humanized care, which Watson emphasizes to take to consideration because newborns must be protected in their vulnerability through a special, conscious, critical-reflexive and transpersonal.

- In relation to the Apgar at birth it can be observed that the greater Apgar, the greater pain they perceive. This may be due to their neurological condition presented by the newborn, though further research is required to be proved.

- Regarding behavioral and physiological changes evaluated by the scale, in higher percentages it was observed that crying, heart rate and blood pressure are the most altered parameters in the newborn exposed to nursing procedures during the present study.

- Nursing professional should work on avoiding or minimizing pain in newborns, favoring non-pharmacological measures, such as pacifiers or the administration of oral glucose in order to avoid complications that may be generated in these patients when perceiving pain.

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