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CLINICAL FACTORS AND PREDICTORS OF DRY EYE IN POSTOPERATIVE PATIENTS

FATORES CLÍNICOS E PREDITORES DO RESSECAMENTO OCULAR EM PACIENTES NO PERÍODO PÓS-OPERATÓRIO

FACTORES CLÍNICOS Y PREDICTORES DE SEQUEDAD OCULAR EN PACIENTES POSTOPERADOS

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Objective: to evaluate the clinical predictors for dry eye and the nursing diagnosis Risk of dry eye in postoperative patients in the Post-Anesthesia Care Unit. Method: cross-sectional study conducted between May and August, 2017. The sample was 157 adult patients undergoing elective surgical procedures. Data were analyzed using descriptive and inferential statistics. Results: the clinical diagnosis of dry eye prevailed in 85.35% of patients, and the nursing diagnosis Risk of dry eye in 14.65%. Statistical differences were observed between hyperemia, excessive tearing and insufficient Schirmer test with the diagnosis of ocular dryness in the right eye and with the diagnosis Risk of dry eye. In the left eye the Schirmer test was insufficient. Conclusion: hyperemia, excessive tearing and insufficient Schirmer test are relevant perioperative clinical predictors to promote preventive measures and/or early detection of dry eye.

Descriptors: Nursing Diagnosis. Dry Eye Syndromes. Eye Health.Surgicenters.Postoperative Period. Perioperative Nursing.

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Objetivo: avaliar os fatores clínicos preditores para o ressecamento ocular e para o diagnóstico de enfermagem Risco de ressecamento ocular em pacientes no pós-operatório em Unidade de Recuperação Pós-Anestésica. Método: estudo transversal realizado entre maio e agosto de 2017. Amostra foi de 157 pacientes adultos submetidos a procedimentos cirúrgicos eletivos. Os dados foram analisados mediante estatística descritiva e inferencial. Resultados: o diagnóstico clínico de ressecamento ocular prevaleceu em 85,35% dos pacientes, e o diagnóstico de enfermagem Risco de ressecamento ocular em 14,65%. Observou-se diferenças estatísticas entre a hiperemia, lacrimejamento excessivo e teste de Schirmer insuficiente com o diagnóstico de ressecamento ocular no olho direito e com o diagnóstico Risco de ressecamento ocular. No olho esquerdo o teste de Schirmer foi insuficiente. Conclusão: a hiperemia, o lacrimejamento excessivo e o teste de Schirmer insuficiente são fatores clínicos preditores relevantes no perioperatório para promover medidas preventivas e/ou detectar precocemente o ressecamento ocular.

Descritores: Diagnóstico de Enfermagem. Síndromes do Olho Seco. Saúde ocular. Centros Cirúrgicos. Período Pós-Operatório. Enfermagem Perioperatória.

Objetivo: evaluar los predictores clínicos de ojo seco y el diagnóstico de enfermería Riesgo de ojo seco en pacientes postoperados en la Unidad de Recuperación Postanestésica. Material y método: estudio transversal realizado entre mayo y agosto de 2017. La muestra fue de 157 pacientes adultos sometidos a procedimientos quirúrgicos electivos. Los datos se analizaron mediante estadística descriptiva e inferencial. Resultados: el diagnóstico clínico de ojo seco predominó en el 85,35% de los pacientes, y el diagnóstico de enfermería Riesgo de ojo seco en el 14,65%. Se observaron diferencias estadísticas entre la hiperemia, el lagrimeo excesivo y el test de Schirmer insuficiente con el diagnóstico de sequedad ocular en el ojo derecho y con el diagnóstico Riesgo de ojo seco. En el ojo izquierdo el test de Schirmer fue insuficiente. Conclusión: la hiperemia, el lagrimeo excesivo y el test de Schirmer insuficiente son predictores clínicos perioperatorios relevantes para promover medidas preventivas y/o la detección precoz del ojo seco.

Descriptores: Diagnóstico de Enfermería. Síndromes de Ojo Seco. Salud Ocular. Centros Quirúrgicos. Periodo Posoperatorio. Enfermería Perioperatoria.

Introduction

The tear is essential for lubrication, hydration, oxygenation, and antimicrobial protection of the eye. The loss of tear homeostasis is responsible for causing hyperosmolarity and tear film instability, which can result in ocular surface changes that trigger ocular discomfort and visual disturbances that can lead to corneal ulcerations and even vision loss[1].

Dry eye is characterized as a clinical condition resulting from an insufficient tear film that may compromise the integrity of the ocular surface[2-4]. Therefore, in order to prevent it in hospitalized patients, nurses must design efficient and resolutive care plans through the operationalization of the Nursing Process and the use of its standardized language systems.

NANDA Internacional (NANDA-I) is a standardized language system that contains the Nursing Diagnosis Risk of Dry Eye (00219), defined as susceptibility to inadequate tear film, which may generate ocular discomfort or surface damage, with potential health impairment[5].

The risk factors for the nursing diagnosis Risk of dry eye are: air conditioning, low air humidity, inadequate knowledge of modifiable factors, caffeine consumption, omega-3 fatty acid deficiency, vitamin A deficiency, inattention to passive smoking, excessive wind, sun exposure, decreased blink frequency, insufficient fluid intake, air pollution, smoking, use of products with benzalkonium chloride-based preservatives, improper use of contact lenses, improper use of hair dryers, improper use of fans[5].

Some of these risk factors, such as humidity, temperature and use of air conditioning are present both in the Operating Room (OR) and in the Post-Anesthesia Care Unit (PACU). Thus, patients in the immediate postoperative period are exposed due to low temperatures and, sometimes, low air humidity in these places. They are patients who mostly need ventilatory assistance, oxygen therapy and use of medications that may favor tear film instability and, therefore, are susceptible to present this undesirable human response[3].

Thus, the use of certain drugs in the perioperative period are predictive factors to be considered, since they can inhibit motor and

sensory reflexes, compromising complete eyelid closure and decreased tear production by the lacrimal glands. Examples of these drugs are: sedatives, general anesthetics, hypnotics, muscle blockers, antihistamines, anticholinergics, antidepressants, and diuretics[4,6].

Eye care can often be postponed or unnoticed by the multiprofessional team in these settings, since there is technical prioritization focused on the debilitated organ[3]. Given the elucidation of the problem involving eye dryness in the surgical center and PACU, this study aims to evaluate the clinical predictors for ocular dryness and the nursing diagnosis (ND) Risk of ocular dryness in postoperative patients in the Post-Anesthetic Recovery Unit.

Method

This is an observational, descriptive, analytical, cross-sectional study with quantitative approach, conducted in the Operatin Room (OR) and Post-Anesthesia Care Unit (PACU) of a university hospital in northeastern Brazil, from May to August 2017. Its design was guided by the instrument for observational studies Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)[7].

The population comprised adult patients undergoing elective surgical procedures. Patients who were in the preoperative reception room for elective surgery, aged 18 years or older and cared for postoperatively by the PACU were included in the study. The excluded patients were those in isolation, since they did not pass through the reception room; those who underwent head, neck and thoracic region surgeries with bronchoscopy, since they were performed in areas near the ocular region; and the patients submitted to cardiac surgery, since the immediate postoperative period was in the Intensive Care Unit.

Previously, a pilot study was carried out with 30 patients in order to adjust the data collection instrument and find the expected proportion of individuals with the outcomes for the sample calculation. After the pilot study, the sample was calculated using the formula of infinite populations ($n=Z\alpha^2.P.(1-P)/e^2$). A confidence coefficient ($Z\alpha$) of 95%, a sampling error (e) of 3%, and an expected proportion (p) of 92% were considered. Thus, a final sample of 157 patients (314 eyes) was obtained. The participants were selected by consecutive sampling and intentionally[8].

Data collection was conducted through primary and secondary sources. The first, through direct observation of the patient; and the second through consultation of medical records. This study was carried out in the immediate postoperative period; however, it was necessary to collect some variables in the immediate preoperative period and in the transoperative period.

In the immediate preoperative period epidemiological and clinical data and the subjective risk factors for the NANDA-I ND Risk of dry eye were collected, since in the immediate postoperative period the patient would not be able to respond due to the effects of anesthetics and sedatives. In the transoperative period, environmental factors of the operating room (temperature and humidity), hemodynamic data, positioning of the patient, time of surgery, use of ventilatory devices/oxygen therapy, exposure of the eyeball, use of products/medicines for eye protection in the transoperative period, and types of anesthetics and drugs used were collected. In the immediate postoperative period (first 24 hours after the end of the surgical procedure) in the PACU, the Aldrete and Kroulik scale was applied, the clinical data of ocular evaluation considered predictors for eye dryness (corneal-palpebral reflex, Eye movement, Pupillary assessment, Blink reflex assessment/min, Lakeophthalmia, Eye hyperemia, Mucous secretion, Eyelid edema, Conjunctival chemosis, Conjunctival hemorrhage, Proptosis, Excessive tearing) and the Schirmer I test were evaluated. In addition, the presence of the objective risk factors of the ED Risk of dry eye were evaluated.

It is noteworthy that all elements clinically assessed as risk factors and/or predictors for the outcomes emerged from previous studies of the researchers, based on other research on the subject, as well as the elements indicated by the NANDA-I taxonomy were included. The instrument was

then validated in the population of this research through a pilot study previously conducted.

For data collection, a team with final-year nursing undergraduate students and nurses from the *Núcleo de Estudos em Processo de Enfermagem e Classificações* (NEPEC) – Center for Nursing Process and Classification Studies – of the *Universidade Federal do Rio Grande do Norte* (UFRN) was selected and trained for clinical assessment and application of the collection instrument.

The training lasted eight hours with theoretical and practical content about anatomy and physiology of the eye, semiotechnics for physical examination and nursing classification systems. In addition, the data collection instrument was made available for discussion of the variables, in order to reduce measurement bias, and application of the volumetry test (Schirmer I). A theoretical-practical evaluation with a maximum value of ten points was performed, and the participants who scored above seven were eligible to participate in the data collection. Two nurse diagnosticians from the NEPEC research group of UFRN were selected to analyze the data collected from each patient in the postoperative period, which were tabulated in a spreadsheet and sent to the nurse diagnosticians for evaluation of the presence of outcomes (ocular dryness and/or nursing diagnosis Risk of ocular dryness).

To infer dry eye it was considered an adaptation of the recommendations of the II Dry Eye Workshop – DEWS II. Thus, patients who presented Schirmer I test below ten millimeters associated with one or more positive clinical signs (hyperemia and/or mucous secretion) were evaluated with this outcome. The nursing diagnostic inference was standardized by pattern recognition [2,9].

The inclusion criteria for the participation of diagnostic nurses were: scientific production and clinical experience related to eye dryness and/or dry eye and research involving nursing classification systems and the theme involved. In case of disagreement among diagnosticians, this was solved by consensus.

The Statistical Package for Social Science (SPSS) version 22.0 software was used for the statistical analysis of the data, in which the absolute and relative frequencies, measures of the center of the distribution and their variability were measured. The Kolmogorov-Smirnov test was used to verify the normality of the data. The Chi-square test was used to analyze the associative variables, and when the expected frequency values were less than five, Fisher's test was used. To verify the magnitude of the association, the Prevalence Ratio (PR) and 95% Confidence Interval (CI) were used.

This study obtained a favorable opinion from the Research Ethics Committee of the *Universidade Federal do Rio Grande do Norte* with n. 2.004.545 and Certificate of Ethical Appreciation Submission (CEAS) n. 64881717.5.0000.5537. Patients were informed of the research objectives in the immediate preoperative period and invited to participate voluntarily and anonymously. In case of acceptance, they were asked to sign the Informed Consent Form. The determinations of Resolution No. 466/2012 of the National Health Council of the Brazilian Ministry of Health were followed. The bioethical principles of beneficence, non-maleficence, justice, and autonomy were obligatorily observed. Furthermore, benefits were maximized and harms were minimized[10].

Results

Of the 157 patients, most were male (52.23%), with a mean age of 48.90 years (±15.98), 60.51% lived with a partner, 56.05% were born in the interior of the state, and 49.68% lived in the capital. As for schooling, the survey participants studied a median of 11.00 years and regarding religion, 66.88% were Catholic. 54.78% of the participants worked and had a median family income of 1.00 minimum wage and 3.00 family dependents.

Regarding the main surgical specialties, the most frequent were gastrointestinal (43.31%) and urological/renal (28.66%). Gastrointestinal (42.68%) and urological/renal disorder (33.12%) stood out as the main reasons for patient admissions. Hypertension (38.22%) was the main

type of associated comorbidity, followed by Diabetes Mellitus (15.92%). Most patients came from the outpatient sector (53.50%), followed by the surgical clinic (31.21%) and the medical clinic (15.29%).

The great majority of patients (99.36%) stayed in places with air conditioning in the transoperative period and 91.75% with exposure to artificial light. As for patient positioning, the dorsal decubitus (59.87%) and the lithotomic position (24.20%) stood out. As for ventilatory devices/oxygen therapy, 54.14% used invasive mechanical ventilation and 45.86% used a device for oxygen therapy (spectacle-type nasal catheter). Of those who used invasive mechanical ventilation, 82.17% used the volume controlled mode and 17.86% the pressure controlled mode.

The average humidity in the operating room was 63.11% (±4.24), and the average temperature was 24.88ºC (±1.58). The surgical procedure lasted an average of 122.89 (±91.72) minutes. Regarding the medications used by patients in the transoperative period, the following were noteworthy: analgesics (77.71%), antibiotics (77.07%), antiemetics (70.70%), opioids (70.70%), corticosteroids (63.06%), anti-inflammatories (47.77%), gastric secretion inhibitors/ protectors (46.50%), myorelaxants (43.68%) and anticholinergics (36.94%). Regarding the type of anesthesia, general anesthesia was used in 49.68% of patients, followed by spinal (24.84%), local (15.29%), and epidural (10.19%). It is noteworthy that of the patients who used spinal anesthesia, seven evolved to general anesthesia, corresponding to 4.46% of the total sample.

In the PACU, the verified humidity obtained an average of 64.18% (±4.21) and temperature of 24.40 ºC (±1.38). In the evaluation of the patient by the Aldrete and Kroulik scale, the mean score was 9.39 (±0.90) points. In the eye evaluation in the immediate postoperative period in the PACU, 98.73% of the patients presented preserved corneopalpebral reflex. In the test of cranial nerve pairs (CN) III, IV and VI, 89.81% showed preserved reflex for CN III, and 91.72% for CN IV and VI. The number of blinks was less than five times per minute in 55.41% patients, more than five times per minute in 42.04%, and five times per minute in 2.55%. In the evaluation of eyeball exposure in the right eye, the following results were obtained: 1/2 of the cornea exposed (0.64%), 1/3 of the cornea exposed (5.10%), exposed conjunctiva (1.90%), and complete eyelid closure (92.36%). In the left eye, 1/2 of the cornea exposed (0.64%), 1/3 of the cornea exposed (4.46%), exposed conjunctiva (2.54%), and eyelid closure (92.36%) were obtained.

In the other evaluations of the ocular surface for each eye, a higher prevalence of hyperemia (97.45%) was observed in both eyes, followed by chemosis in the right eye (RE) (21.66%) and in the left eye (LE) (22.93%), The Schirmer's test showed a median-median of 3.18% (RE) and 2.55% (LE), mucous secretion in the right eye (3.18%) and in the right eye (2.55%), and proptosis (1.91%) in both eyes. The Schirmer test had a median of 4.0 mm in the right eye and 3.0 mm in the left eye. The tear volume evaluated by Schirmer's test and classified as insufficient (< 10 mm) showed a percentage of 84.71% in the right eye and 84.08% in the left eye. In a general analysis, 91.08% of patients had insufficient Schirmer's test results.

As for the inference of outcomes, the clinical diagnosis of eye dryness prevailed in 85.35% of patients, while the nursing diagnosis Risk of dry eye was present in 14.65% of patients. Table 1 describes the relationships between the ocular assessments and the clinical diagnosis of eye dryness in RE.

Table 1 – Relation between eye assessments and the clinical diagnosis of eye dryness in the right eye. Natal, Rio Grande do Norte, Brazil – 2020. (N=157)

Variables	Dry eye in the right eye		Total	*p-value*	PR [IC95%]
	Yes	No			
	%(n)	%(n)	%(n)		
Blink Reflection (times/min)					
< 5	78.16(68)	21.84(19)	100.00(87)		
=5	100.00(4)	-	100.00(4)	0.562(1)	-
> 5	77.27(51)	22.73(15)	100.00(66)		
Lagophthalmos					
Yes	66.67(8)	33.33(4)	100.00(12)	0.292(2)	0.84 [0.56 ; 1.26]
No	79.31(115)	20.69(30)	100.00(145)		
Hyperemia					
Yes	79.74(122)	2.26(31)	100.00(153)	0.032(2)	3.19 [1.58 ; 7.44]
No	25.00(1)	75.00(3)	100.00(4)		
Mucous Secretion					
Yes	80.00(4)	20.009(1)	100.00(5)	1.000(2)	1.02 [0.65 ; 1.60]
No	78.29(119)	21.71(33)	100.00(152)		
Eyelid Edema					
Yes	87.50(28)	12.50(4)	100.00(32)	0.159(1)	1.15 [0.98 ; 1.36]
No	76.00(95)	24.00(30)	100.00 (125)		
Conjunctival chemosis					
Yes	84.21(32)	15.79(6)	100.00(38)	0.313(1)	1.10 [0.93 ; 1.30]
No	76.47(91)	23.53(28)	100.00(119)		
Proptosis					
Yes	100.00 (3)	-	100.00 (3)	1.000(2)	1.28 [1.00 ; 1.39]
No	77.92(120)	22.08(34)	100.00(154)		
Excessive tearing					
Yes	33.33(2)	66.67(4)	100.00(6)	0.020(2)	0.42 [0.13 ; 0.99]
No	80.13(121)	19.87(30)	100.00(151)		
Insufficient Schirmer Test (<10 mm)					
Yes	84.62(121)	15.38(22)	100.00(143)	< 0.001(2)	5.92 [1.64 ; 1.41]
No	14.29(2)	85.71(12)	100.00 (14)		

Source: Created by the authors.

Note: Conventional sign used:

- Numeric data equal to zero not resulting from rounding.

(1) Pearson's chi-square test;

(2) Fisher's Exact Exact; PR - Prevalence Ratio; CI - Confidence Interval.

In the eye evaluation with the diagnosis of ocular dryness in the RE, for a significance level of 5%, there is evidence of statistical difference between the diagnosis of dry eye in the RE with hyperemia, excessive tearing and insufficient Schirmer test. The prevalence ratio was found to be 3.19 times higher in the presence of hyperemia, 58% lower in the presence of

excessive tearing, and 5.92 times higher in the presence of insufficient Schirmer test results when compared to those who did not have these characteristics. Table 2 describes the relations between the ocular evaluations and the clinical diagnosis of dry eye in LE.

Table 2 – Relation between ocular assessments and the clinical diagnosis of eye dryness in the left eye. Natal, Rio Grande do Norte, Brazil – 2020. (N=157).

Variables	Left eye dryness		Total	*p-value*	PR [CI95%]
	Yes	No			
	%(n)	%(n)	%(n)		
Blink Reflection (times/min)					
< 5	80.46(70)	19.54(17)	100.00(87)	0.290(1)	-
=5	100.00(4)	-	100.00(4)		
> 5	72.73(48)	27.27(18)	100.00(66)		
Lagophthal mos					
Yes	50.00(6)	50.00(6)	100.00(12)	0.027(2)	0.62 [0.35 ; 1.11]
No	80.00(116)	20.00(29)	100.00(145)		
Hyperemia					
Yes	79.74(122)	20.26(31)	100.00(153)	0.002(2)	-
No	25.00(1)	75.00(3)	100.00(4)		
Mucous Secretion					
Yes	80.00(4)	20.00(1)	100.00(5)	1.000(2)	1.03 [0.66 ; 1.61]
No	77.63(118)	22.37(34)	100.00(152)		
Eyelid Edema					
Yes	81.25(26)	18.75(6)	100.00(32)	0.589(1)	1.06 [0.87 ; 1.28]
No	76.80(96)	23.20(29)	100.00(125)		
Conjunctival chemosis					
Yes	78.95(30)	21.05(8)	100.00(38)	0.833(1)	1.02 [0.84 ; 1.24]
No	77.31(92)	22.69(27)	100.00(119)		
Proptosis					
Yes	66.67%(2)	33.33(1)	100.00(3)	0.533(2)	0.86 [0.38 ; 1.91]
No	77.92(120)	22.08(34)	100.00(154)		
Excessive tearing					
Yes	50.00(3)	50.00(3)	100,00(6)	0,125(2)	0,63 [0,28 ; 1,42]
No	78.81(119)	21.19(32)	100,00(151)		
Insufficient Schirmer Test (<10 mm)					
Yes	83,92(120)	16,08(23)	100,00(143)	<0,001(2)	5,87 [1,62 ; 21,23]
No	14,29(2)	85,71(12)	100,00(14)		

Source: Created by the authors.

Note: Conventional sign used:

- Numeric data equal to zero not resulting from rounding.

(1) Pearson's chi-square test;

(2) Fisher's Exact Exact; PR - Prevalence Ratio; CI - Confidence Interval.

With regard to eye evaluation with the diagnosis of eye resection in the LE, for a significance level of 5%, a statistically significant difference was found between the diagnosis of eye resection in the LE with hyperemia, lagophthalmos, and insufficient Schirmer I test.

According to the evaluation of the prevalence ratio, it was not possible to estimate the magnitude of the association with lagophthalmos because the confidence interval exceeded the value one, nor with hyperemia because it presented a cell in the cross-reference table with the value zero. The occurrence of ocular dryness in the LE was 5.87 times higher in the presence of insufficiency in the Schirmer I test when compared to those who did not show these characteristics. Table 3 describes the relationships between the eye evaluations and the nursing diagnosis Risk of eye dry.

Table 3 – Relations between ocular assessments and nursing diagnosis Risk of eye dryness. Natal, Rio Grande do Norte, Brazil – 2020. (N= 157)

Variables	Nursing Diagnosis Risk of Eye Dryness		Total	*p-value*	PR [CI95%]
	Yes	No			
	%(n)	%(n)	%(n)		
Blink Reflection (times/min)					
< 5	14.94(13)	85.06(74)	100.00(87)		
=5	-	100.00(4)	100.00(4)	0.703 (1)	-
> 5	15.15(10)	84.85(56)	100.00(66)		
Lagophthalmos					
Yes	33.33(4)	66.67(8)	100.00(12)	0.078 (2)	2.54 [1.00 ; 6.28]
No	13.10 (19)	86.90(126)	100.00(145)		
Hyperemia					
Yes	13.07(20)	86.93(133)	100.00(153)	0.010 (2)	0.17 [0.87 ; 0.35]
No	75.00% (3)	25.00(1)	100.00(4)		
Mucous Secretion					
Yes	20.00(1)	80.00(4)	100.00(5)	0.552 (2)	1.38 [0.23 ; 8.32]
No	14.47(22)	85.53(130)	100.00(152)		
Eyelid Edema					
Yes	9.38(3)	90.63(29)	100.00(32)	0.416 (2)	0.59 [0.19 ; 1.85]
No	16.00(20)	84.00(105)	100.00%(125)		
Conjunctival chemosis					
Yes	10.53(4)	89.47(34)	100.00(38)	0.409 (1)	0.66 [0.24 ; 1.82]
No	15.97(19)	84.03(100)	100.00(119)		
Proptosis					
Yes	-	100.00(n=3)	100.00(n=3)	1.000 (2)	-
No	14.94(23)	85.06(n=131)	100.00(n=154)		
Excessive tearing					
Yes	50.00(3)	50.00(3)	100.00(6)	0.041 (2)	3.77 [1.54 ; 9.27]
No	13.25(20)	86.75(131)	100.00(151)		
Insufficient Schirmer Test (<10 mm)					
Yes	7.69(11)	92.31(132)	100.00(143)	< 0.001 (2)	0.09 [0.05 ; 0.16]
No	85.71(12)	14.29(2)	100.00(14)		

Source: Elaborated by the author.

Note: Conventional signal used:

- Numeric data equal to zero not resulting from rounding.

(1) Pearson's chi-square test;

(2) Fisher's Exact; PR Prevalence Ratio; CI Confidence Interval.

Regarding the ocular evaluation with the nursing diagnosis Risk of dry eye, for a significance level of 5%, there was evidence of statistical difference between the nursing diagnosis Risk of dry eye with hyperemia, excessive tearing and insufficient Schirmer test. Regarding the prevalence ratio assessment, the occurrence of the nursing diagnosis Risk of dry eye was 83% lower in the presence of hyperemia, 3.77 times higher in the presence of excessive tearing, and 91% lower in the presence of insufficient Schirmer's test.

The NANDA-I risk factors for the nursing diagnosis under study that were present in patients in the immediate postoperative period, considering the subjective and objective data collected, were: air conditioning (99.36%), caffeine intake (78.98%), smoking (9.55%) and prolonged reading (4.46%). Regarding the at-risk populations described in the taxonomy, female gender (47.77%), aging (29.30%), history of allergy (16.56%), and contact lens wearers (5.10%) were present. According to the associated conditions, mechanical ventilation was the most frequent in 54.14% of patients, the treatment regimen considering the immediate postoperative period was present in 28.03%, neurological injury with reflex sensory and motor loss (lagophthalmos and/or lack of blink reflex) in 7.64% and autoimmune disease in 1.27%.

Discussion

The process of clinical reasoning and the inference of a diagnosis begin through the influence and relationship between its supposed etiological factors, defined as clinical antecedents that interact with the individual, affecting physiological responses. Therefore, the combination of etiological factors articulates and modulates the clinical aspect, so that they indicate a proper situation and point to a clinical situation[5]. The main finding of the current study was the presence of the clinical diagnosis of dry eye in most of the sample, highlighting especially the greater predisposition to susceptibility to the occurrence of the nursing diagnosis risk of dry eye. This fact corroborates another research, in which a 47.6% prevalence was described for Risk of ocular dryness, while most of the findings (52.4%) manifest the existence of dry eye[2].

Regarding the demographic characteristics presented here, it was verified in the sample that there is no relevant relationship between the variables and the proposed outcome. Therefore, the differentiation of sex, education, religion, family income, and region of origin suggest that they are independent of the development of ED. Regarding the gender variable, in opposition to this study, a cohort study that aimed to validate the nursing diagnosis Dry eye risk in patients admitted to an intensive care unit found that most participants were female[11]. Regarding the social profile of the samples, other studies in hospital settings showed a majority with elementary school education, practicing some religion, with an income of one minimum wage and coming from the interior of the state. Both studies corroborate the present study, and do not present a significant relation between social variables and the presence of risk of dry eye[2-3].

In the present study, the sample mostly obtained gastrointestinal surgeries as the most prevalent among surgical specialties, as well as the main reason for hospital admissions. In a descriptive survey, the prevalence of abdominal surgeries was 17.6%, while the cause of hospitalization was only 5.6%, being exceeded by postoperative (50.0%) and cardiac disorders (23,1%)[4]. The occurrence of a higher prevalence of gastrointestinal surgeries leads to the hypothesis that the surgical procedure may be a clinical predictor for the incidence of ocular dryness; a first reason is because it provides the opportunity for volume reduction, which favors a decrease in tear film production, and the second reason is characterized by the use of general anesthetics, found in most participants.

General anesthetics cause depression of the central nervous system, inhibiting sensory and motor reflexes. Related to this fact, there is a decrease in the blink reflex and consequent lacrimal production, which makes complete eyelid closure impossible. Invasive mechanical

ventilation minimizes venous return and benefits fluid absorption in the connective tissue. The excess volume may motivate conjunctival membrane infiltration with consequent edema generation, while establishing incomplete eyelid closure (lagophthalmos)[12].

Lagophthalmos is defined as a predisposing factor for the occurrence of diseases in the eye region, especially dry eye. Thus, this incomplete closure of the eyelid comes from the decrease in the tone of the orbicular muscle, causing the exposure of this surface and an increase in the evaporation of the tear film, which converges to its instability and the promotion of dry eye[12].

In this study, given the high prevalence rate among the others, four classes of drugs used in the transoperative period were frequent, namely: analgesics, opioids, antiemetics, and antibiotics. In another study, carried out with patients in an Intensive Care Unit, the same drugs, with the exception of antiemetics replaced by vasodilators, were related with statistical significance in the incidence of dry eye. Therefore, it was observed that the use of antibiotics and opioids had a higher risk for this outcome. It also adds vasodilators as a protective factor to the patients who used them, with an 81% decrease in the risk of ocular dryness. This fact may be justified by the vasodilator action of the parasympathetic system with the release of acetylcholine when stimulating salivation and tear secretion[11].

The ND, added to NANDA-I, Ineffective self-management of dry eye (00277), exposes the signs and symptoms of dry eye in its defining characteristics, such as low production of the aqueous component of the tear film, filamentary keratitis, conjunctival hyperemia mucosal plaques, chemosis, blurred vision, eye fatigue, burning sensation in the eyes, sensation of dryness of the eye, and as a risk population, individuals in prolonged hospitalization or with a history of ineffective self-management of health and older people[5].

The findings of this study together with the critical reasoning and clinical judgment, supported the link with what is recommended by the taxonomy and the predisposing factors for the progression of the eye dry risk and consequent dry resection. Among the linking variables were: surgical specialty, general anesthetic, mechanical ventilation and drug regimen. Attention should be paid to the fact that the risk population determined by NANDA-I as female, in the current research there was no interference in this aspect, since most of the sample was male and therefore has no relevance that can be statistically proven. It is also highlighted that in the introductory phase of the tear film insufficiency, the appearance of eye signs and symptoms may be accentuated, such as hyperemia, decrease in tear volume, mucous secretion, blurred vision, burning, pruritus and fatigue, all of which have the ability to modify ocular integrity and thus potentiate the aggravation of this phenomenon[11,13].

Another study shows eye hyperemia and mucous secretion to be statistically significant indicators of dry eye, with a corresponding risk of 18.37 and 12.00 times higher than in participants who did not have these signs[11]. The amplification of vessels in this region due to a stimulating factor, such as irritation of the ocular surface by reduction of the lacrimal quantity, originates hyperemia and is capable of progressing to subconjunctival hemorrhage[14]. Therefore, statistically it can be considered that the appearance of this phenomenon is associated with the occurrence of ocular dryness, and the use of this variable is justified for the inference of the outcome of this study.

Patients who remain for periods exposed in places with air conditioning are susceptible to the appearance of blurred vision, a fact that may precede drying of the eye. Among the clinical manifestations presented by the patient in this context is the foreign body sensation, hyperemia, burning, and excessive tearing[14]. Therefore, statistically it can be considered that the appearance of this phenomenon is associated with the occurrence of dry eye, and the use of this variable is justified for the inference of the outcome of this study.

In this study, there was statistical significance with excessive tearing as a clinical sign of dry eye in the right eye. However, the presence of the outcome was 58% lower in the presence of excessive tearing, which may be related to the low frequency of patients with this sign in the right eye (3.18%). Moreover, it should be noted that the appearance of excessive tearing in dry eye is a reflex response[1]. Therefore, although this variable is a protective factor for dry eye, this finding diverges from the scientific literature[1]. Therefore, although this variable is presented as a protective factor for dry eye, this finding diverges from the scientific literature.

The Schirmer I test verifies the presence of dry eye, since the insufficient volume is closely connected to the presence of the phenomenon. The volumetry test indicates the decrease in tear production due to hyposecretion of the lacrimal gland, as well as by increased evaporation, contributing to the instability of the tear film and consequent dry eye by associating it with a clinical sign or symptom[15].

In this study, the insufficient test showed a relationship with both dry eye in the right and left eye and risk diagnosis. Individuals with an insufficient Schirmer's test score were 5.92 RE and 5.87 LE more likely to have dry eye than patients with a normal Schirmer's test score. The patients with ND risk of dry eye and insufficient Schirmer's test had 91% lower occurrence of the outcome. Decreased tear volume according to the Schimer's test is an important clinical sign of dry eye[5]. The high number of individuals with insufficient Schirmer's test, together with the higher frequency of participants with hyperemia, may be responsible for the higher prevalence (85.35%) of dry eye, when compared to the ND risk of ocular dryness (14.65%). For this reason, the presence of these clinical signs predisposes to a higher occurrence of the clinical outcome of dry eye.

As a limitation of this study, some risk factors were not evaluated in accordance with the new edition of NANDA-I, because the data were collected in a period prior to its publication. At the same time, other elements of the diagnosis could not be considered because they did not correspond to particular responses of the sample in this study, such as history of allergies, vitamin A deficiency, use of contact lenses, autoimmune diseases, and leukocytosis. Multicenter studies in a variety of populations and settings are proposed to clarify and compare each scenario where the outcome of dry eye is present.

This study is relevant because it exposes the need for early identification of clinical predictors for ocular dryness in patients in the immediate postoperative period, to support preventive measures in this population. In addition, this study may promote clinical results for comparison with other studies and to increase the NANDA-I body of evidence on this diagnostic focus.

Conclusion

The results presented point out that the prevalence of dry eye was higher when compared to the Nursing Diagnosis Risk of dry eye in patients in the immediate postoperative period in the Post-Anesthesia Care Unit. The most prevalent risk factors were air-conditioning, caffeine intake and smoking. As for clinical data of the ocular evaluation, hyperemia, chemosis and eyelid edema stood out. The number of blinks was less than five times per minute in both eyes, and the Schirmer test was less than ten millimeters in most patients.

Understanding the clinical and sociodemographic characteristics of patients with dry eye has practical implications to provide evidence for nurses' diagnostic inference and allow planning of nursing care aimed at prevention and promotion of eye diseases. The associative analysis highlights that hyperemia, excessive tearing and insufficient Schirmer test I are relevant clinical predictors to be evaluated in the perioperative period to promote preventive measures and/or early detection of dry eye.

Collaborations:

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2 – Analysis and interpretation of data: Raianny Alves Costa Medeiros, Jéssica Naiara de Medeiros Araújo, Ana Paula Nunes de Lima Fernandes, Bárbara Ebilizarda Coutinho Borges, Cyntia Leenara Bezerra da Silva, Marcos Antonio Ferreira Júnior and Allyne Fortes Vitor;

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Conflicts of interest:

There are no conflicts of interest.

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